

**Statistics
on
Information Technology
in
New Zealand**

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1. Introduction

This is the fifth annual release of the Ministry of Commerce's Information Technology Statistics paper. It follows a special update release in October 1997 which was produced to incorporate newly released data from the 1996 Census. This paper includes:

- updated figures for IT hardware imports and exports;
- updated figures for trade in software and services and the size of the New Zealand information technology (IT) market;
- updated and revised figures for employment in segments of the IT industry;
- updated figures on the size of the Internet in New Zealand; and
- updated figures on the number of World Wide Web sites.

Also included are figures initially published in the special update from October last year for:

- those employed in the IT industry;
- those employed in the IT industry by occupation, skill level, age, sex and ethnicity;
- the number of computers in homes;
- the number of computers in New Zealand schools; and
- the number of Internet connections in schools and the number of schools that intend to connect to the Internet.

This paper is also available through the Internet. The address is given on page 42

1.1 Acknowledgements

The majority of the figures in this paper have been sourced from Statistics New Zealand. Other sources are credited specifically where they have been used. Some of the figures are taken from a survey of IT businesses conducted by Statistics New Zealand and jointly sponsored by the Ministry of Commerce, the Information Technology Association of New Zealand, Tradenz and Statistics New Zealand.

1.2 Defining Information Technology

As well as the traditional data processing industries, telecommunications and broadcasting are shown in many of the figures in this paper. This reflects the fact that these industries process information using technological means, and the increasingly blurred distinctions between these sectors.

2. Imports and Exports

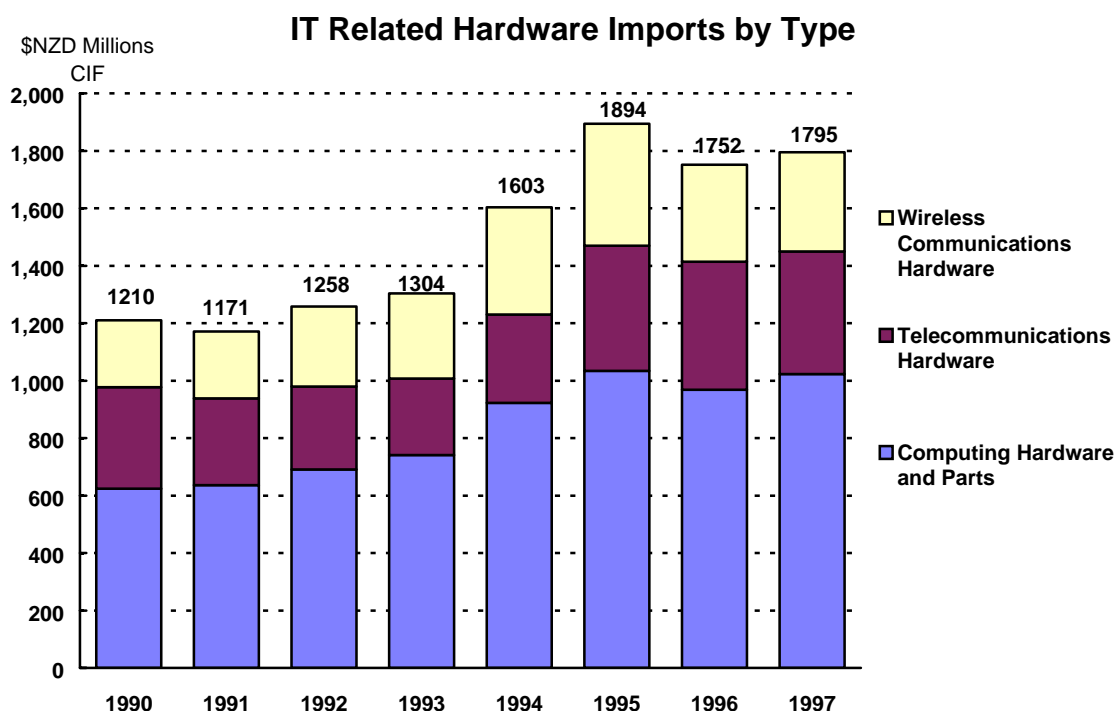
IT hardware imports and exports are given under three categories: *Computer Hardware and Parts*, *Telecommunications Hardware*, and *Wireless Communications Hardware*.

The hardware import and export figures given here are measured at the border by the Customs Department as goods leave or enter the country. Calendar years are used in these figures.

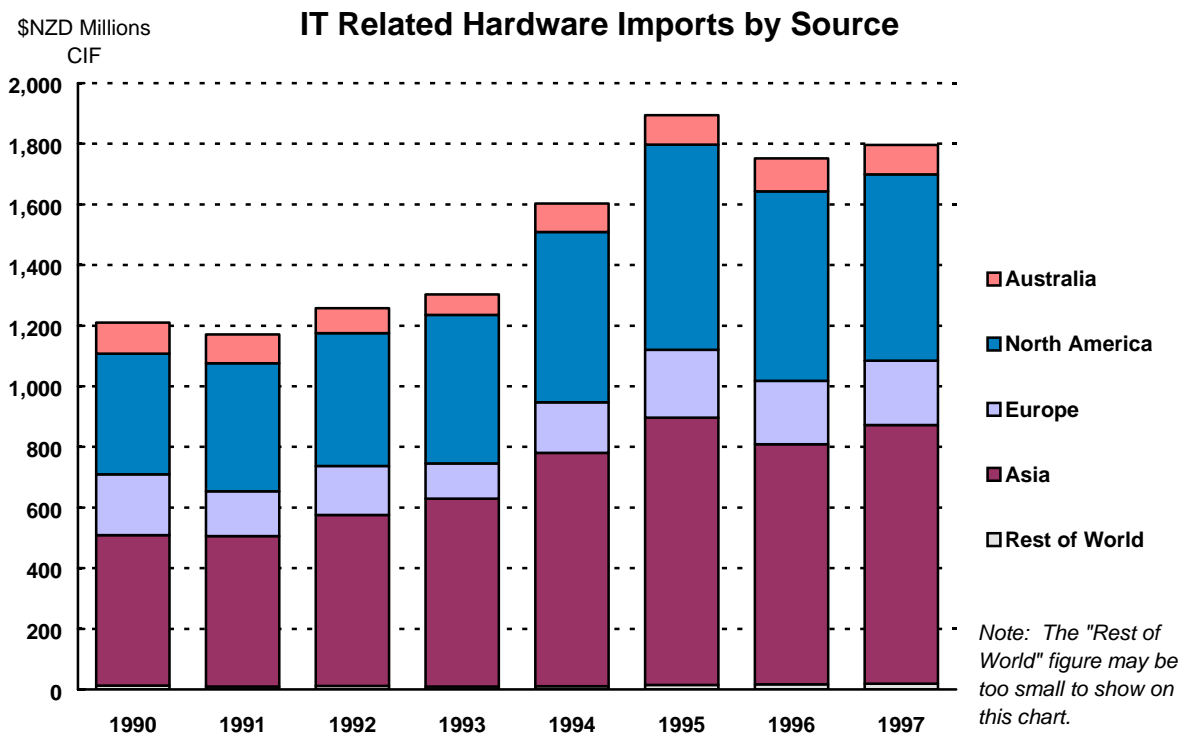
The Software and Services Export section uses a different methodology - a survey of businesses - so its results are not directly comparable with the hardware figures given below.

2.1 Hardware Imports

The following chart shows a summary of New Zealand IT hardware imports for the last eight calendar years. The 1997 year shows a slight increase in IT hardware imports from 1996 of 2%, following a decrease of 7% from 1995. This increase is due to increases in imports in the *Computer Hardware and Parts* and *Wireless Communications Hardware* categories. There was a small fall of imports in the *Telecommunications Hardware* category.

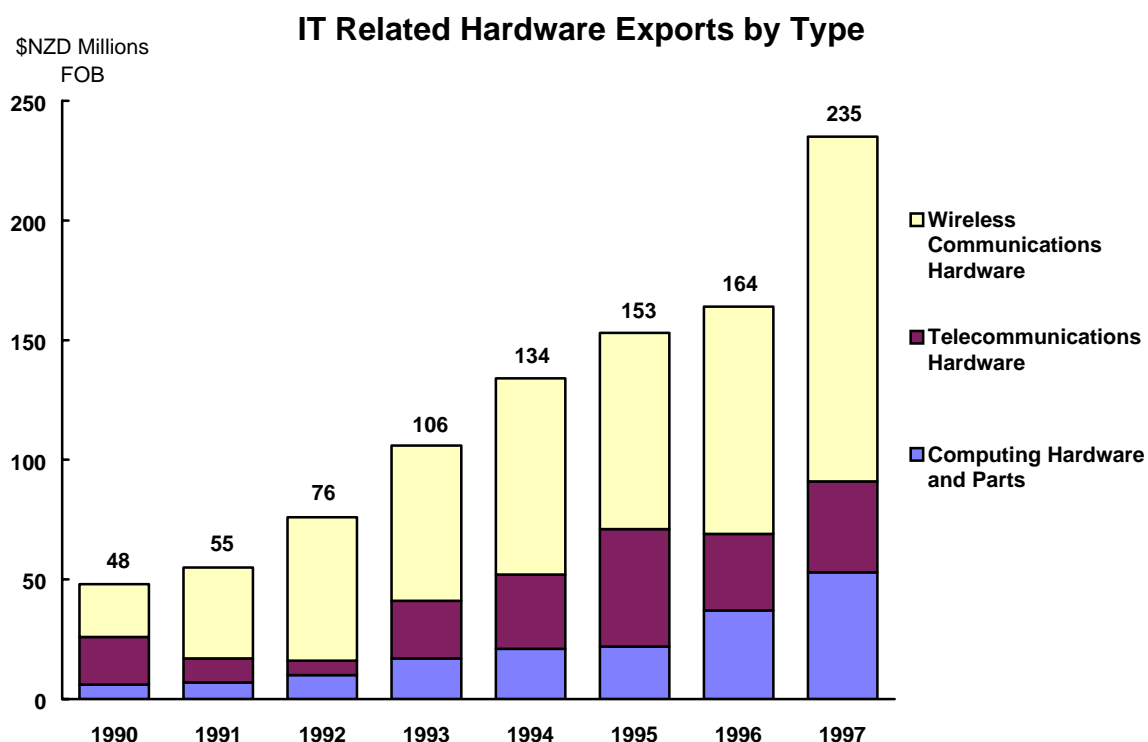


The information in the previous chart is shown again below split by source, showing that the bulk of IT hardware imports are sourced from Asia and North America. In the 1997 year there were declines in IT hardware imports from North America (by 2%) and Australia (by 11%), while imports from all other regions increased modestly. The biggest increase was an 8% increase in the value of imports from Asia, to \$853 million in 1997.



2.2 Hardware Exports

The following chart shows a summary of New Zealand IT hardware exports for the last eight calendar years.

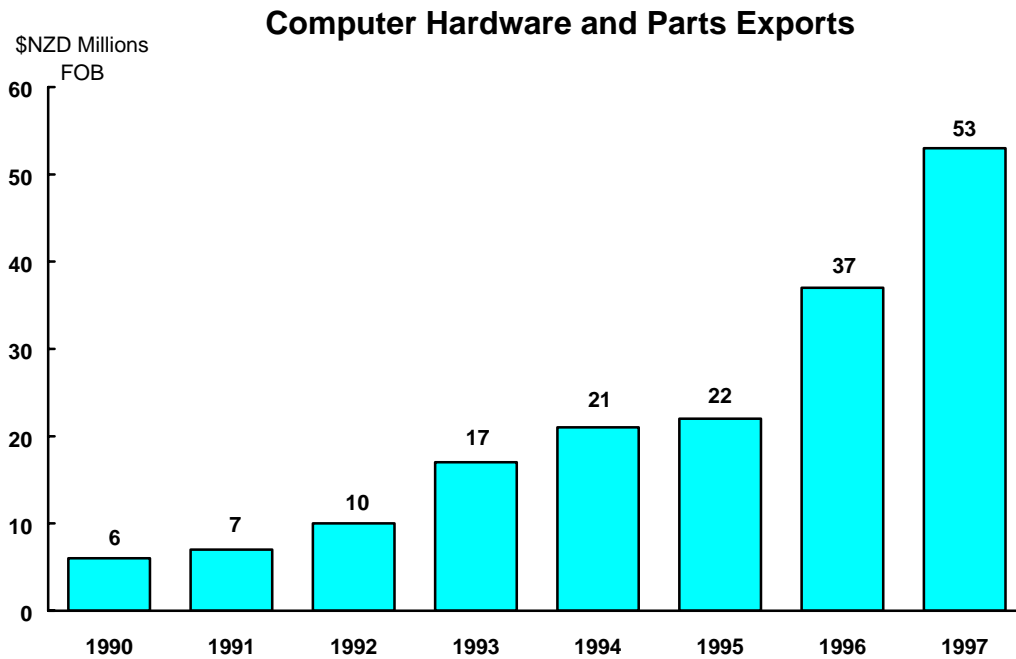


The chart shows that 1997 was a year of exceptionally strong growth for exports of IT hardware. IT hardware exports increased to \$235 million, a 43% increase over the 1996 total of \$164 million. This exceptional growth is mainly due to a 52% increase in the value of *Wireless Communications Hardware* exports following a 16% increase in value in this category in 1996, and a 43% increase in the value of the *Computer Hardware and Parts* category, which also follows an increase of 37% in 1996. The value of exports in the *Telecommunications Hardware* category has shown some volatility over time, but 1997 was marked by a 19% increase in the value of exports in this category. This follows a fall of 35% in value the year before.

While IT hardware exports have continued to grow over the last eight years, and have significantly expanded in the last year, IT hardware imports have also grown over the corresponding period and their value is still 7.5 times as large as the value of New Zealand's exports.

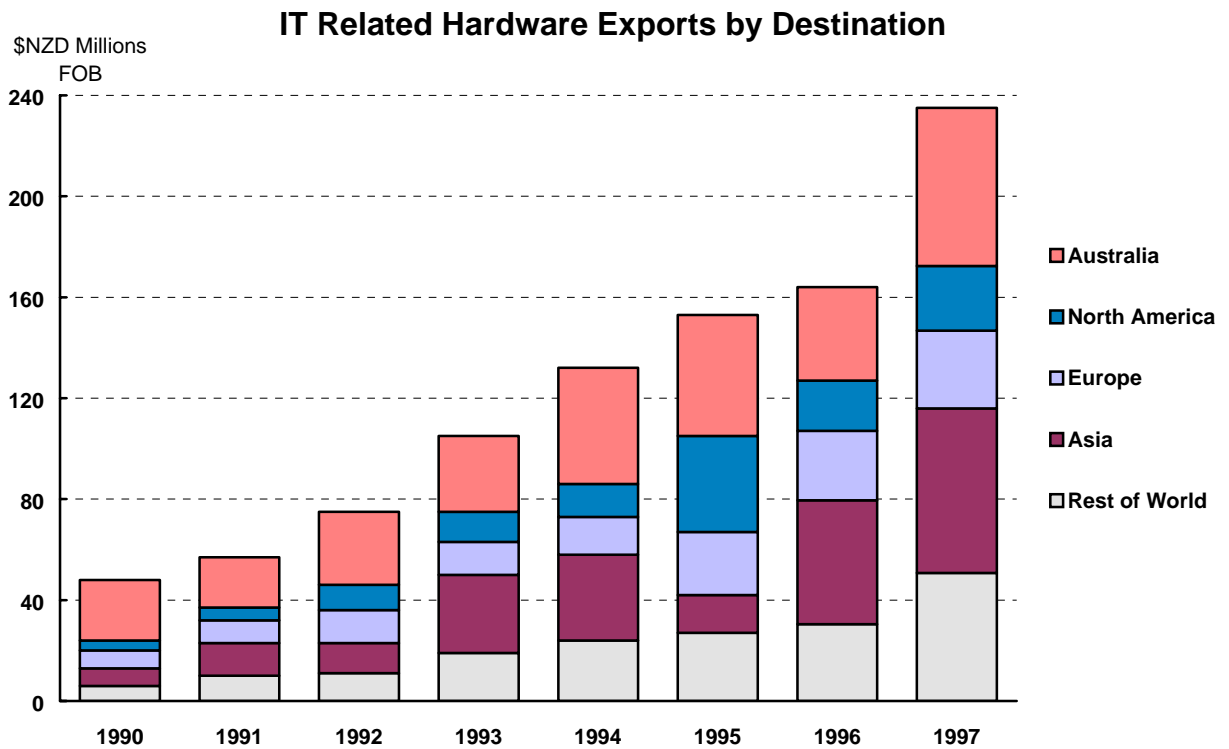
The growth in the value of IT exports suggests that New Zealand exporters, particularly of *Wireless Communications Hardware* goods are increasingly successful at finding and supplying overseas niche markets.

The previous chart refers to three categories of IT related hardware exports, the one below shows just the contribution of *Computer Hardware and Parts*:



Over the past two years there have been exceptional increases in the value of exports of *Computer Hardware and Parts*, so much so that the value in 1997 was well over double that recorded in 1995. The chart clearly shows these increases which were of the order of 68% in 1996 and 43% in 1997.

Below the total IT hardware exports are shown split by export destination.



The strong growth in 1997 is shown in the chart as being driven by growth in the value of exports to all five areas. Big increases were recorded in the value of exports to Australia (69%) to \$62.6 million, the Rest of the World (67%) to \$50.8 million and Asia (33%) to \$65.1 million. The last of these follows a sharp decline in exports to Asia in 1995 to just \$15 million and a bounce back in 1996 to \$49 million. The increases in the value of exports to Australia and North America (28% in 1997) were preceded by decreases in 1996 of 23% and 47% respectively.

2.3 Software and Services Exports

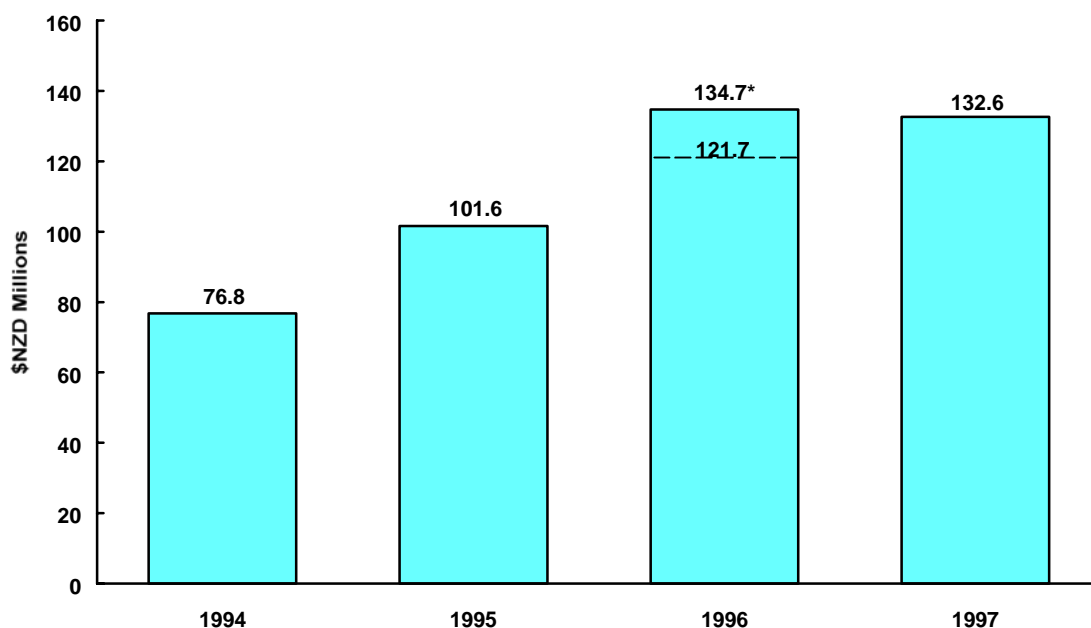
The information in this section is taken from a survey of IT businesses conducted by Statistics New Zealand. The survey, now in its fourth year, is sponsored by the Ministry of Commerce, the Information Technology Association of New Zealand (ITANZ), Tradenz, and Statistics New Zealand.

The survey asks all businesses for information as at their previous annual balance date, with a cut-off of 30 September each year. The average balance date in each sample might reasonably be assumed to be March.

The survey has two specific limitations. Firstly, it does not include “embedded software” ie software which is part of a hardware product such as a communications system or a washing machine. Secondly, it does not comprehensively cover non-IT businesses or IT businesses with 2 full time equivalent staff or less. Both of these limitations tend to cause the survey to underestimate the actual export figures.

Software and services have not been separated due to the difficulty of accounting for software maintenance revenue.

Software and Services Exports



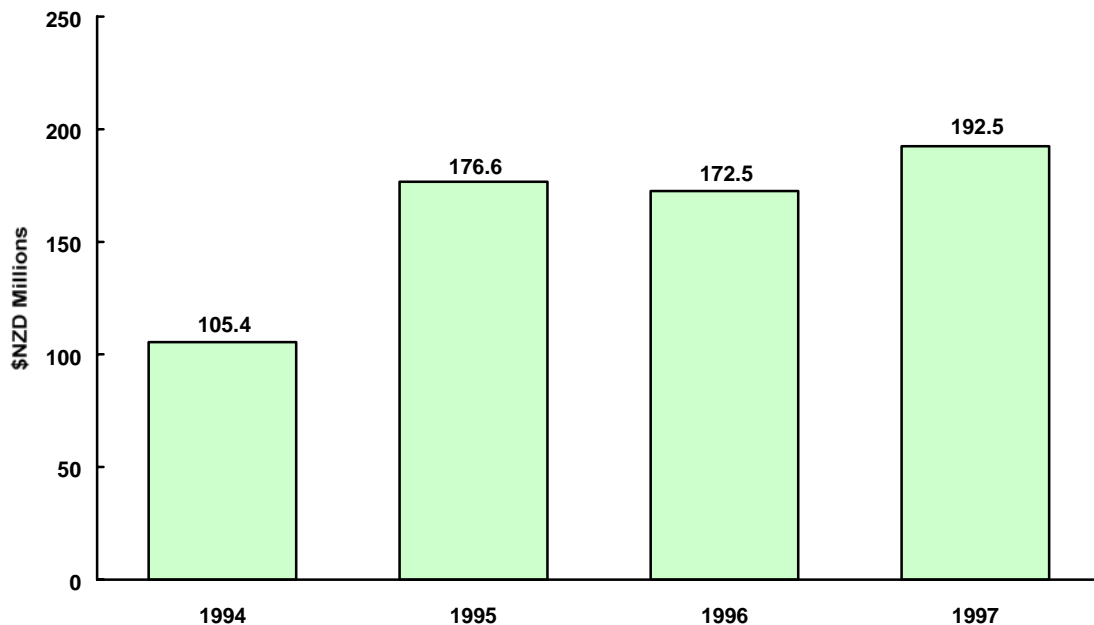
*The 1996 figure has been revised since first published in last year's report due to more accurate information becoming available as described below.

The survey found software and computer services exports of \$132.6 million in the 1997 financial year, a 1.6% decrease from the revised 1996 figure of \$134.7 million (the 1996 figure published last year was \$121.7 million).

The survey also finds the value of hardware exports was \$192.5 million for the 1997 financial year, up from \$172.5 million in 1996 and \$176.6 million in 1995. The following chart maps these figures.

Note, however, they are not directly comparable to the IT hardware export figures captured at the border and given earlier in this paper because of differences in the accounting year; the exclusion of export costs such as freight and insurance; and the aforementioned restriction of the survey to IT related firms with at least 2 staff members.

IT Hardware Exports

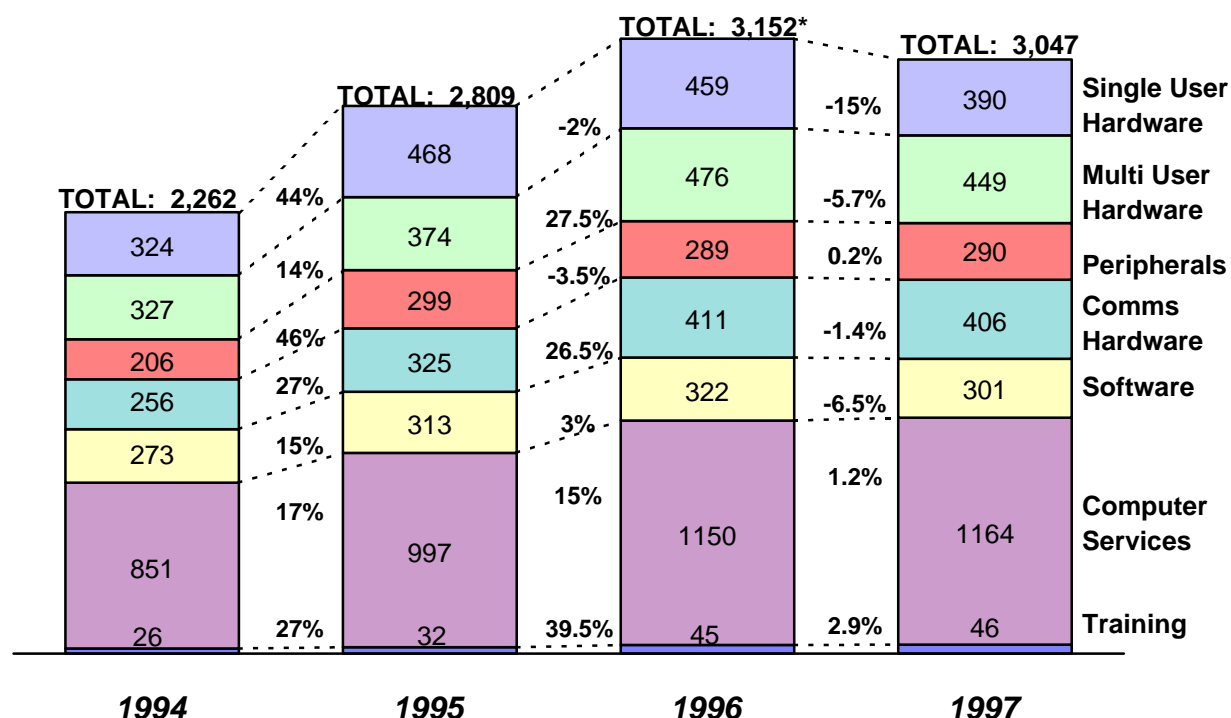


A number of revisions were made to the 1996 survey data when the 1997 data was presented as more accurate information has become available (a revision also occurred with the release of the 1996 survey to the 1995 data). In some cases, the original survey responses were inconsistent with company accounts and in others the revisions follow a re-classification of income by some firms. Additionally, improved information about non-respondent companies has become available. The data for non-respondent companies is imputed based upon the experience of similar responding firms at the time of the survey. These revisions make direct comparisons between the 1996 figures used in this paper with the figures published in last year's paper not possible.

3. New Zealand IT Market

The information in this section is taken from a survey of IT businesses conducted by Statistics New Zealand. For more information about the survey see the previous section, Software and Services Exports.

**New Zealand Computer Hardware, Software and Services Market
NZD millions**



* The 1996 figures include a number of revisions due to more accurate information becoming available as described in the previous section.

The figures used in the graph above represent goods and services sold to end users, and so do not double-count items which are sold by wholesalers and sold on by retailers.

The *Single User Hardware* category refers to complete computers intended for use by only one person at any one time and so mainly comprises desktop and laptop PCs and Macintoshes. *Multi User Hardware* refers to computers intended for use by many people at the same time and includes file servers, midrange systems and mainframes. Parts of computer systems (other than the CPU) when sold separately appear under *Peripherals*. The split between *Software* and *Computer Services* is unreliable because of the difficulty of accounting for software maintenance revenue.

Taking into account the revisions to the 1996 figures, sales in the New Zealand IT market fell by 3.4% in the 1997 financial year, following growth of 12.3% in 1996 and 24% in 1995. This was due to large falls in sales of *Single User Hardware*, (a 15% decrease), *Multi User Hardware*, (a 5.7% decrease), and sales of *Software*, (a 6.5% decrease). These falls may reflect ongoing and significant decreases in the prices of IT hardware and software, rather than actual decreases in sales volumes. There was also a small fall of 1.4% in sales of *Communications Hardware and Cables* from \$411 million to \$406 million.

The categories that showed some growth in 1997 were the *Peripheral Equipment* category, which rose 0.2%, *Computer Services*, a 1.2% increase and *Training and Education in IT*, which increased by 2.9%. These increases were not enough to offset the decreases in the other four categories.

Combining the IT hardware categories shows that sales of IT hardware fell 6.2% to \$1.5 billion from \$1.6 billion in 1996, which was an 11.6% increase on the 1995 figure. Single user hardware sales have decreased in both the 1996 and 1997 years from a peak of \$468 million in 1995. However, sales of multi user systems and communications hardware and cables appear to have peaked in the 1996 year.

Sales of software and services, when combined fell by just 0.4% to \$1.46 billion from \$1.47 billion in 1996. This follows an increase of 12.3% in 1995. The growth rate of software sales has decreased since the survey was first undertaken in 1994 and is now falling. Computer services sales have continued to increase, although at a much lower rate in 1997. A similar pattern is noticeable in the field of IT training and education, which has continued to grow, although at a much decreased rate of 2.9% in 1997.

4. IT Industry Employment

The IT Industry comprises those industry sectors whose business is IT related eg software companies. IT occupations are defined here as those jobs whose focus is on IT, eg a programmer. However, there are non-IT occupations within the IT industry (eg an accountant in a computer company), and IT occupations in non-IT industries (eg a programmer in a bank).

The table below shows the number of people working in IT occupations in the IT industry and in the working population as a whole for 1991 and 1996.

The data in used in this section is taken from the 1991 and 1996 Censuses of Dwellings carried out by Statistics NZ.

	IT Occupations		All Occupations	
	1991	1996	1991	1996
No. Employed				
IT Industry	8,826	10,695	40,200	41,823
All Industry	27,717	33,642	1,400,376	1,630,809

The table shows the number of people working in an IT occupation in the IT industry increased from 8,826 in 1991 to 10,695 in 1996. The number of people working in the IT industry has also increased by 4% to 41,823. However, as a proportion of the working population, the percentage of people working in the IT industry decreased to 2.6% (as shown in the table below).

In addition to those in the IT industry, there are also people working in IT occupations outside of the IT industry. Combining those in IT occupations in the IT industry and in other industries gives the number of people in IT occupations as 33,642 in 1996, a 21% increase between the two Censuses.

The next table shows that at the 1996 Census, 4% of the working population in New Zealand was in an IT occupation and/or working for an IT industry company. This is the virtually the same proportion as at the 1991 Census, despite an increase of 9.6% from 59,091 to 64,770 in the number of people employed in IT occupations and IT companies. The proportion has remained the same due to the increase in the working population over the same period.

The right hand column of the table shows the change in each category adjusted for the change in the working population. It shows the overall proportion of people in an IT occupation and/or working for an IT company (IT Employed) fell by 5.9% between the two Censuses, despite the rise in people working in an IT occupation. This indicates that the number of people supporting the work of each person employed in an IT occupation has fallen.

	No. Employed	% Change of
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	1991	1996	Working Pop.
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%

* The *IT Employed* category is the number of people working in an IT occupation and/or in the IT industry and is derived as the sum of IT occupations in all industry and all occupations in the IT industry minus the IT occupations in the IT industry, (already counted in the all occupations in the IT Industry category).

While there has been a decline in the proportion of people in the IT Employed category - those people in actual IT jobs and/or working in the IT industry - there appears to be no fewer computers in use in the economy. This suggests that the IT industry is becoming more efficient, as fewer people in relative terms, provide IT goods and services to a larger working population.

4.1 IT Industry

Digital convergence is increasingly tying computer technology to telecommunications and broadcasting. For this reason the definition of IT industry used in this paper is broad, encompassing telecommunications and electronic media. It could be argued that some of the industry sectors below do not deal exclusively with IT even under this broad definition. However, these figures are based on the standard industrial codes in use in New Zealand at the time this data was collected.

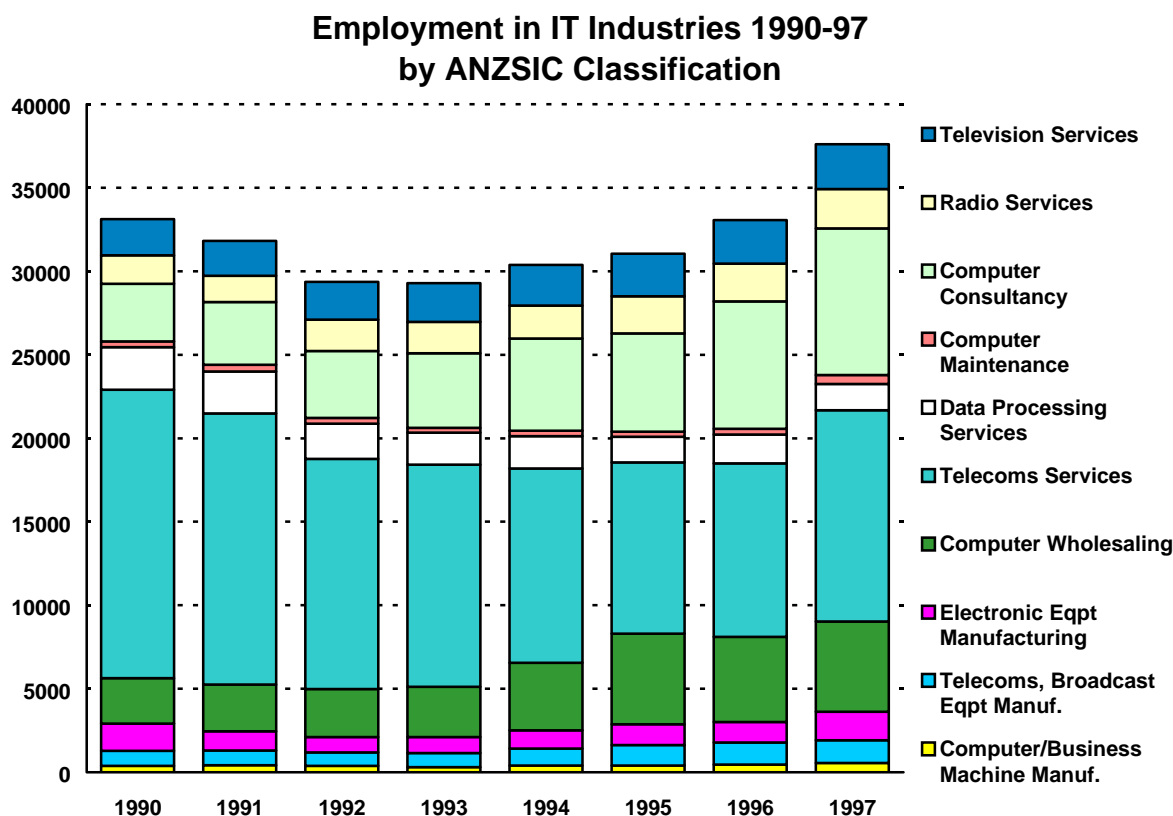
The information for the two charts below on employment in the IT industry is taken from the Statistics New Zealand Business Directory produced by Statistics New Zealand. Staff numbers are full time equivalents.

A significant change has occurred to the way this data is presented. Previously industry occupations were classified according to the New Zealand Standard Industrial Classification (NZSIC) and this paper has used that classification in the past. For the first time in 1997 the population for the output statistics has been selected using criteria based on the Australia and New Zealand Standard Industrial Classification (ANZSIC). The NZSIC classification is no longer being used. The ANZSIC code is a classification system that enables Australian and New Zealand employment data to be compared. However, the change means it is not possible to compare the data produced here with that presented in earlier versions of this paper. Statistics New Zealand have been able to provide historical data based on the ANZSIC classification back to 1990, enabling comparison over time.

The 1996 business activity statistics were the first to be published using ANZSIC as the official industry classification. The population of some 5-digit ANZSIC categories in 1996 was only partially covered, due to the NZSIC-based selection, and the exclusion of certain industries from the statistics.

With improvements to industry coverage in 1997, data at the 5-digit ANZSIC level is now fully covered.

As this year's data marks a transitional period, both the data available under the new classification system and that previously presented are presented here. The chart below shows those occupations that make up the IT industry under the ANZSIC classification for the years 1990 to 1997.

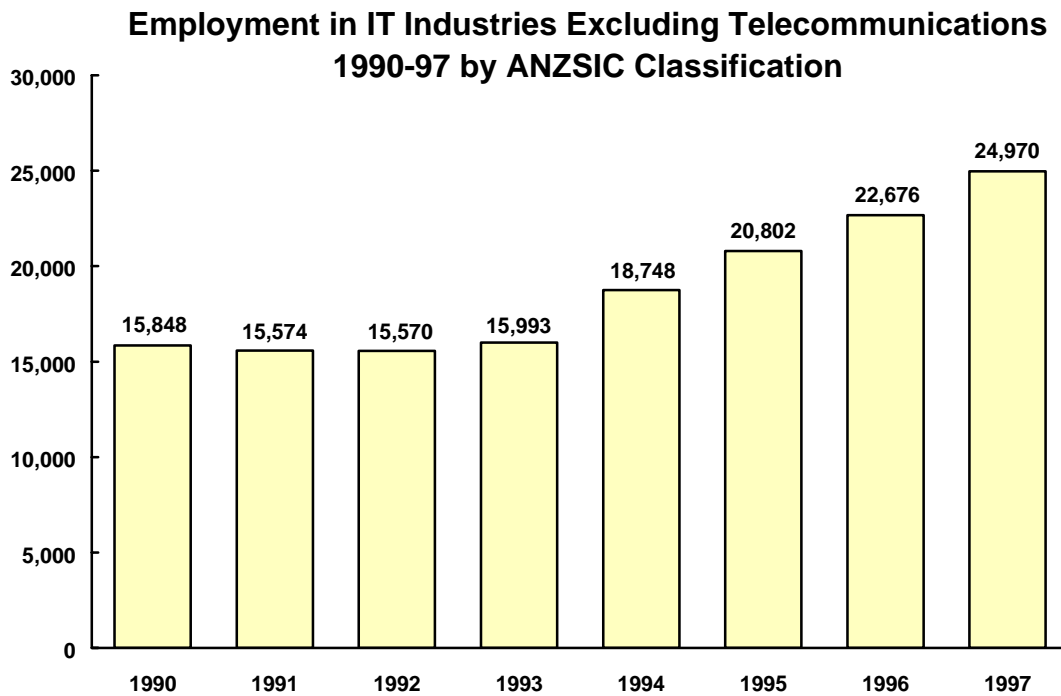


As the chart above indicates, following a slump in employment in 1993 to 29,282, employment in all the IT occupations has grown strongly and in 1997 hit a high of 37,610. The numbers employed in each of the occupations increased in 1997, except for those in *Data Processing Services* jobs. The latter has continued to decrease throughout the period from 2,553 to 1,780. The only other category to show a decrease over the period is the *Telecommunications Services* occupation, however, in the last two years increases have brought the numbers in this occupation up from a low of 10,254 in 1995 to 12,640 in 1997.

In all of the other occupations, very strong growth was recorded immediately after the slump in 1994-95. Two occupations have grown consistently over the period - *Computer Consultancy Services* and *Computer Wholesaling*, - in both the numbers employed have doubled since 1990.

It should be noted that in 1994 the coverage of the Business Activity Statistics was improved through data matching with the Inland Revenue Department's business database. The 1994 figures given here are the revised ones.

The next chart shows the same data as above, but excludes those employed in *Telecommunications Services*. It follows much the same trend as the chart above, but instead of falls in 1991-93, there is just flat or very limited growth, before significant increases kick in from 1994 to 1998. This gives an overall percentage increase in employment in IT industries excluding *Telecommunications Services* of 57.6% from 1990 to 1997.

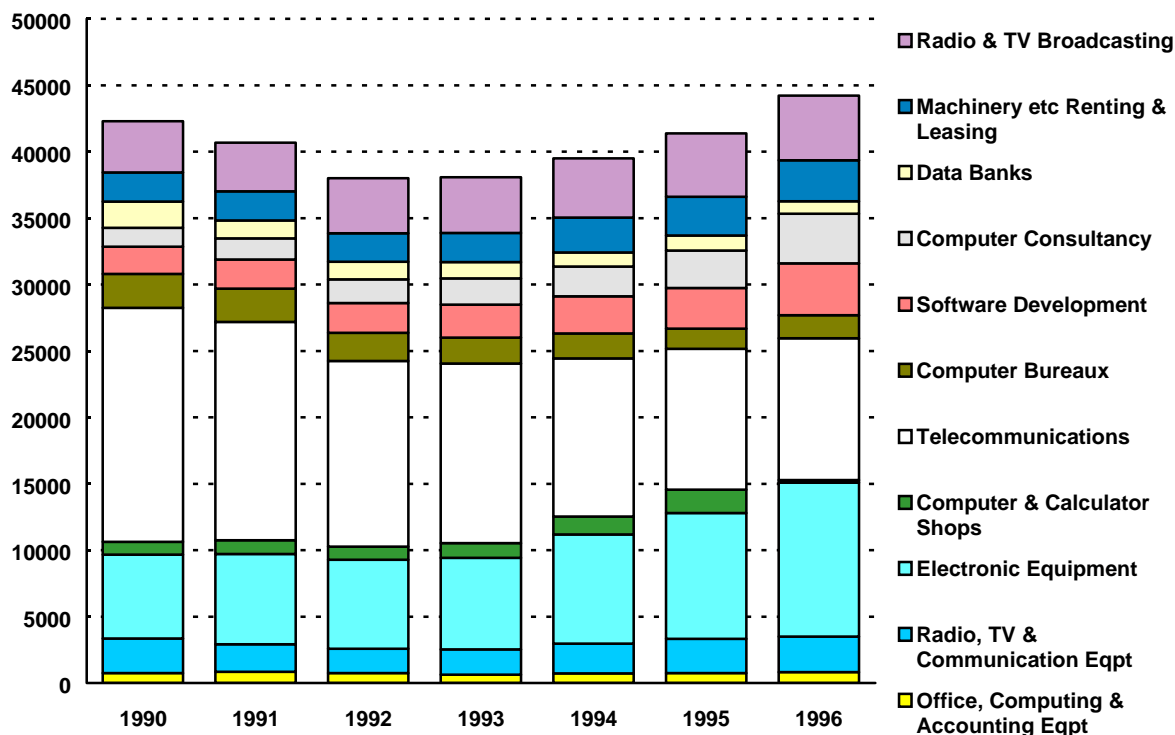


Given the change in the classification system, data from last year's paper is presented here for comparison purposes. The table below shows the total numbers found to be employed in IT occupations under the NZSIC classification for 1990 to 1996 and under the ANZSIC classification for 1990 to 1997.

	Total Employed NZSIC Classification	Total Employed ANZSIC Classification
1990	42,300	33,115
1991	40,680	31,816
1992	37,990	29,357
1993	38,080	29,282
1994	39,486	30,382
1995	41,376	31,056
1996	44,218	33,062
1997		37,610

The following chart shows the employment data from the NZSIC classification. It shows much the same trends as that in the chart above using the ANZSIC classification, with a fall through 1992-93 before increases bring the total back above 1990 levels.

**Employment in IT Industries 1990-96
by NZSIC Classification**



4.2 IT Occupations

The information in this section is taken from the 1991 and 1996 Censuses.

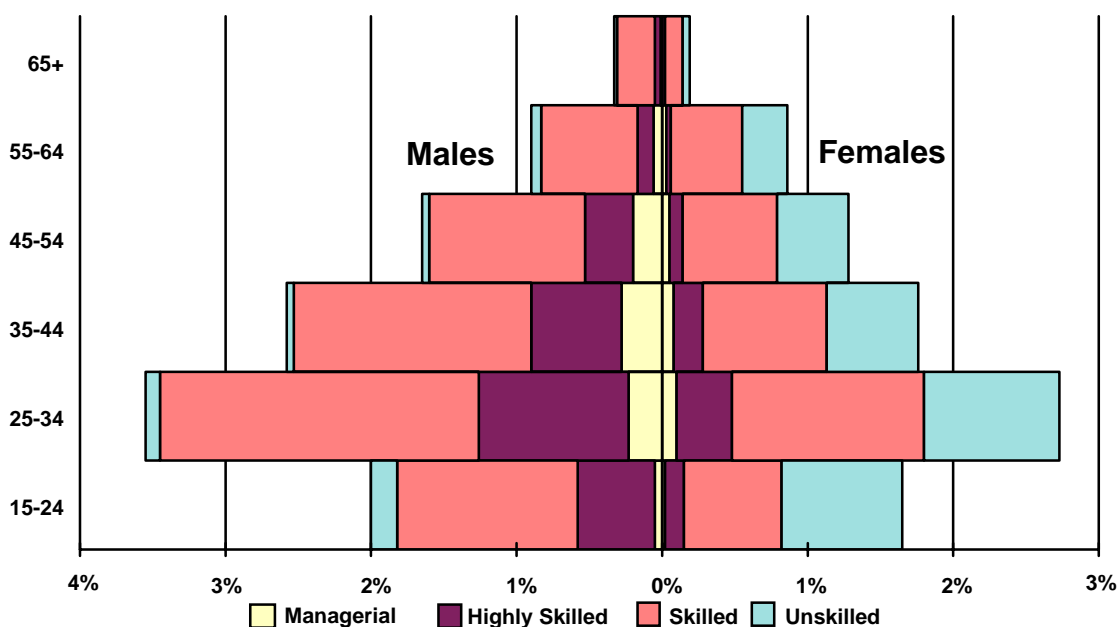
Occupations are categorised according to the occupation classification codes used by Statistics New Zealand. For the purpose of this paper, the following codes are deemed to be IT occupations. The only change to these classifications in 1996 was a change to the occupation previously classified as Computer Systems Engineer (code 21312) to a new classification of Computer Application Engineer.

Code	Description	Category
12271	Computing Services Manager	Managerial
21311	Systems Analyst	Highly Skilled
21312	Computer Application Engineer	Highly Skilled
31142	Computer Systems Technician	Skilled
31211	Computer Programmer	Skilled
31212	Computer Operator	Skilled
33152	Technical Representative	Skilled
41121	Data Entry Operator	Unskilled

The category column is used as an indication of skill level.

The age and sex breakdown for those working at various skill levels in IT occupations for 1991 and 1996 is shown in the two following charts.

Employment of the Working Population by Age and Sex in IT Occupations At Various Levels - 1996



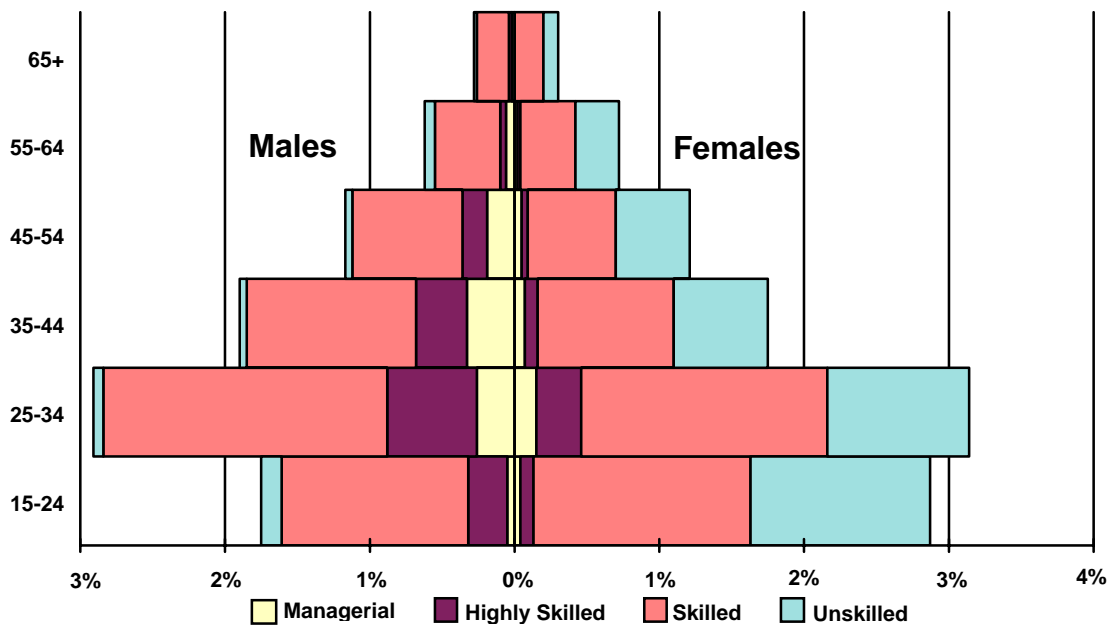
Each bar in this chart represents the numbers employed in IT occupations as a percentage of the numbers working in all occupations for a given age/sex group. These percentages are known as participation rates.

The chart indicates the IT industry remains a youthful industry, with 81.4% of men working in IT occupations being in the 35-44 or younger age groups and 80.9% of female IT workers in the 35-44 or younger age groups. It also shows that men had higher participation rates than women in IT occupations in all age groups in 1996.

Men also had higher participation rates than women in managerial IT positions and in the more highly skilled non-managerial occupations such as Systems Analysis and Computer Applications Engineer. Women in contrast, still dominate the Data Entry occupation with significantly higher participation in this occupation than men.

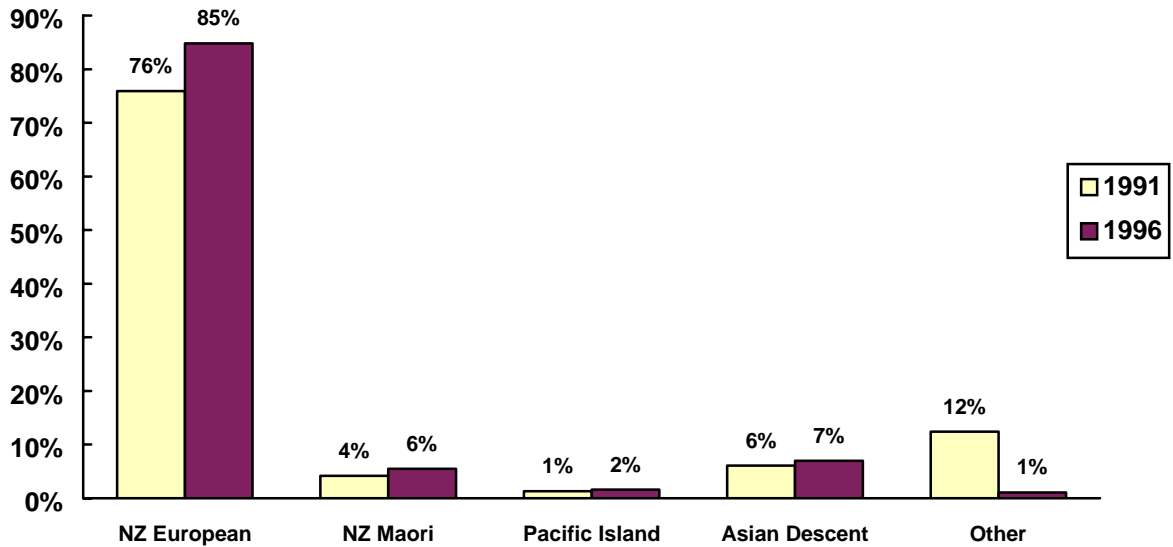
A comparison with the same data from the 1991 Census below, shows a relatively similar pattern to the 1996 chart. However, it also reveals a slight 'maturing' of the industry between 1991 and 1996. In 1991 85.2% of men in IT occupations were 44 or younger, while 86.4% of women in IT occupations were 44 or younger.

Employment of the Working Population by Age and Sex in IT Occupations At Various Levels - 1991



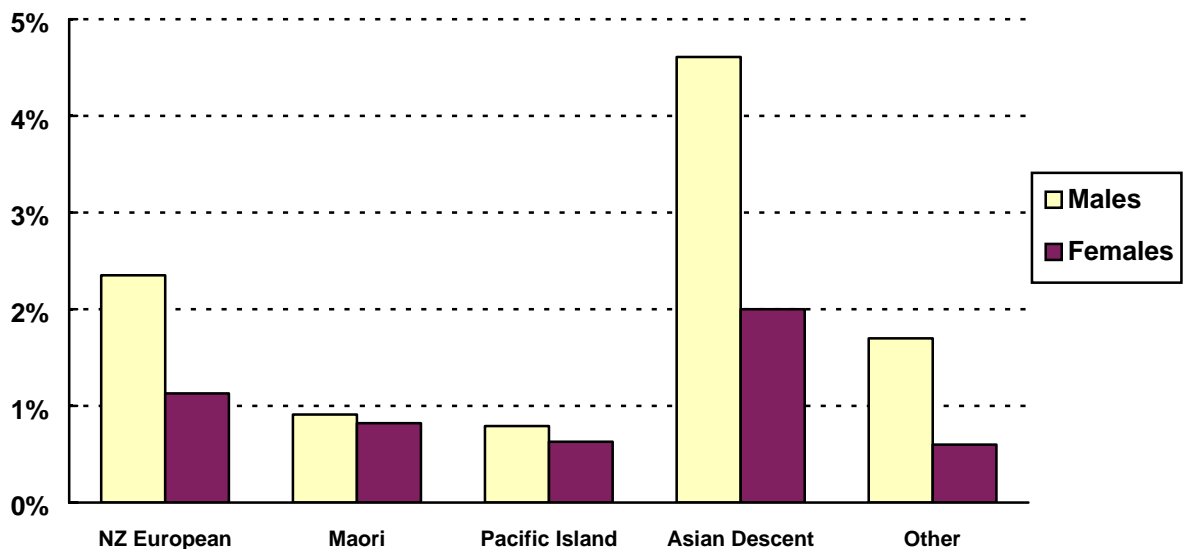
The following chart shows the breakdown by ethnic origin of those in IT occupations for 1991 and 1996, excluding data entry operators. The only changes of note between the two surveys is a large decrease in the proportion of people classifying themselves as Other and an increase in the NZ European category.

Breakdown of those Employed in IT Occupations by Ethnic Origin Excluding Data Entry in 1991 & 1996



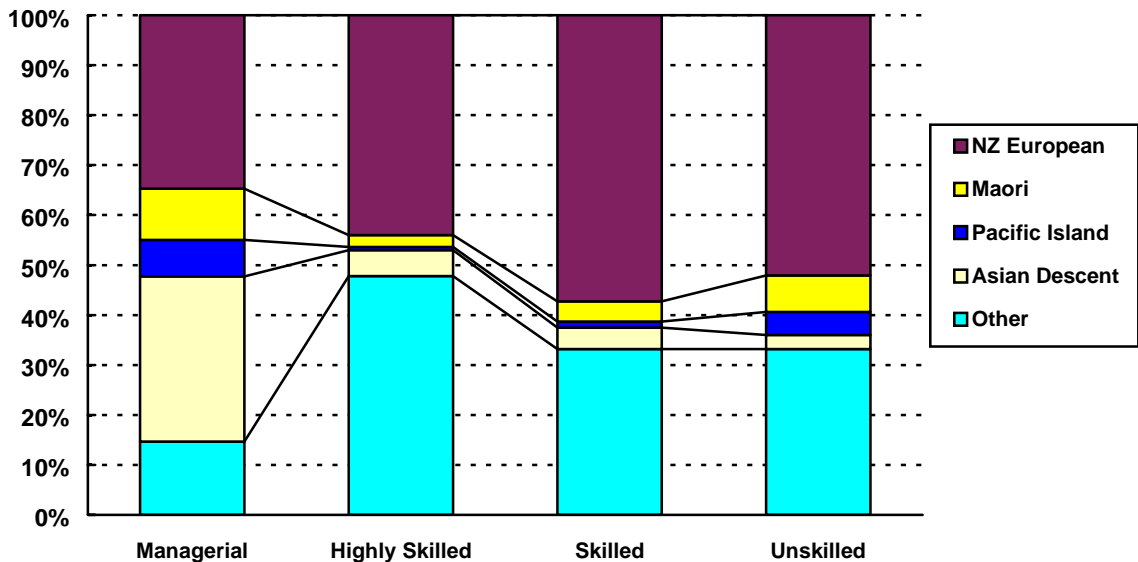
The next chart shows the numbers working in skilled IT occupations as a percentage of the working population in each ethnic group. While the participation of men and women identifying themselves as NZ European is higher than those of Maori and Pacific Islanders, the outstanding feature of the chart is the very high rates of participation among those of Asian descent. Men have higher participation rates than women in all of the ethnic origin categories considered.

Percentage of Working Population in IT Occupations by Ethnic Origin Excluding Data Entry in 1996



The chart below shows the participation rate of each ethnic group in IT occupations at each level of skill. The graph answers the question: what would be the ethnic breakdown of each level of IT occupation if the working populations of each ethnic group were the same.

IT Occupations at Various Levels as a Percentage of Total Numbers in IT Occupations for each Ethnic Group - 1996

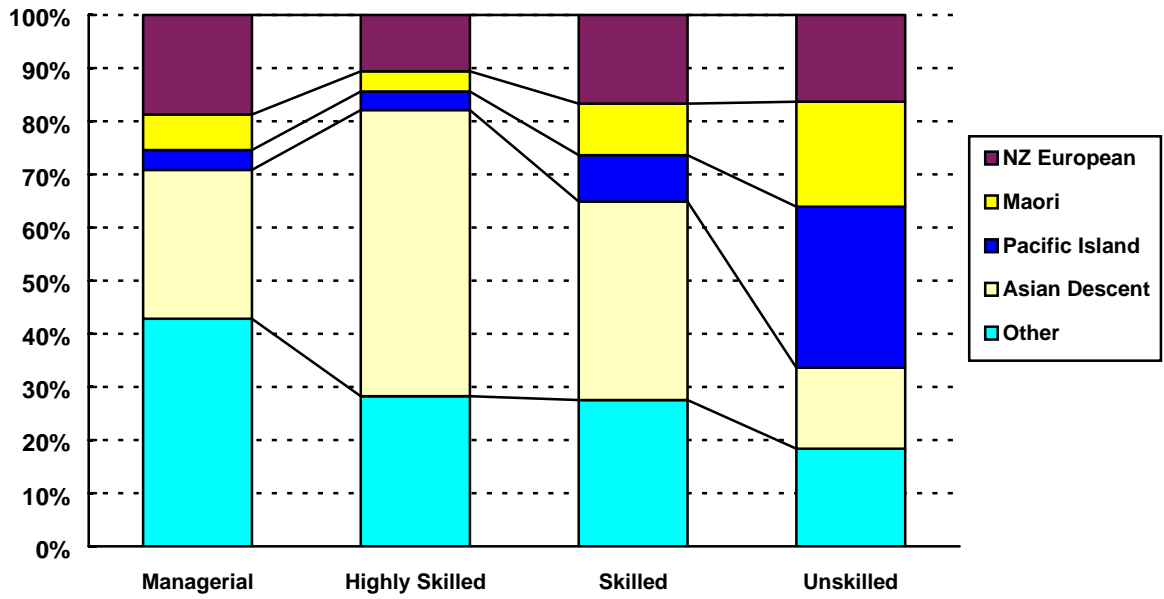


People categorising themselves as NZ European have high participation rates across all four levels of IT occupations. The Other group also shows relatively high participation rates, except at the managerial level. This is reflected by the significantly higher participation rate of people of Asian descent at the managerial level than at other levels. What is also clear from the graph is that Maori and Pacific Islanders have low participation rates across all IT occupations.

Comparing the 1996 data above with the same data from 1991 below, gives a quite different picture. In 1991, those classifying themselves as NZ European had much lower participation rates across all IT occupations, while people of Asian descent had much higher participation rates at the highly skilled and skilled levels. There was also a much more even distribution of people at the unskilled level in 1991 and a higher participation rate by people in the Other category at the managerial level.

Although it is not clear why this change has occurred, there was at the same time a significant change in numbers of people in each ethnic group in the working population, which is likely to have at least partly affected the ethnic composition of those in IT occupations. Overall the working population grew by 16% between 1991 and 1996. However, the number of people classified in the Other grouping fell during this time by 75%, being compensated by rises in the working population of Maori by 52%, Pacific Islanders by 40%, Asians by 65% and NZ Europeans by 18%.

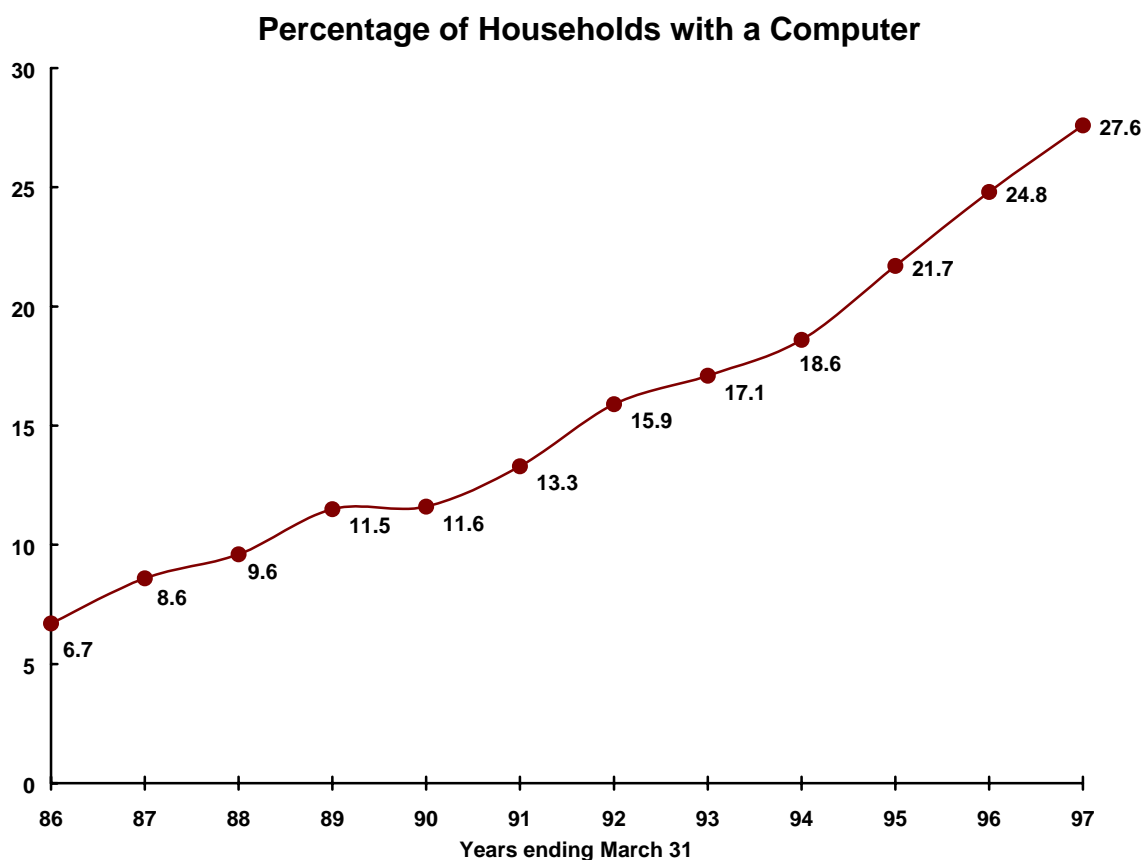
IT Occupations at Various Levels as a Percentage of Total Numbers in IT Occupations for each Ethnic Group - 1991



5. Computers in Homes

The figures used in this section are taken from the annual Household Economics Survey conducted by Statistics New Zealand. This survey assesses each household in a sample of 3000 over a 12 month period ending in March. It is therefore reasonable to attach the figures to a March year end.

The following chart shows the percentage of homes with a computer (mains operated with keyboard):

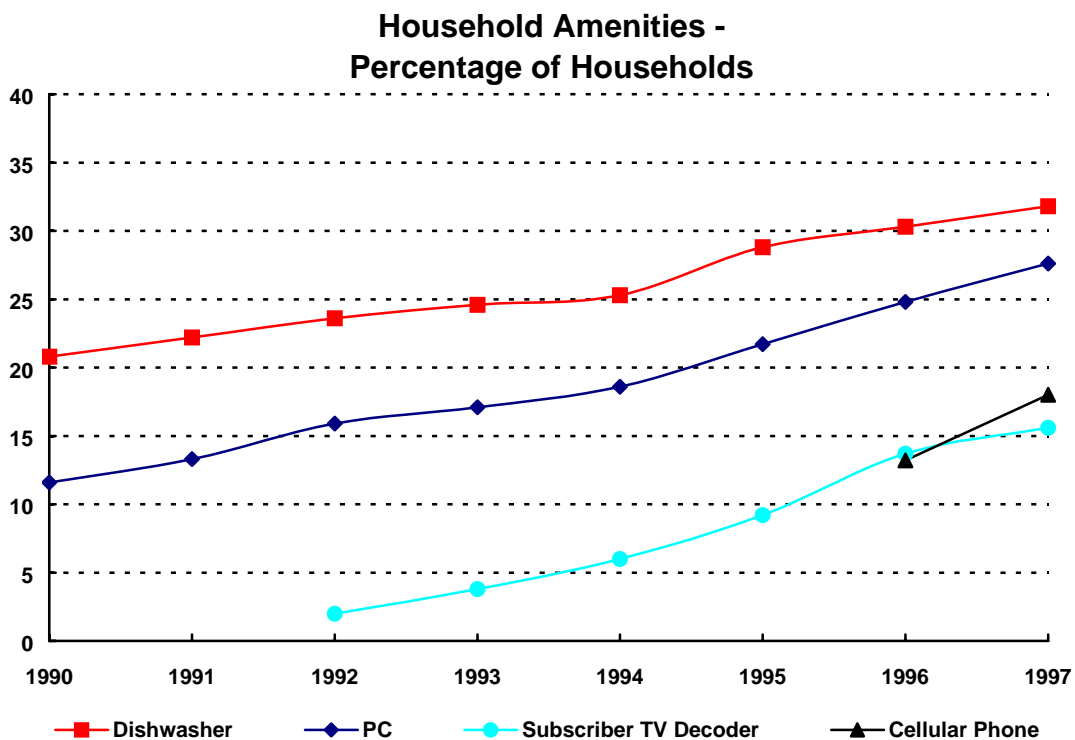


The chart shows that in March 1997, 27.6% of New Zealand homes had a mains-operated computer. The percentage of households with a computer has continued to rise since the question was first asked in the survey in 1985-86, with steady, but relatively larger increases in the last three years as shown by the steeper curve of the graph over the latter part. The survey does not distinguish between households with only one computer and those with more than one.

In addition to home computers, the survey also asks about the availability of a number of other electronic amenities. The following table shows the percentage of households responding to the survey that reported the presence of a range of these amenities in 1997.

Amenity in dwelling	Percentage of Households, 1997
Clothes Washing Machine	97.7
Colour Television	96.6
Telephone	95.9
Video Recorder	81.3
Microwave Oven	77.2
Dishwasher	31.8
Home Computer	27.6
Cellular Phone	18.0
Subscriber TV Decoder	15.6

The graph below gives the percent of households owning the lower four of these amenities from 1990 to 1997. The percent of households with a computer appears to be catching up with the percent owning a dishwasher, while the percent with a subscriber TV decoder grew quickly initially, but now appears to have flattened out.



6. Computers on the Internet

The data presented in this and the next section covers the number of hosts (computers) permanently connected to the Internet in New Zealand, and the size of the New Zealand domain which is a measure of the number of organisations connected.

6.1 Number of Computers on the Internet

The data for this section is derived from the results of a survey undertaken every six months by Network Wizards. The full survey results are available on that company's web server at <www.nw.com>.

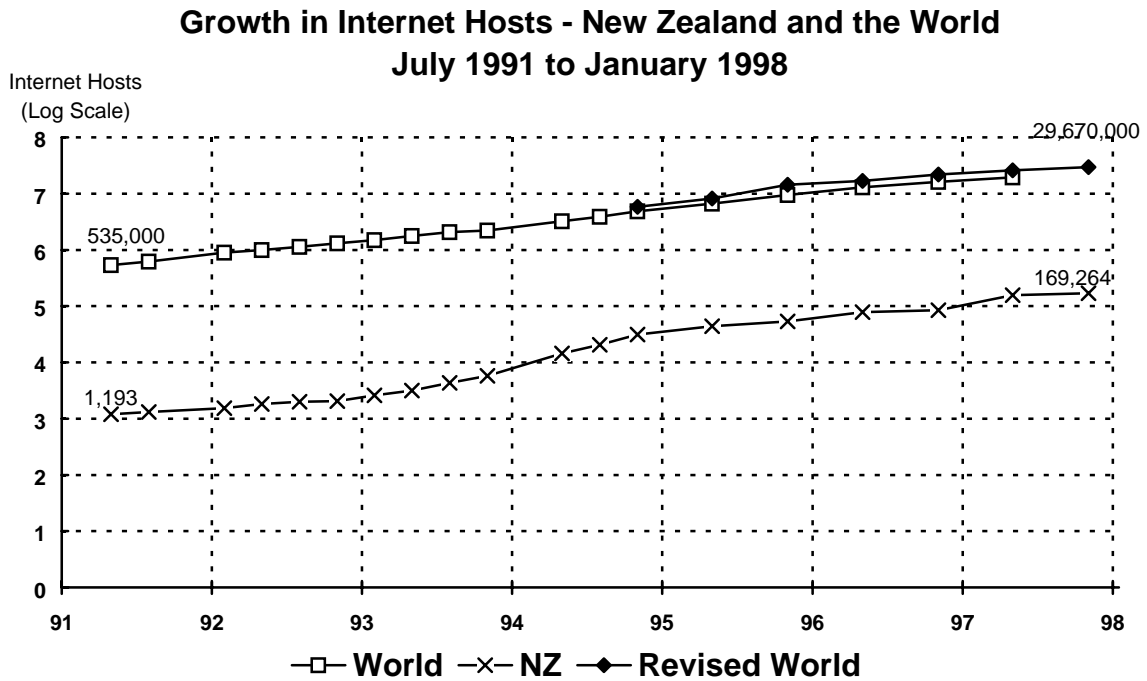
The number of "hosts" (computers) on the Internet is often regarded as a measure of the number of people with access to the Internet.

To be counted as a host, a computer must have its own Internet address and be permanently and directly connected to the Internet. Home or small business computers which connect by dialling up to a service provider are therefore not counted. Consequently, it is reasonable to assume that there are more users than hosts, possibly by a factor of two or more. To stress this point: the information in this paper refers to the number of computers permanently wired into the Internet in New Zealand, it does not purport to describe directly the number of individuals using the Internet. Figures relating to Internet users and usage should be treated with caution due to the evolving nature of the Internet, the variety of ways it can be accessed and the difficulty in gathering reliable data.

Unfortunately due to a significant proportion of organisations restricting access to their domain data, the survey conducted by Network Wizards has become less able to count all the hosts in the domain system. This proportion rose to 25% in the July 1997 survey and this has led to the introduction of a new survey technique. The old survey method counted the number of domain names that had IP addresses assigned to them. The new survey method used in January 1998 counts the number of IP addresses that have been assigned a name. This distinction is subtle but it does mean the new survey is counting a different "thing" than the old survey. As a result comparisons of data between the old and new surveys should be treated with caution.

Given this change and the difficulty of comparing the latest survey with earlier surveys, Network Wizards have also provided adjusted host counts for earlier years of the survey by assuming that if a certain percentage of domains were missed in the old survey, that the final host count would be approximately that same percentage lower than the actual value. The old host counts were raised by the proper percentage of domains that were not surveyed to arrive at an "adjusted host count", enabling some comparisons through this transition period. For a full explanation of the changes visit the Network Wizards web site at <www.nw.com>.

The following graph shows the growth in the number of hosts connected to the Internet in New Zealand, as well as the number connected worldwide, from July 1991 through to January 1998. A line has been added showing the revised total host counts for the earlier surveys. This line indicates the new survey method finds more hosts than the old method for the earlier surveys.



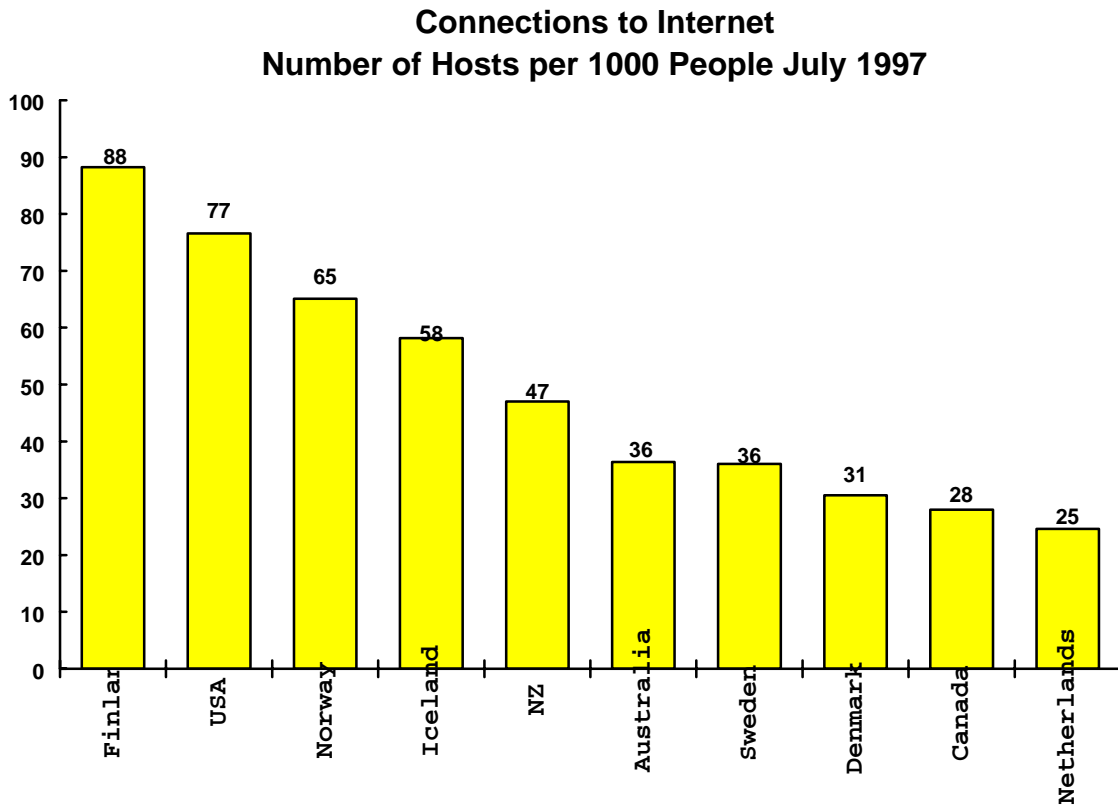
The straight rising lines on this logarithmic graph tell the same story as the exponential curve usually seen on graphs of growth of the Internet. By using the logarithmic scale both curves can be plotted on the same graph, despite the substantial difference in the actual numbers.

The graph shows a significant jump in the number of Internet hosts worldwide since January 1995. At the same time, the number of hosts in New Zealand has also increased rapidly to 169,264, with strong growth over the last year. In January 1996, the survey recorded 84,532 hosts in New Zealand, giving an annual growth rate for the last year of just over 100%.

This increase follows a period of slower growth from 1995 to January 1997, shown by the levelling off of the New Zealand line above. New Zealand's Internet had been growing much faster than much of the rest of the world up to 1995, but this extreme rate of growth levelled off in 1995 and 1996 to a more normal rate, where "normal" in the context of the Internet means an annual rate of somewhere between 60% and 80%.

As a result of the earlier exponential rates of growth and the current spurt of growth in hosts, New Zealand has the fifth highest number of Internet hosts in the world for every one thousand people behind Finland, the US, Norway, and Iceland.

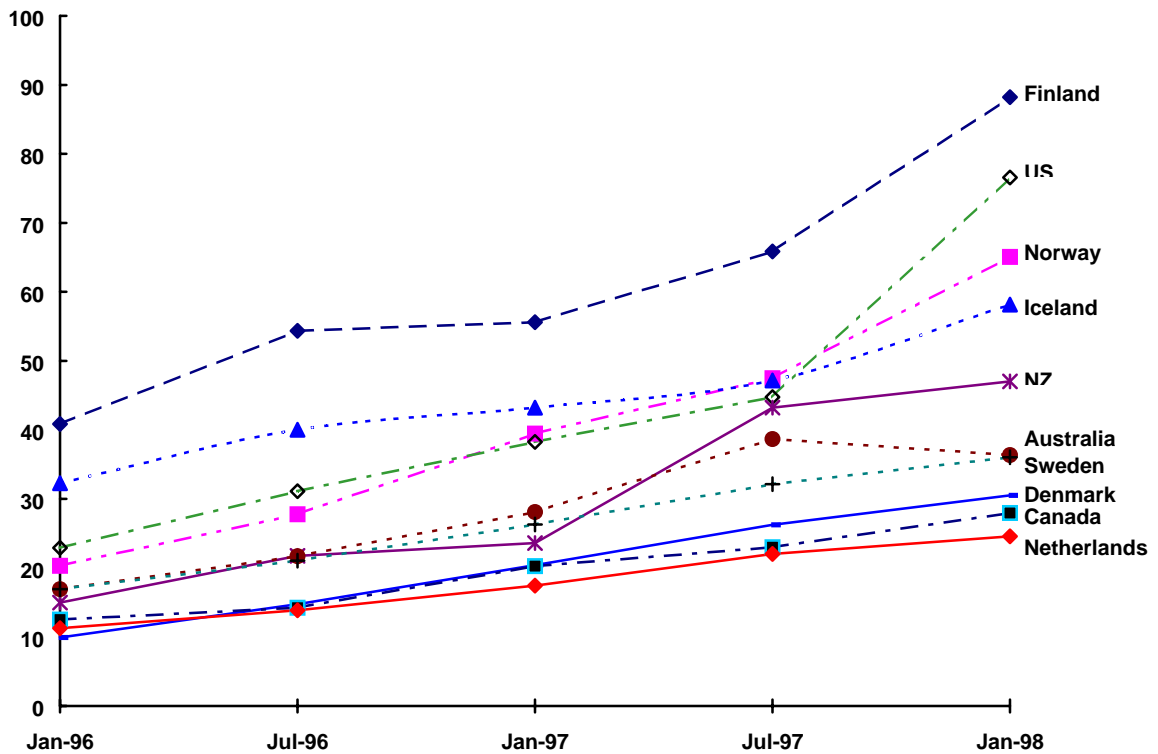
The following chart shows the ten countries with the highest Internet host counts by population. These are the same ten countries that were in the top ten in July 1997, the only change being a move of the USA from the fourth highest to second highest. Interestingly, six out of the ten countries are countries where English is not the first language. Note the numbers are rounded.



The USA figure includes all hosts registered under the .com and other generic top level domains. It may no longer be a realistic assumption that almost all of these are in the USA, as many commercial organisations outside of the USA have taken the opportunity to register their domain in the format <www.name.com>. Therefore the generic domain Internet host figures are no longer reliable as an indicator of the number of hosts in the USA.

To show how the numbers of hosts in each of the countries above has been changing over time, the graph below reproduces the data from the chart above and back dates it to January 1996. The key features are the ongoing strong growth in Finnish hosts, the steep increase in USA related hosts and the ongoing steady growth of hosts relative to population in the other countries. There is also a small decrease in the number of hosts per head of population in Australia. However, this and the steep increase in USA related hosts could be adjustments due to the change in survey method.

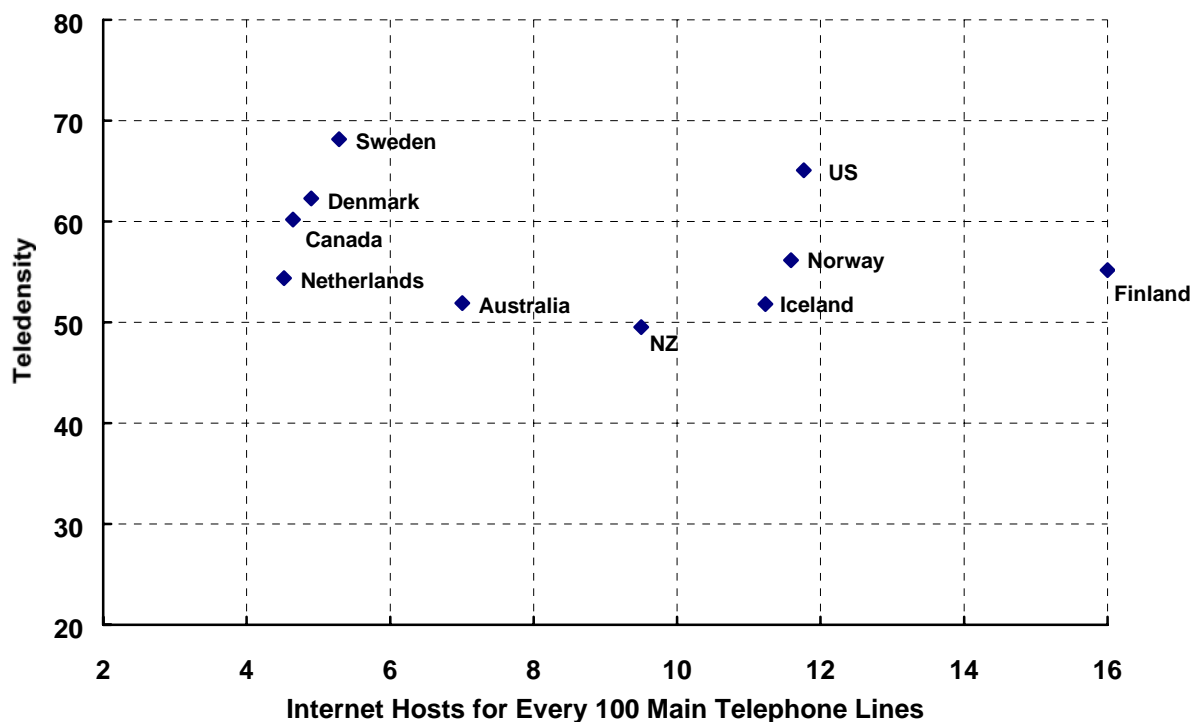
**Number of Internet Hosts Per 1000 People
January 1996 to January 1998**



The following chart plots two variables. The number of Internet hosts for every 100 main telephone lines in the same ten countries is plotted against the number of people for every 100 main telephone lines in each country. The latter variable is known as the *teledensity* of the country. A relatively higher teledensity indicates that there are more main telephone lines for every member of the population. The number of telephone lines in each country is taken from International Telecommunications Union data and is for the end of 1996.

Interestingly the chart indicates that there is no particular correlation between higher teledensities and higher ratios of Internet hosts to main telephone lines. It should, however, be noted there is not a significant variance in teledensity for the ten countries and that all are developed, relatively wealthy nations. New Zealand has the lowest teledensity of the ten countries, but has the fifth highest number of Internet hosts by main telephone lines.

Teledensity and Internet Hosts Per 100 Main Telephone Lines



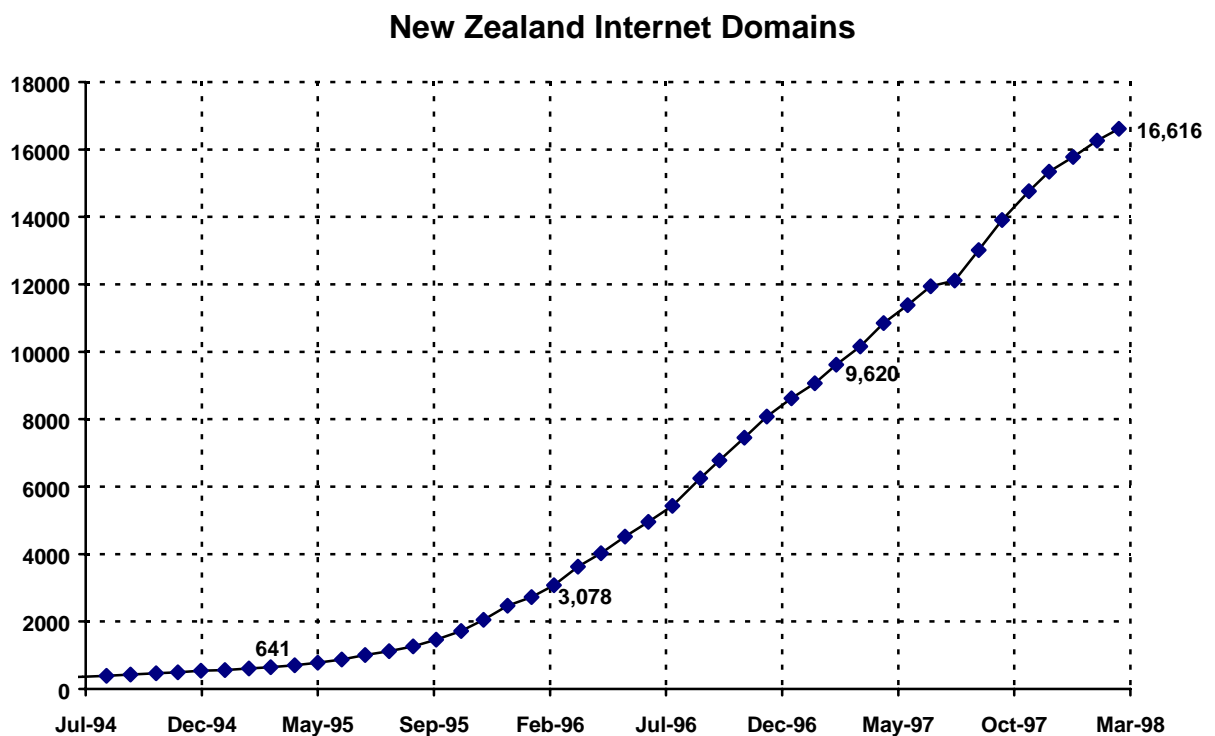
7. Organisations on the Internet

The data in this section is derived from figures compiled by Mark Davies of Victoria University of Wellington.

When an organisation connects to the Internet, it typically registers a “domain name”. In this section we attempt to estimate the numbers of New Zealand organisations connected by counting the registered domain names.

Each third level New Zealand domain, eg name.co.nz, that has been registered is assumed to belong to a separate organisation. Sub-domains are not counted, thus moc.govt.nz is counted but comms.moc.govt.nz is not. In general each third level domain is given to a different organisation, be it a company, school, government department etc, so domains are a good measure of the number of organisations connected.

The following graph shows the total number of network connected organisations as a time series since July 1994.



It is clear there has been strong growth in the registering of domains in New Zealand, particularly over the last three years. By March 1998, there were 16,616 registered domain names, which means there are some 16,616 New Zealand organisations with some form of Internet connection.

7.1 Types of Organisation

Organisations are allocated domain names according to organisation type. The penultimate part of a name, such as the "co" in <name.co.nz> is used to categorise domains. This part of the name is often called a second level domain. In New Zealand the following second level domains are used:

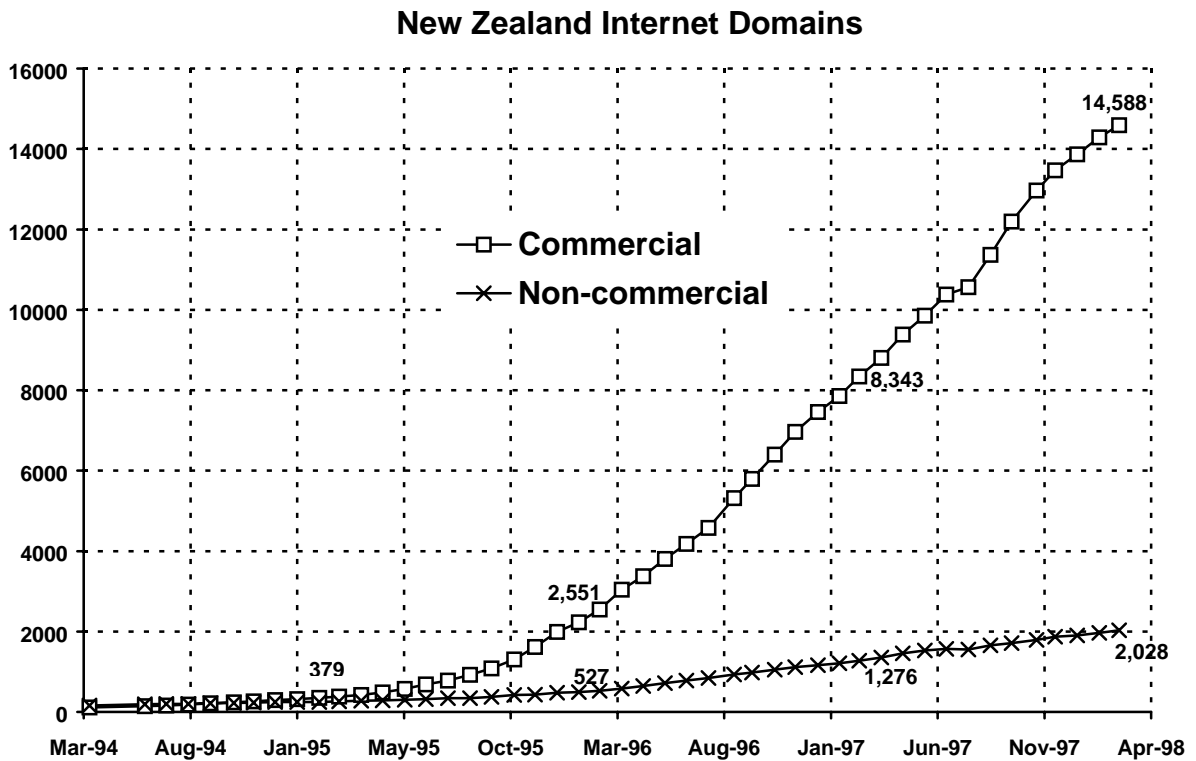
Second Level Domain Normally Used By:

ac.nz	Tertiary educational institutions
co.nz	Companies
cri.nz	Crown Research Institutes
gen.nz	Individuals and organisations which do not fit the other categories
govt.nz	Central government agencies and local and regional councils
iwi.nz	Iwi organisations
mil.nz	Military organisations
net.nz	Internet Service Providers
org.nz	Non-profit organisations and incorporated societies
school.nz	Schools

This table represents current usage, and does not cover a number of historical anomalies. In particular, ISPs have been registered in ac.nz, gen.nz and co.nz as well as net.nz.

While there is provision for individuals to have domain names of their own in the gen.nz domain, most do not. Therefore numbers of domains registered is not a good indicator of individuals using the Internet.

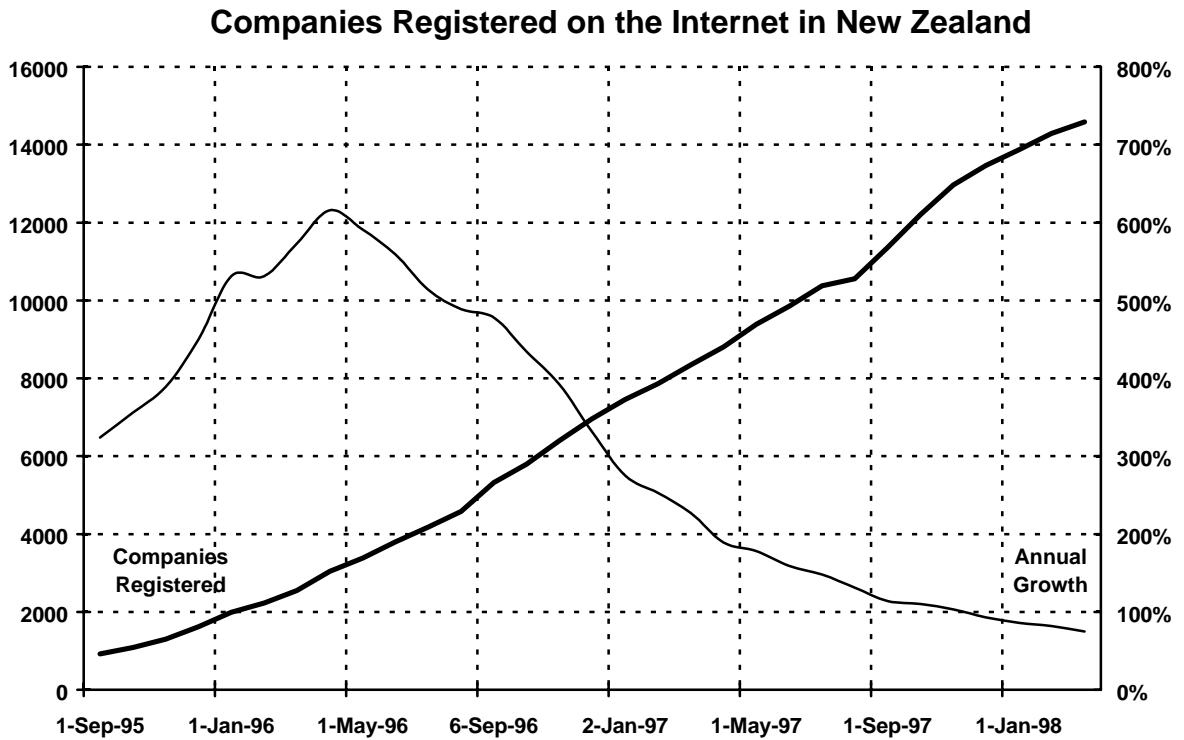
The following graph shows the split of commercial (co.nz) to non-commercial organisations (all other second level domain names registered).



The graph shows that much of the increase in registered domain names is due to the registration of commercial domains, which have increased from 2,551 to 14,588 in the last two years. In the year to March 1998, the annual growth rate in the registration of commercial domains was 75%, down from 227% the year previously. However, the lower growth rate is an indication that there is now an established base of organisations with a registered domain name and Internet connection in New Zealand.

Over the last year growth in the registration of non-commercial domains also increased to 2,028, although the numbers of non-commercial domains are well overshadowed by the number of commercial domains registered.

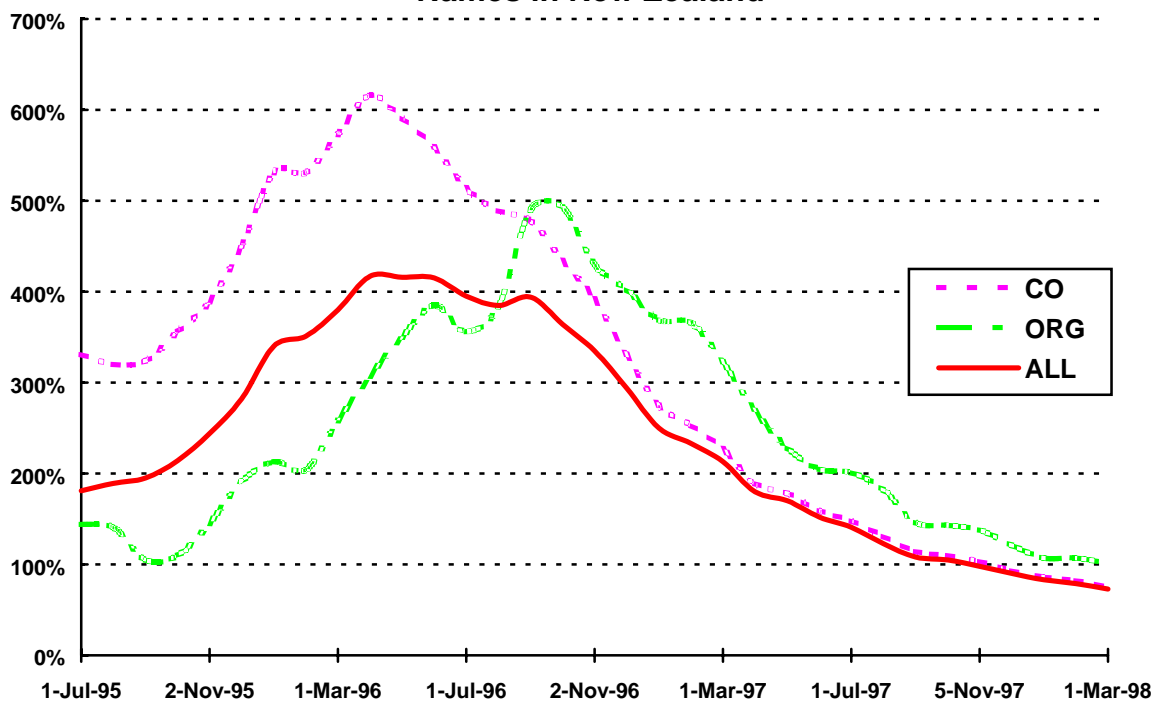
The next graph plots the commercial domain information from the previous graph, however, a line mapping the annual growth rate of the registration of commercial domain names is added. This graph also shows the substantial growth in New Zealand companies registering a domain name on the Internet over the last two to three years. The line plotting the annual growth rate shows that it peaked in April 1996 at 616%, and has fallen steadily since to its current rate of 75%.



The following graph plots the commercial domain registration growth rate against the growth rate of all the domains and the .org domain name growth rate.

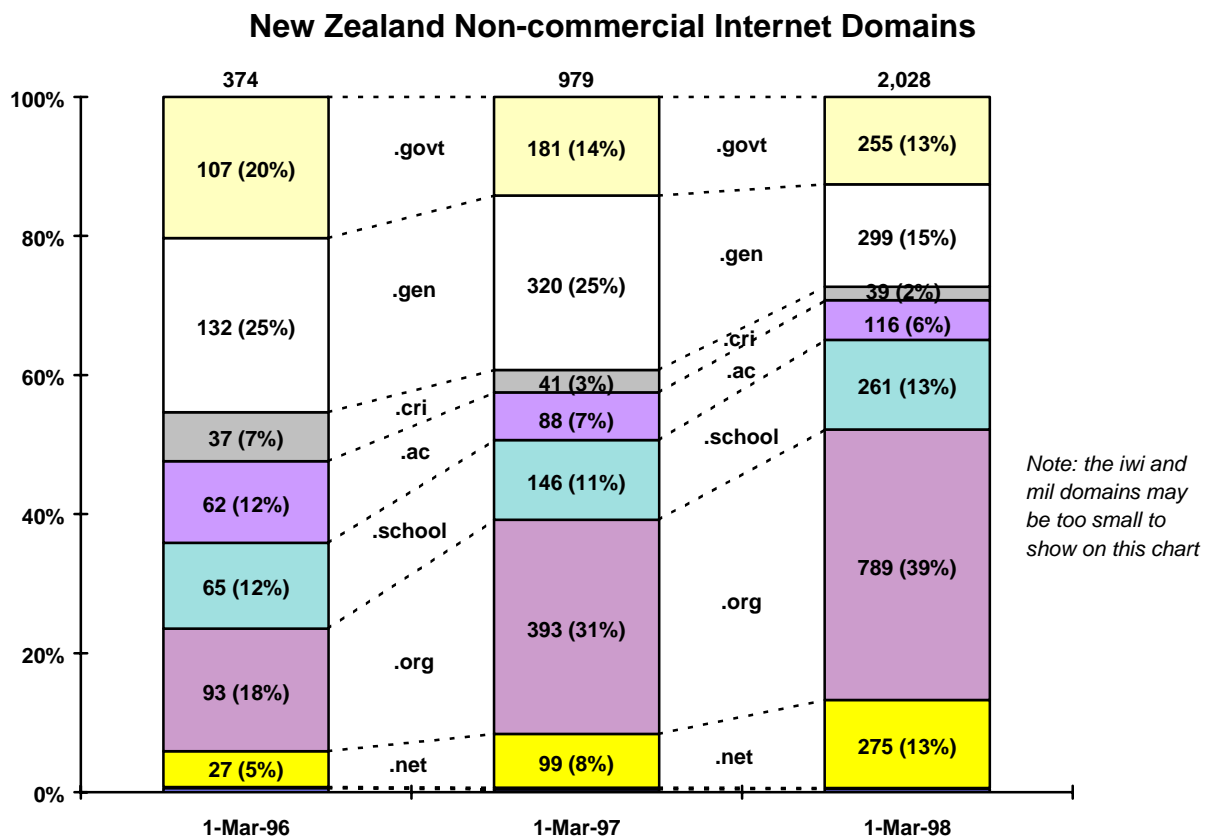
The .org domain name is now the second most popular second level domain name and as the graph shows, is still clearly growing at a faster rate than the registration of commercial domains and the total. Over the year to March 1998, registration of .org domains grew at 101%, while total domain name registrations grew at a rate of 73% and as noted previously, commercial domain registration grew at 75%. As the graph shows, these are all much lower growth rates than recorded in previous years.

Annual Growth Rate of Registration of .co, .org & all Domain Names in New Zealand



The chart below shows how the non commercial domain registrations are split for the March years 1996 to 1998. The chart shows the significant growth in the number of organisations registering under the .org domain. This domain now comprises 39% of the non-commercial domains, up from 18% in March 1996. The .net domain is also showing ongoing growth over and above the other domains and now represents 13% of non-commercial domains, while the number of schools registering under the .school domain also continues to grow, although at a more modest rate.

The one domain to show a decrease is the .gen domain, which has decreased as a proportion of the non-commercial domains to just 15%.

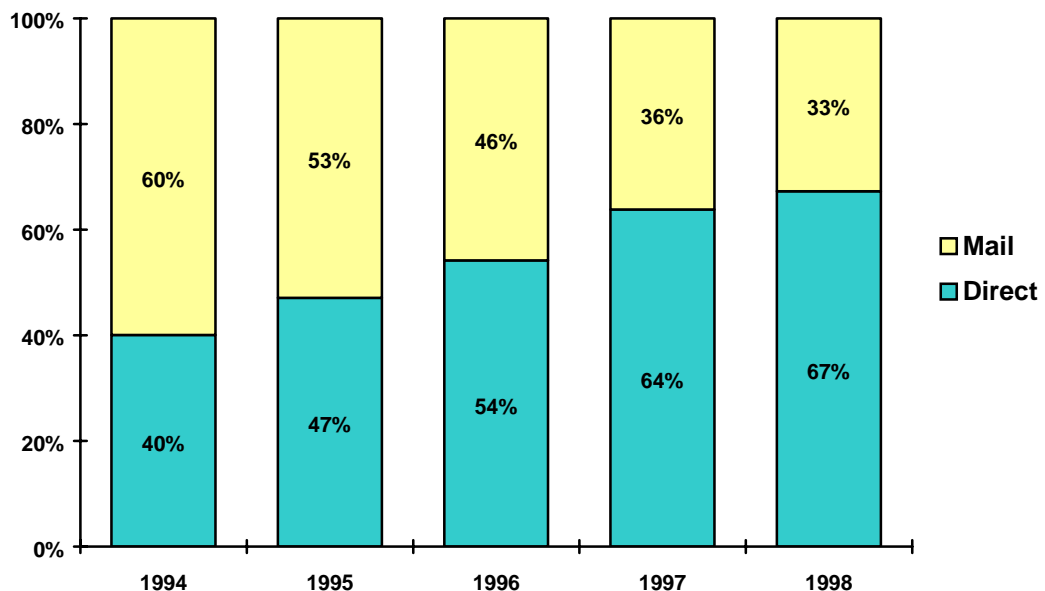


7.2 Direct Connection Versus Mail-Only Connection

There are two ways in which an organisation can connect to the Internet: a direct connection allowing full access, or a mail only connection. The latter type of connection would typically be used to enable the users of a corporate mail system to send and receive Internet mail messages, without providing them full Internet access.

The following graph shows the ratio of directly connected organisations to mail connected organisations in New Zealand for the March years 1994 to 1998. It indicates the proportion of organisations connecting directly to the Internet is growing far more rapidly than the proportion choosing mail only connections, although the latter category is still growing. By March 1998, 67% of connected organisations were directly connected, up from 40% in 1994.

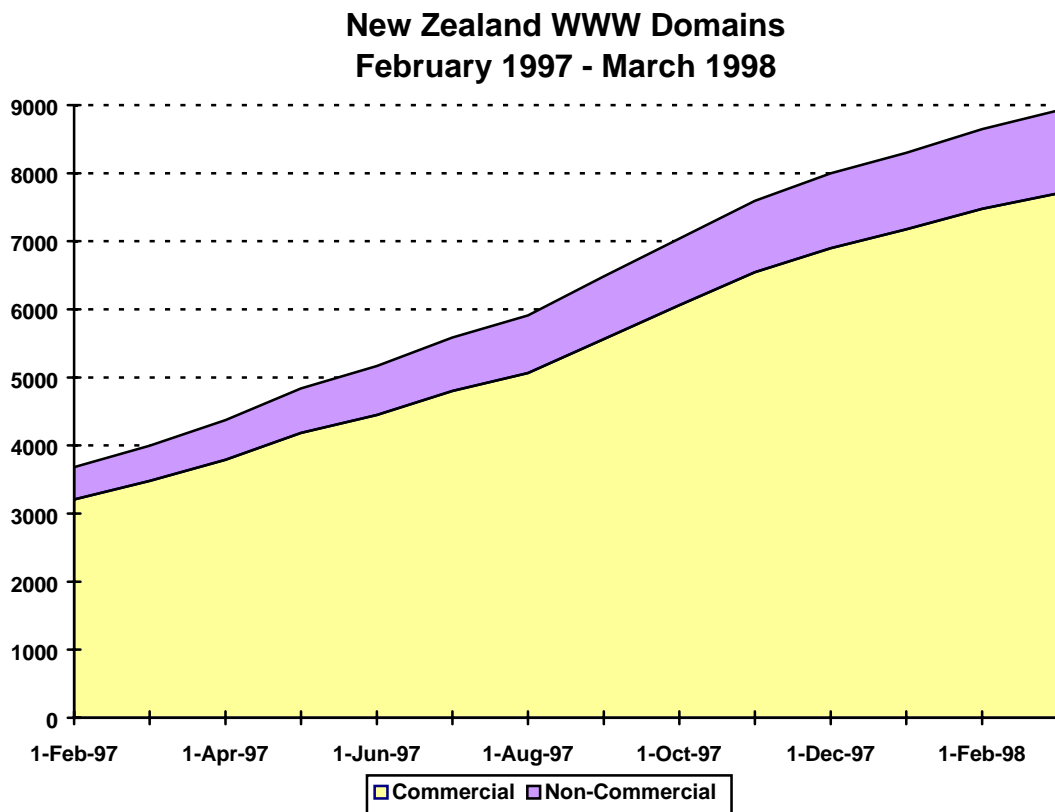
Split Between Directly Connected and Mail-Only Connected Organisations



7.3 New Zealand World Wide Web Sites

The number of organisations with an Internet registered domain provides no indication of how many New Zealand organisations have now established Web sites on the Internet. To estimate this, one must count each World Wide Web domain name that has been registered, ie all the domain names of the format: www.name.domain.nz. However, this only gives an estimate of the number of web sites, as it double counts organisations using different formats eg tvone.co.nz, and does not take into account non-active web sites.

The chart below shows the total number of web sites split into commercial (co.nz) web sites and non-commercial web sites estimated in this way from February 1997 to March 1998. The chart shows that the vast majority (7,730 or 86%) of web sites in New Zealand have been set up by commercial organisations and that the total number of web sites has doubled over the last year from just under 4,000 to a total of 8,920.



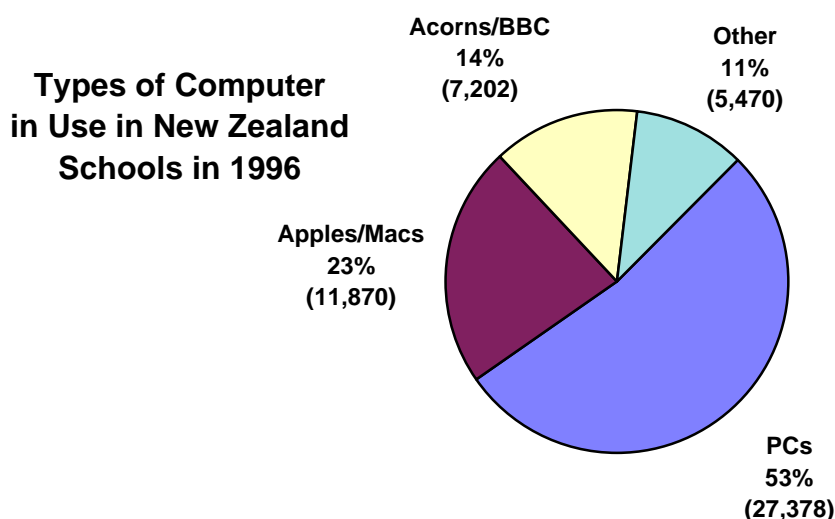
8. Computers in New Zealand Schools

The information in this section was provided by the Ministry of Education and is taken from a survey of New Zealand schools conducted in 1996. The survey was compiled by J Larry Owens for the Ministry of Education and the results were originally published in the Ministry of Education Research Bulletin for November 1996¹. It aimed to determine the numbers and types of computers in New Zealand schools and the extent to which schools are, or intend to be connected to the Internet. The survey has not been repeated.

A total of 2,736 schools were sent forms to complete. 2,673 schools responded, a 98% response rate. However, further information received from schools following the survey indicated that a number treated the survey as relating to only those computers used for administration and did not include those used in classrooms. Additionally a number of schools did not include those computers considered to be 'useless' or obsolete. These factors suggest the numbers used here tend to underestimate the actual numbers of computers in New Zealand schools.

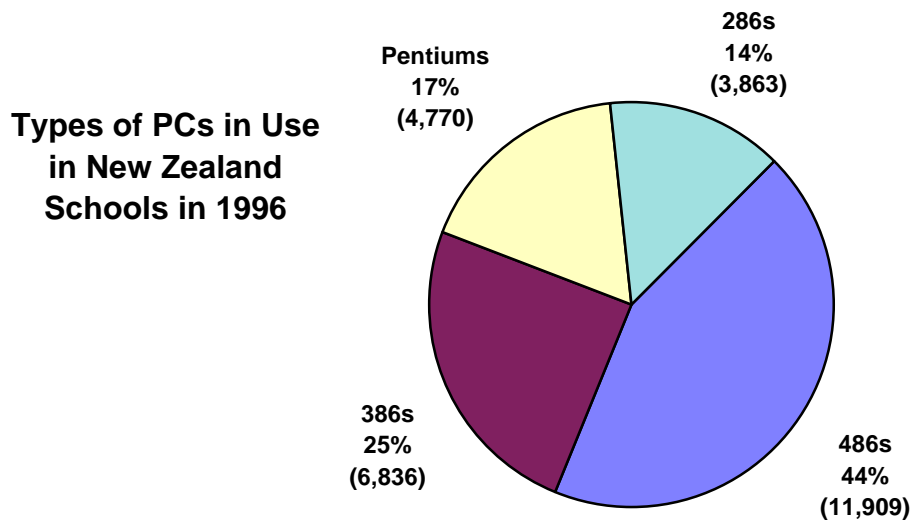
Almost all New Zealand schools have computer equipment of some kind available. The survey found a total of 51,920 computers available for staff or student use among the responding schools, or on average 19.4 computers per school. As can be seen from the chart below the majority of these were IBM compatible PCs. Computers in the 'other' category cover a diverse range, including models that may be considered outdated.

The chart below shows what type of computers were found to be available for staff and student use in the responding schools.



¹ J Larry Owens: *A Survey of Computer Use in New Zealand Schools*; Ministry of Education, Wellington, November 1996.

A breakdown of the IBM compatible PCs category by model of computer is shown below. At the time of the survey, the most common type were PCs based on the 486 chip - there were 11,909 of these in use, or 44% of all PC type computers. This type is also the most common overall, representing 53% of all the computers available in schools.



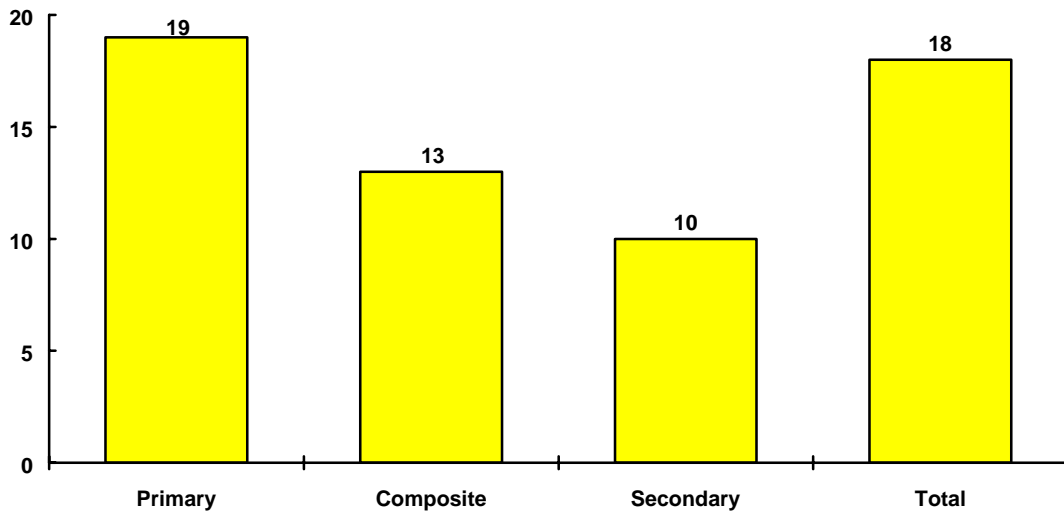
8.1 Student-Computer Ratios

The number of computers per student across all schools and by school type is described in this section. As the survey did not discriminate between computers used by teachers and those used by students, the number of computers is the total number of computers reported. Schools were only included if information was available on both the number of computers and the student roll as at July 1995.

The following chart shows the mean student-computer ratio for each school type - primary (including intermediate), composite (including area) and secondary - and the overall mean student-computer ratio. The latter was taken as the mean of all the student-computer ratios calculated for each school. Each school's student-computer ratio was calculated by dividing the school's roll as at July 1995 by the total number of computers available for student and staff use at the school.

As can be clearly seen, secondary schools had a higher number of computers available per student than primary and composite schools.

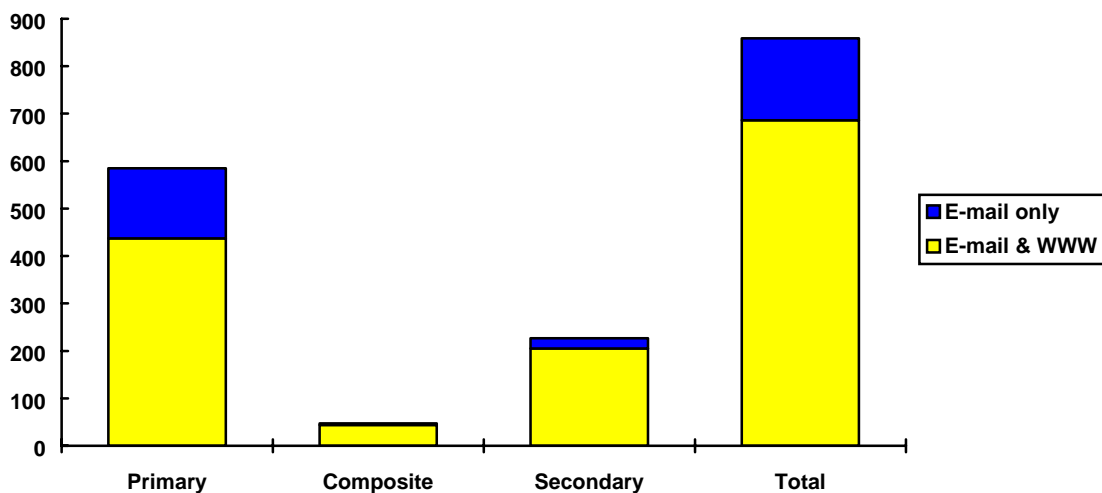
Mean Student-Computer Ratio by School Type



8.2 Internet Connections in Schools

The survey also asked respondents several questions about the Internet. Each school was asked if they had any computers connected to the Internet, and if so, how many were e-mail connected only and how many were connected for both e-mail and world wide web access.

Number of Internet Connections by Type and School in 1996



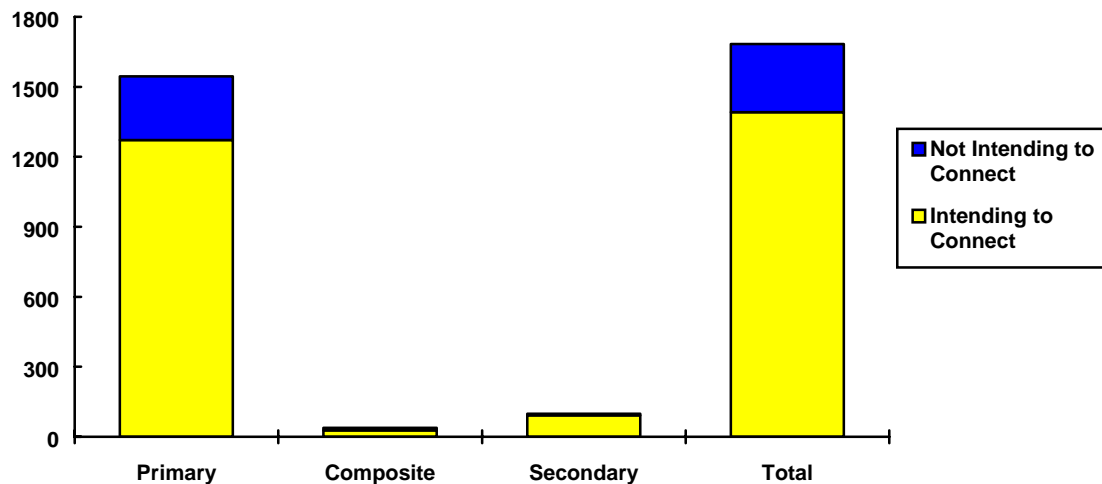
The chart above shows that 859 or 32% of the responding schools had at least one computer connected to the Internet at the time of the survey and the majority of Internet connections are 'full' connections ie offering access to e-mail, the world wide web and other Internet services. Only 173 or 20% of the connected schools had an e-mail only connection.

While the absolute numbers of primary schools with a connection is higher than the number of secondary and composite schools, just 585 or 26% of primary schools had a connection, while 47 (54%) of the composite schools and 227 (68%) of the secondary schools had an Internet connection.

8.3 Intention to Connect

To gauge the future growth of Internet connections in schools, those schools not yet connected to the Internet were asked whether they intended to connect to the Internet by January 1998. The following chart indicates that a majority (83%) of the schools without an Internet connection were intending to connect by January 1998. Almost all (93%) of the unconnected secondary schools were intending to connect and 82% of the unconnected primary schools also intended to get connected by January 1998.

Schools Intending to Connect to the Internet by January 1998



9. Enquiries

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