Trends in investment and interconnection prices

P U B L I C

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1 Introduction

TelstraClear has asked Network Strategies to undertake an analysis of various aspects of telecommunications investment to form part of TelstraClear's submission to the Commerce Commission's *Draft Determination on the Application for Pricing Review for Designated Interconnection Services* (11 April 2005).

In this report we examine how investment levels in OECD countries have changed over time (section 2) and compare the price for interconnection in New Zealand with those in OECD countries (section 3).

Please note that the views contained in this report are entirely those of Network Strategies. Also note that all data and information presented here is available from public sources, and thus may be freely distributed.

2 Trends in investment

Our examination of historical trends in investment levels concentrated on two separate sources of data for the 30 OECD countries listed below in Exhibit 1:

- public telecommunications investment per access channel, for the period 1997–2001, as well as data averaged over the three year periods 1988–90, 1991–93 and 1994–96, sourced from the OECD[1]
- annual telecommunications investment per fixed line, for the period 1995–2003, calculated from annual telecommunications investment and the number of main (fixed) lines, both sourced from the ITU[2].

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1 OECD (2003) *Communications Outlook 2003*.

2 ITU (2005) *ITU World Telecommunication Indicators*. Note that 2003 data was available for only 15 of the OECD countries.

Australia	Hungary	Norway
Austria	Iceland	Poland
Belgium	Ireland	Portugal
Canada	Italy	Slovak Republic
Czech Republic	Japan	Spain
Denmark	Korea	Sweden
Finland	Luxembourg	Switzerland
France	Mexico	Turkey
Germany	Netherlands	United Kingdom
Greece	New Zealand	United States

***Exhibit 1**: List of OECD countries [Source: Network Strategies]*

An earlier analysis undertaken by CostQuest[3] used the OECD data series public telecommunication investment per access path, which includes both fixed and mobile lines. We have used the OECD data series public telecommunication investment per access channel, which is the investment per fixed line.

2.1 Analysis of OECD investment data over time

New Zealand is ranked 22 out of the 30 OECD countries for public telecommunication investment per access channel in 2001 (Exhibit 2).

3 CostQuest (2004). *CostQuest comments in regard to Telecom New Zealand's TSLRIC report*. 31 August 2004. Appendix G of the *Draft Determination on the application for pricing review for designated interconnection services*. 11 April 2005. Available at http://www.comcom.govt.nz.

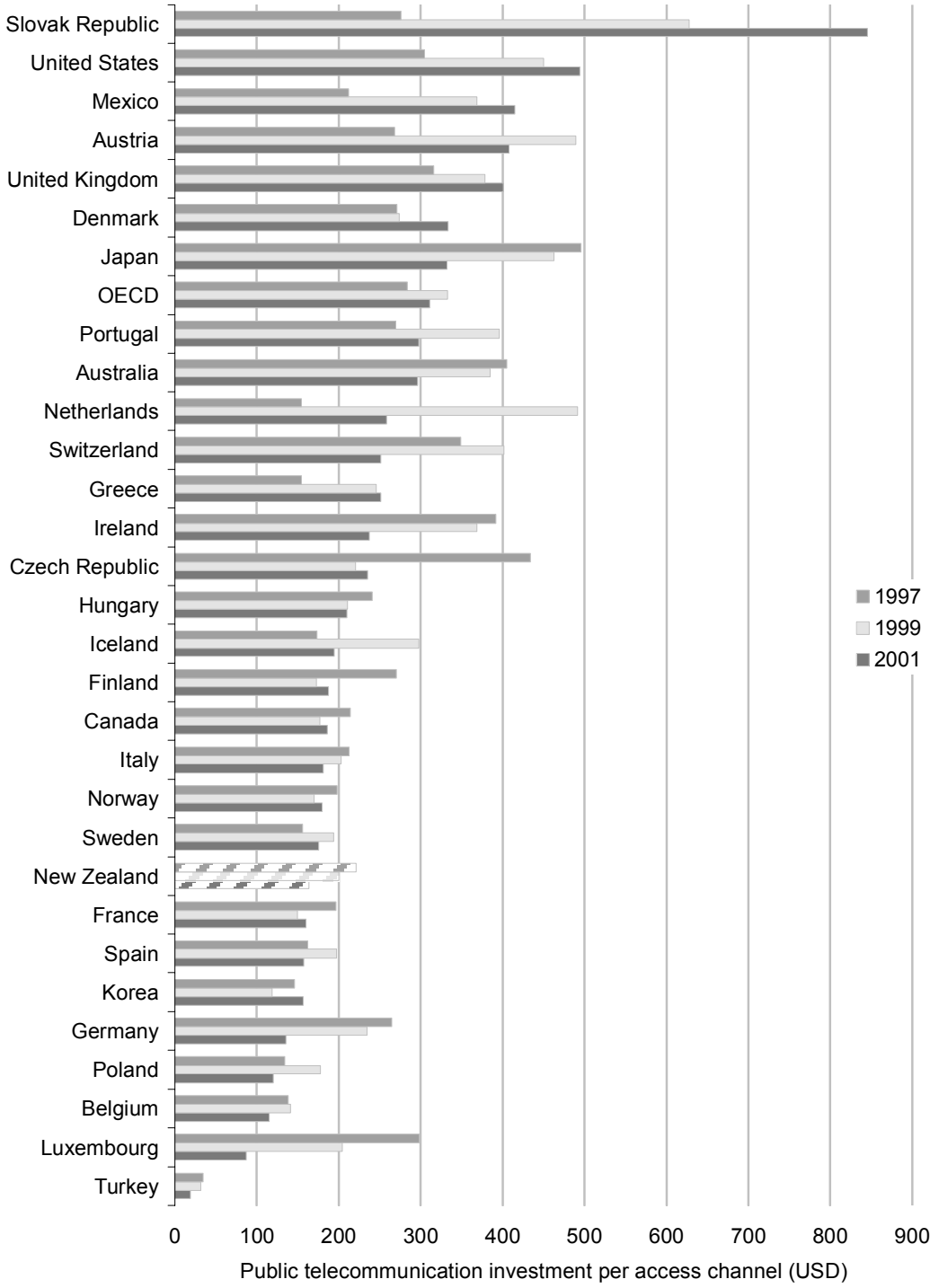

Exhibit 2: *Public telecommunication investment per access channel for 1997, 1999 and 2001 [Source: OECD, Network Strategies]*

The factors that may cause variations in public telecommunication investment per access channel include[4]:

- vendor financing – the introduction of this practice may increase investment levels by allowing more operators to invest larger amounts

- capabilities of technology – an upgrade to new and improved technology causes the unit cost of servicing customers to decline. In some cases the public telecommunication investment per access channel may be lower even though the total investment overall is higher.

These factors can cause variations in public telecommunication investment per access channel over time and across countries.

Exhibit 3 shows how the public telecommunication investment per access channel has varied over the period 1997 to 2001 for a sample of OECD countries. In general the public telecommunication investment per access channel is between USD150 and USD400. The outlying country is the Slovak Republic which has experienced marked growth in levels of investment since 1998. This is possibly due to very low levels of investment in previous years, although countries similar to the Slovak Republic (the Czech Republic, Hungary and Poland) have not experienced such rapid investment growth over this period. New Zealand's public telecommunication investment per access channel (shown in red) is between USD164 and USD222 and is at the lower end of the range of OECD countries.

4 OECD (2003) *Communications Outlook 2003*.

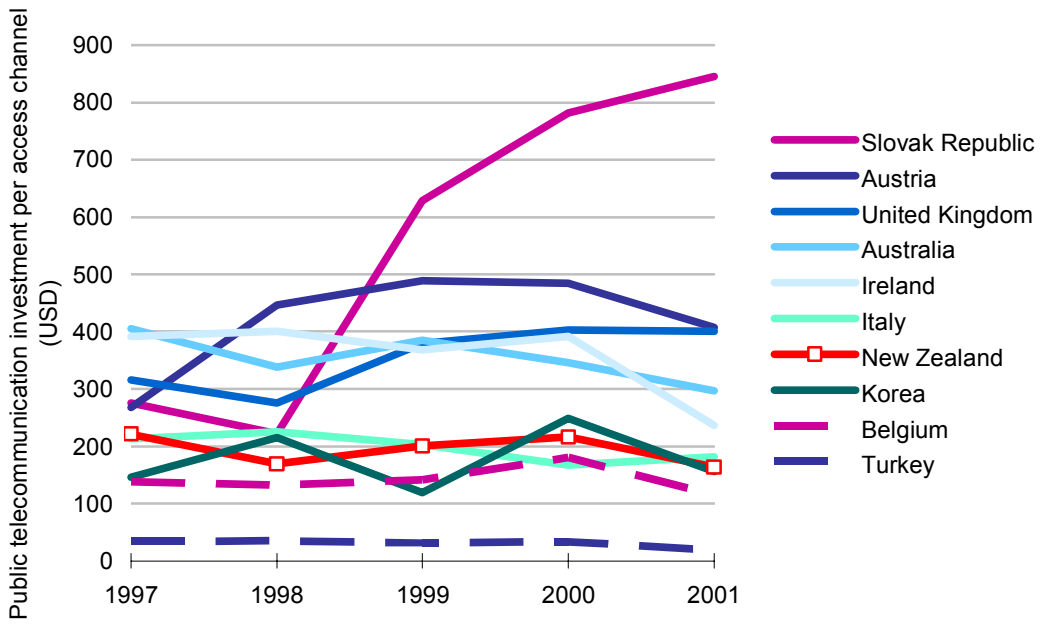

Exhibit 3: *Public telecommunication investment per access channel for a sample of OECD countries [Source: OECD, Network Strategies]*

New Zealand's public telecommunication investment per access channel has declined in comparison with OECD trends (Exhibit 4). In 1997 New Zealand was close to the median but fell sharply below the first quartile in 1998, and although investment levels improved slightly the following two years, New Zealand decreased again in 2001 to only just above the first quartile.

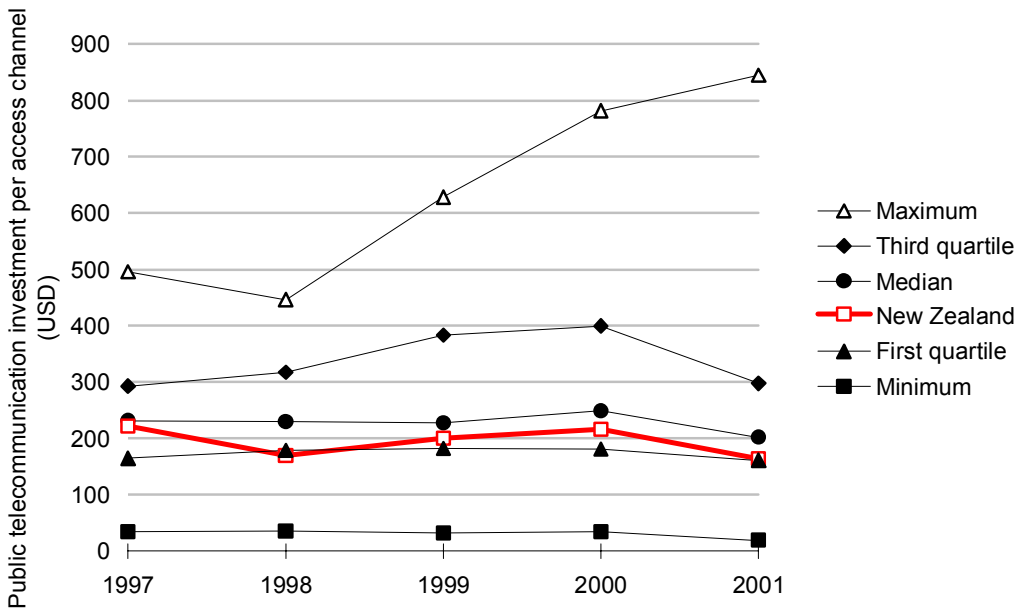

Exhibit 4: *Comparing New Zealand's public telecommunication investment per access channel with the OECD countries [Source: OECD, Network Strategies]*

Levels of investment in the OECD decline between 2000 and 2001. Prior to 2000 investment had been growing at record levels due to[5]:

- roll out of second generation (2G) mobile networks
- new entrants to the local access market
- investment in national and international backbone infrastructure
- expectations of the 'dot.com bubble'.

During 2001 a combination of the downturn in the telecommunication market and the completion of 2G networks lead to a decline in investment levels. The exaggerated expectations during the hype of the 'dot.com bubble' caused overinvestment and poor management decisions, which left companies with high levels of debt. A number of new entrants pulled out of the market, while others cut back on investment.

5 OECD (2003) *Communications Outlook 2003*.

Over the short term we see clear evidence that public telecommunication investment per access channel fluctuates from year to year. An examination of smoothed data (such as short term averages) would provide a better indication of medium term trends in investment levels.

This smoothed data shows that during the period 1997 to 2001 investment levels within OECD countries have been relatively constant. However New Zealand is one of only three OECD countries whose three year average public telecommunication investment per access channel has decreased each period. Exhibit 5 shows New Zealand's declining levels of investment compared to the OECD median when three year averages of public telecommunication investment per access channel are used. New Zealand's average for 1988-1990 is above the median for the OECD, falling below the median for 1994-96 and approaches the first quartile thereafter.

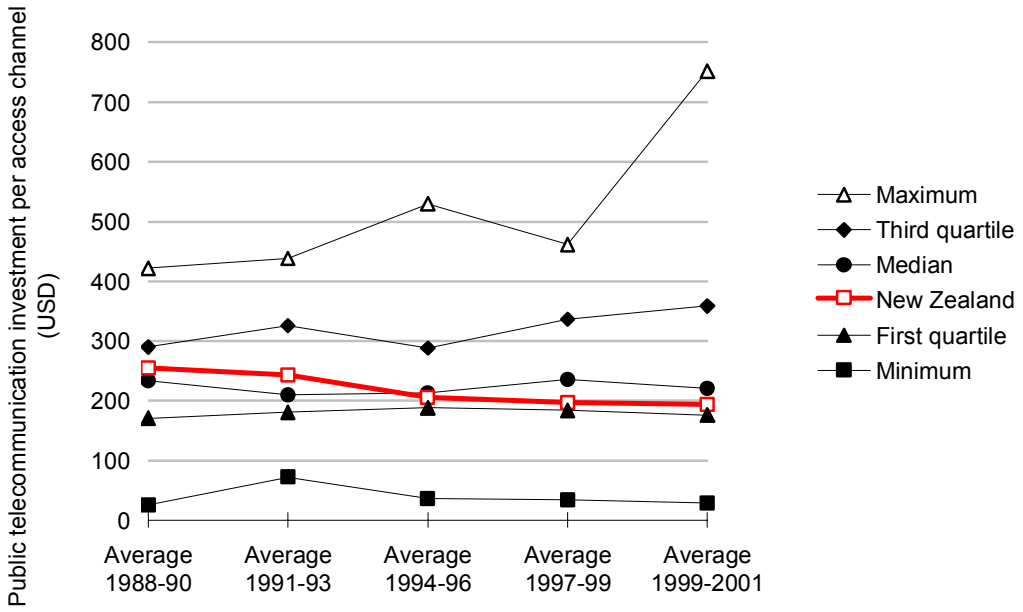

Exhibit 5: *Three year average public telecommunication investment per access channel [Source: OECD, Network Strategies]*

The rates of change of the three year average public telecommunication investment per access channel for a sample of OECD countries are shown in Exhibit 6. In three countries – New Zealand, Spain and Turkey – investment continued to decrease over the entire period.

Decreases in average investment levels in other countries, such as Korea, Belgium, Italy and Luxembourg, are balanced by increases in other years. It is reasonable to assume that after a period of heavy investment in telecommunications a country may invest much less in the following years. Alternatively, after a period of decreasing investment a country may begin to invest strongly.

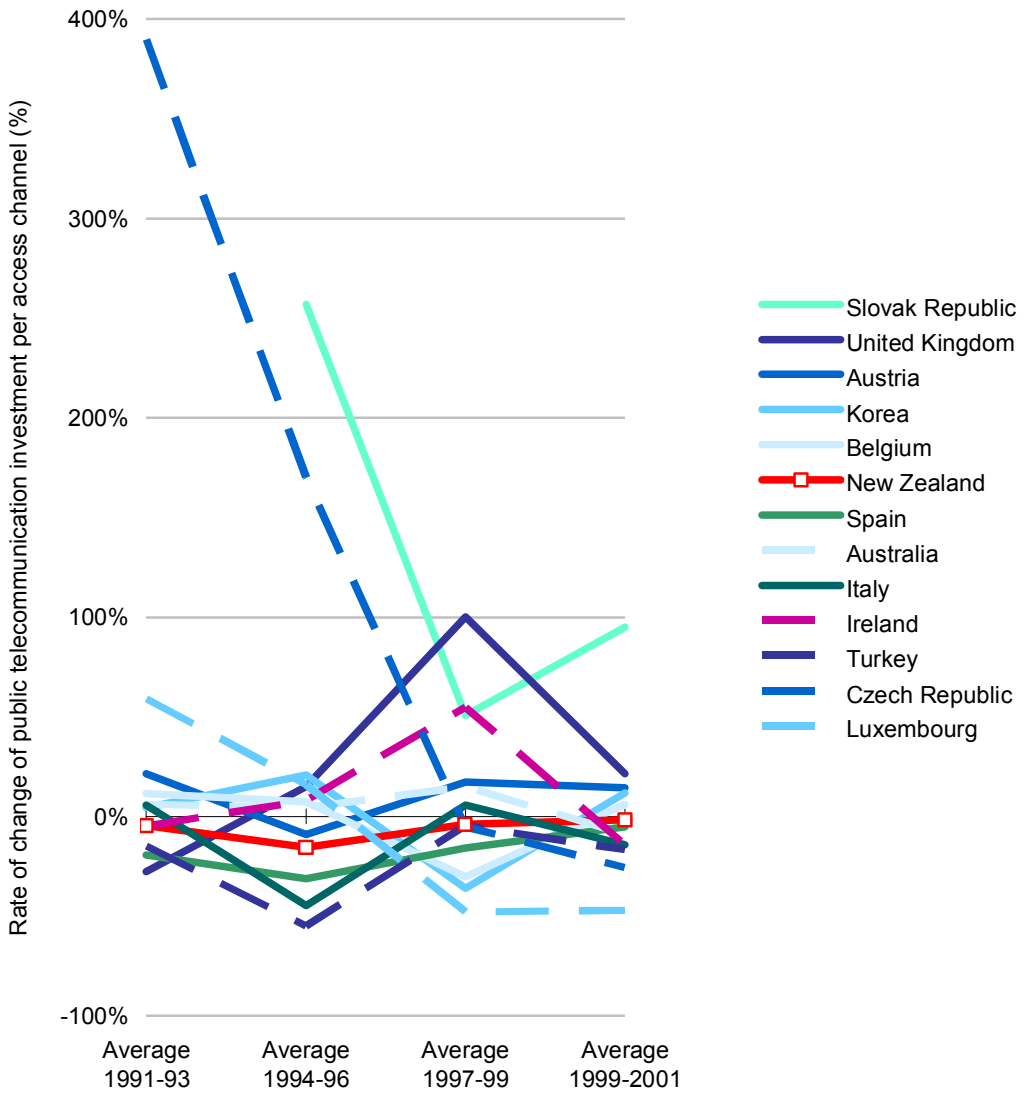

Exhibit 6: *Rates of change of three year average public telecommunication investment per access channel [Source: OECD, Network Strategies]*

Exhibit 7 compares New Zealand's rates of change of three year average public telecommunication investment per access channel with that of OECD countries. Note that the spread between the minimum and the third quartile is quite small. New Zealand lies between the first quartile and the median.

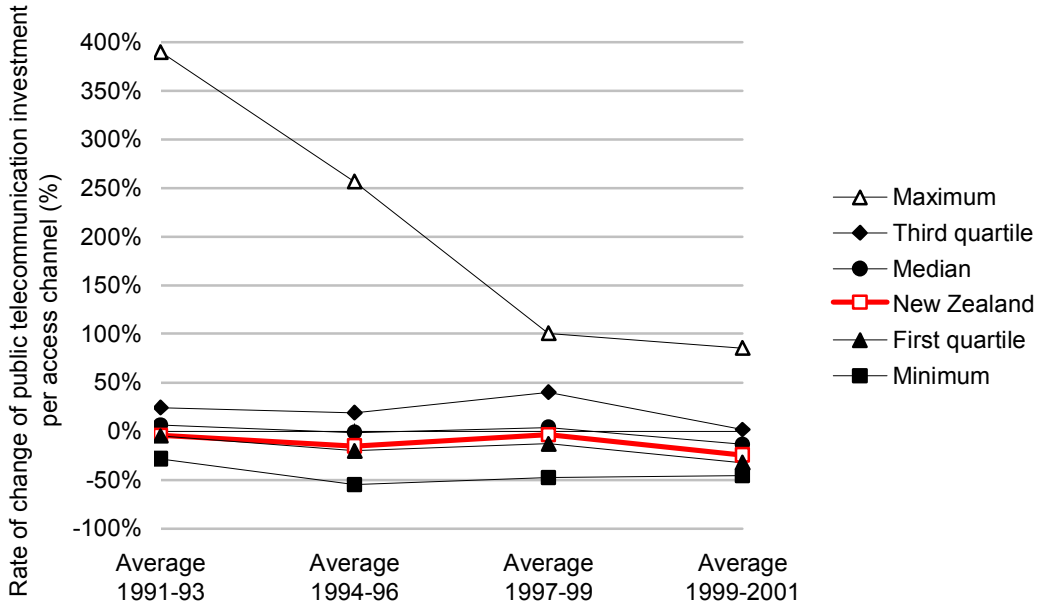

Exhibit 7: *Rates of change of three year average public telecommunication investment per access channel [Source: OECD, Network Strategies]*

The strongest levels of growth in the three year average public telecommunication investment per access channel occurred during the 1991-93 and 1994-96 periods and in the countries shown in Exhibit 8.

Jurisdiction	Average 1991-93	Average 1994-96	Average 1997-99	Average 1999-2001
Czech Republic	+390%	+170%	-5%	-26%
Slovak Republic	n.a.	+257%	+51%	+95%
Poland	+175%	+26%	+3%	+1%
Greece	+135%	-19%	+56%	+10%
United Kingdom	-28%	+15%	+100%	+21%

Exhibit 8: *Countries with a rate of change of three year average public telecommunication investment per access channel greater than 100% [Source: OECD, Network Strategies]*

In the Czech Republic, Slovak Republic and Poland the increase in investment levels coincides with the fall of communism, which may have opened potential for investors. In the United Kingdom the largest increase occurs at the time of greatest growth in the global telecommunications market.

The three year average public telecommunication investment per access channel has increased each period in only three countries: Poland, Iceland and the United States.

The countries with the largest reductions in investment levels are shown in Exhibit 9. As stated previously the three year average public telecommunication investment per access channel in Turkey has decreased each period. In Luxembourg and Hungary the reductions follow strong increases in earlier years.

Jurisdiction	*Average 1991-93*	*Average 1994-96*	*Average 1997-99*	*Average 1999-2001*
Turkey	-15%	-55%	-5%	-17%
Luxembourg	+59%	+16%	-48%	-47%
Italy	+6%	-45%	+6%	-14%
Hungary	+50%	-3%	-37%	-3%
Korea	+4%	+21%	-36%	+12%

Exhibit 9: *Countries with a rate of change of three year average public telecommunication investment per access channel below -35% [Source: OECD, Network Strategies]*

2.2 Analysis of ITU investment data over time

The differences between the ITU's annual telecommunication investment per main line and the OECD's public telecommunication investment per access channel are illustrated in Exhibit 10. The data differs in some countries by over 100% but in other countries the levels of investment are almost identical.

Jurisdiction	*1997*	*1998*	*1999*	*2000*	*2001*
Australia	-3%	-25%	-9%	3%	50%
Austria	14%	-4%	-2%	-56%	-17%
Belgium	111%	32%	1%	51%	113%
Canada	4%	10%	13%	38%	40%
Czech Republic	-0%	0%	1%	25%	35%
Denmark	-2%	-2%	-1%	-0%	1%
Finland	7%	38%	78%	60%	54%
France	0%	10%	33%	15%	17%
Germany	-25%	-19%	-12%	4%	45%
Greece	-1%	-55%	-47%	34%	7%
Hungary	-32%	-15%	-31%	-28%	-5%
Iceland	-0%	-3%	-1%	1%	1%
Ireland	-26%	-21%	-2%	-48%	n/a
Italy	22%	-7%	-20%	91%	47%
Japan	1%	6%	4%	21%	21%
Korea	172%	3%	188%	42%	58%
Luxembourg	-5%	167%	40%	269%	109%
Mexico	-3%	0%	-2%	-1%	1%
Netherlands	19%	-30%	-43%	2%	2%
New Zealand	-1%	-1%	-15%	-26%	17%
Norway	45%	211%	238%	270%	n/a
Poland	29%	-17%	-20%	-32%	n/a
Portugal	24%	0%	1%	0%	32%
Slovak Republic	-17%	-22%	-89%	-92%	-82%
Spain	-6%	-31%	76%	154%	165%
Sweden	-22%	-1%	-0%	101%	26%
Switzerland	-0%	-1%	-0%	0%	23%
Turkey	0%	0%	0%	0%	0%
United Kingdom	24%	38%	13%	17%	12%
United States	-56%	-62%	-68%	-73%	-70%

Exhibit 10: *Difference between ITU data and OECD data of investment per main line (access channel) [Source: ITU, OECD, Network Strategies]*

Using the ITU investment data instead of data from the OECD does not change New Zealand's ranking among the 30 OECD countries. Exhibit 11 compares the annual telecommunication investment per main line for each country during the years 1997, 1999,

2001 and 2003. Note that 2003 data was available for only 15 of the OECD countries, including New Zealand. New Zealand's ranking in 2001 is 22, identical with that for the OECD data (Exhibit 2).

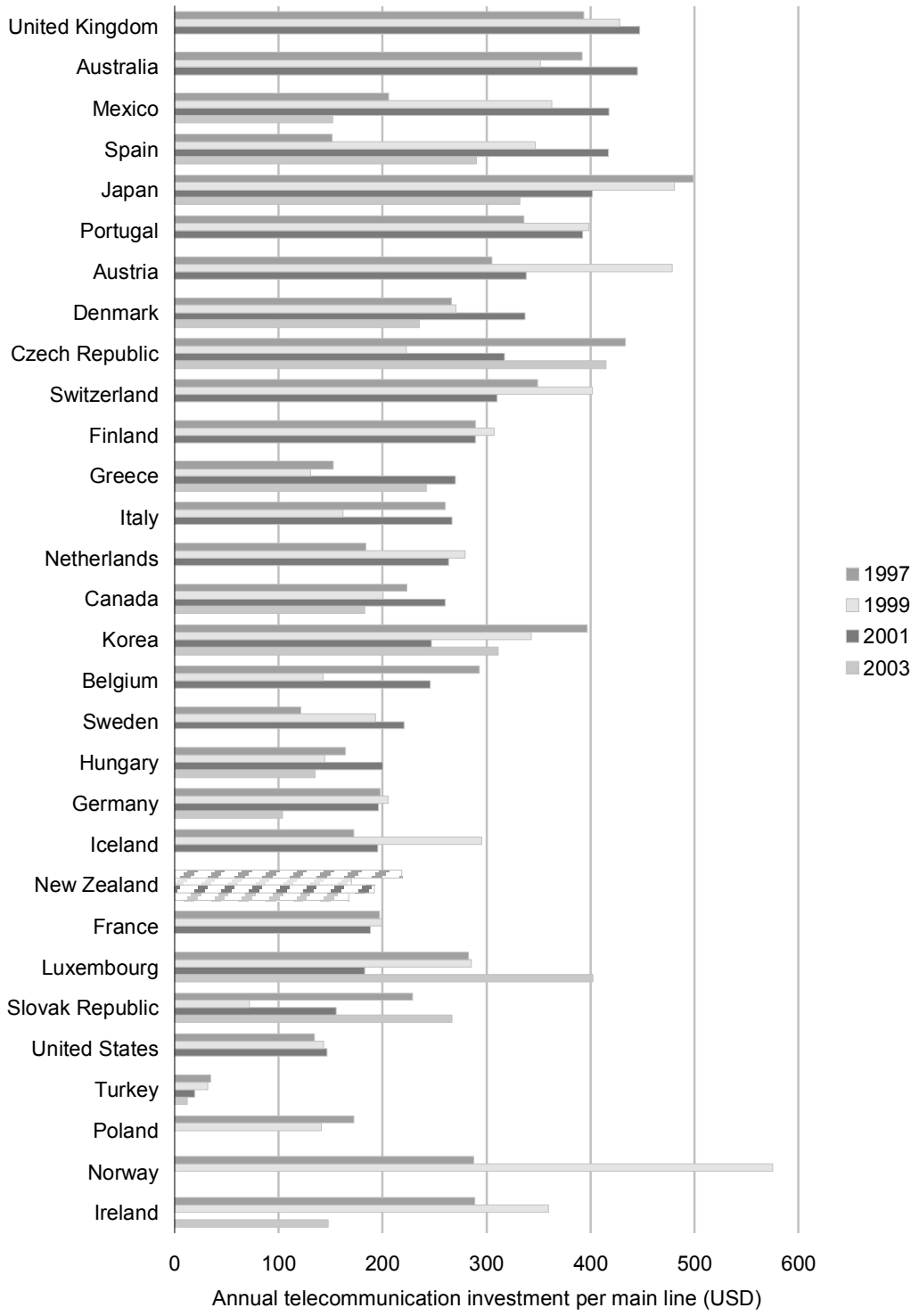

Exhibit 11: *Annual telecommunication investment per main line for 1997, 1999, 2001 and 2003 [Source: ITU, Network Strategies]*

The level of ITU investment over time for a sample of OECD countries is illustrated in Exhibit 12. For most of the countries in the OECD the annual investment lies in the range of USD150-400 per main line, similar to the OECD investment data (Exhibit 3). New Zealand's annual telecommunications investment per main line (shown in red) ranges between USD149 and USD277. In 1996 New Zealand's annual telecommunication investment per main line was at its peak and the twelfth highest in the OECD. From 1997, of the sample shown, only Turkey and the Slovak Republic have lower investment levels than New Zealand and in the Slovak Republic investment levels rapidly increase after 2000.

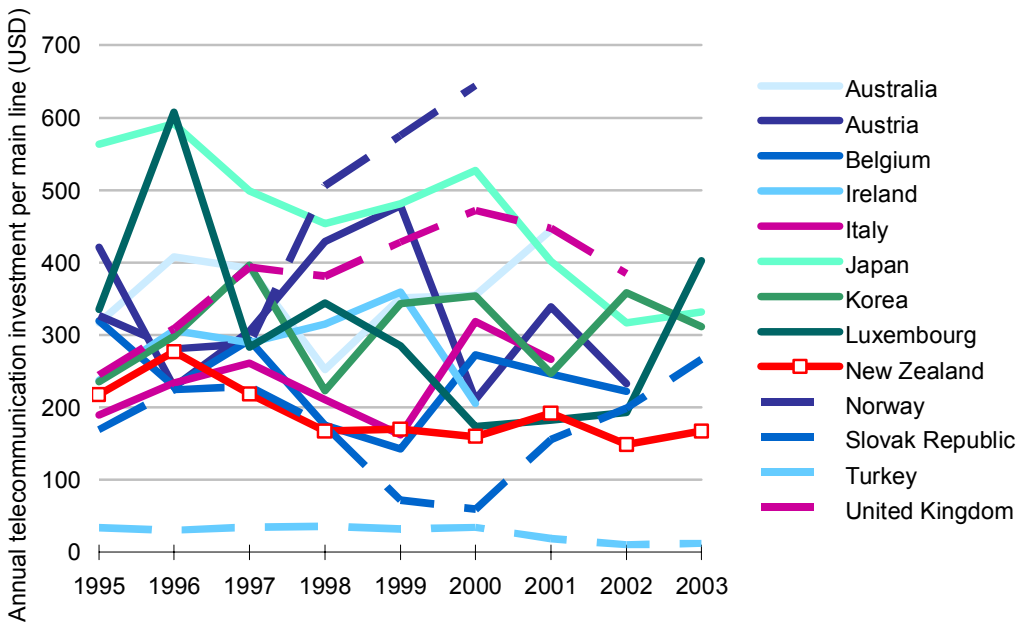

Exhibit 12: *Annual telecommunication investment per main line for the 30 OECD countries [Source: ITU, Network Strategies]*

New Zealand's ranking for annual investment per main line has declined since 1996. In 1996 the level of investment in New Zealand was very close to the third quartile but had fallen to the first quartile by 1998 (Exhibit 13).

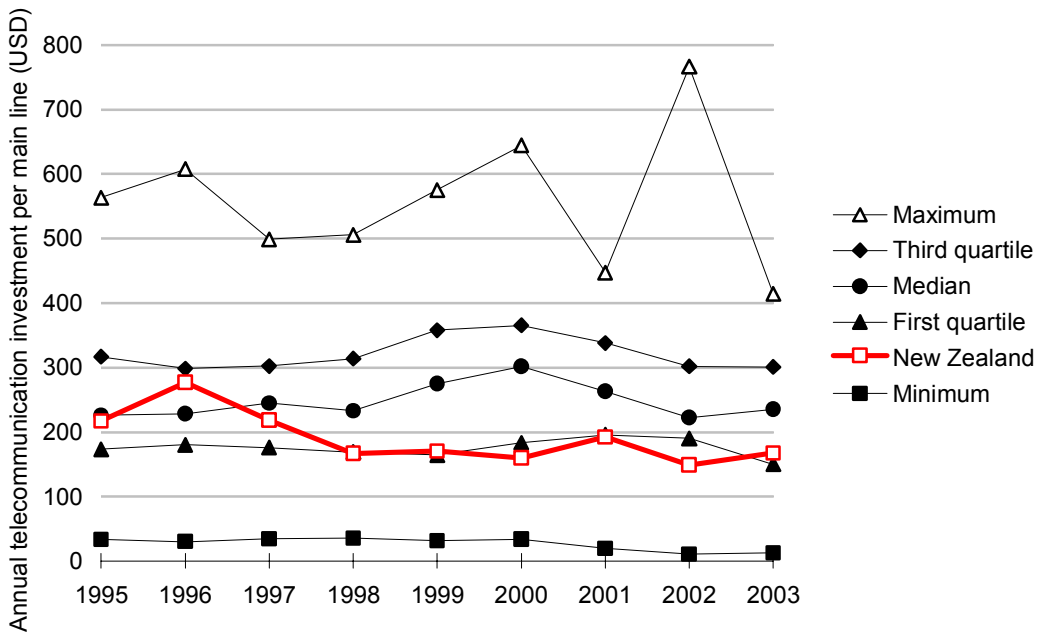

Exhibit 13: *Comparing New Zealand's annual telecommunication investment per main line with the OECD countries [Source: ITU, Network Strategies]*

This decline can be seen more clearly in Exhibit 14, which shows a three-year moving average of the annual telecommunication investment per main line. New Zealand's position falls from the median to below the first quartile.

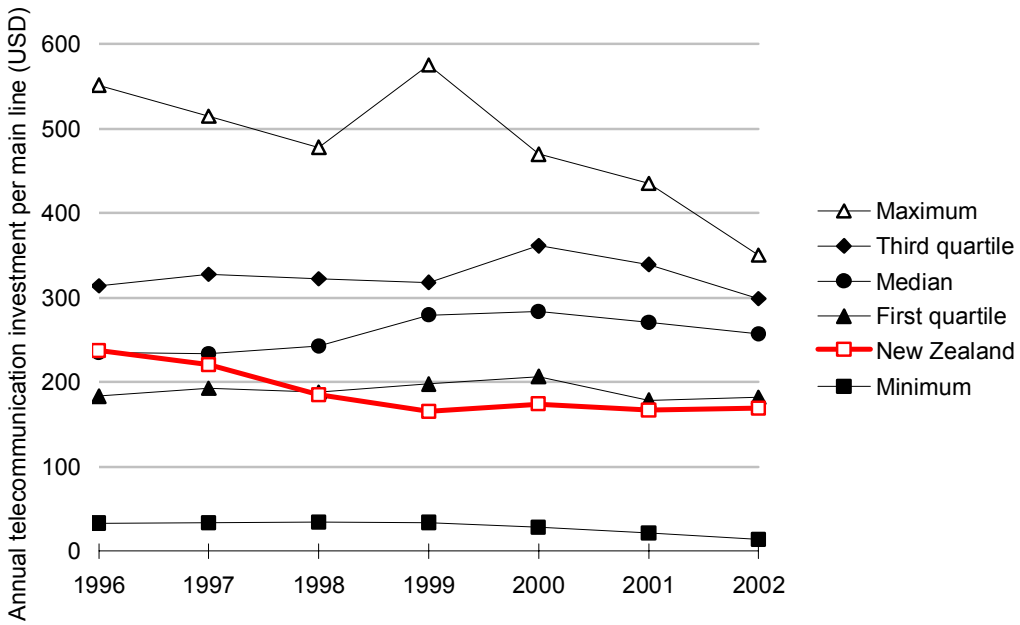

Exhibit 14: *Three year moving averages of annual telecommunication investment per main line [Source: ITU, Network Strategies]*

The rates of change between these moving averages are shown for a sample of countries in Exhibit 15. New Zealand's rates of change are predominantly negative, with levels of investment decreasing the most during the late nineties. The investment levels in other countries have been more changeable, with periods of strong positive and negative growth.

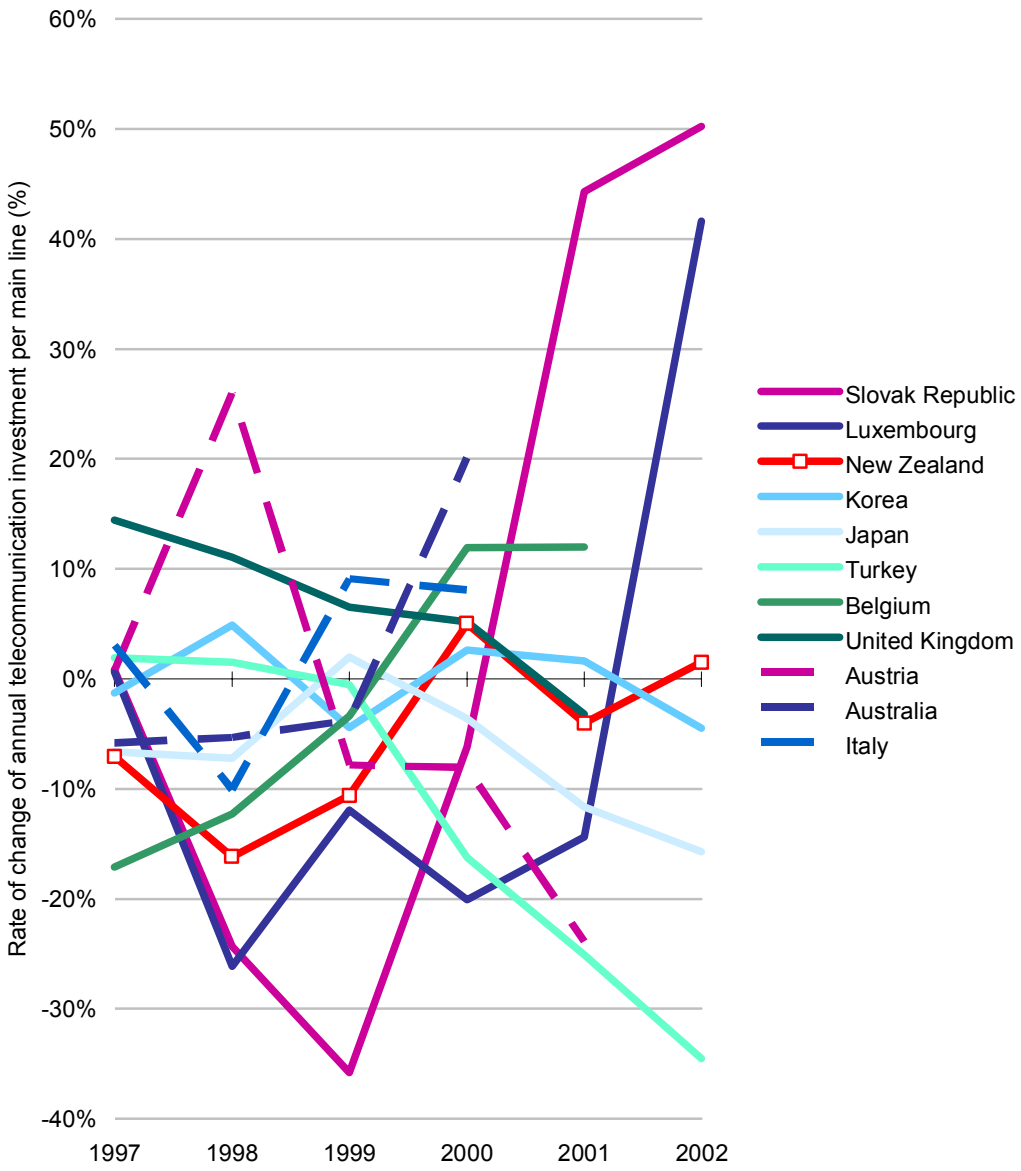

Exhibit 15: *Rates of change of three year moving averages of annual telecommunication investment per main line for a sample of OECD countries [Source: ITU, Network Strategies]*

From 1997 to 2000 the moving average levels of investment in New Zealand declined while in the OECD investment generally remained at a constant level. From 2001 New Zealand's decline in moving average investment levels has flattened out as OECD levels

began to decrease. Exhibit 16 compares the rates of change in three year moving averages between New Zealand and the OECD.

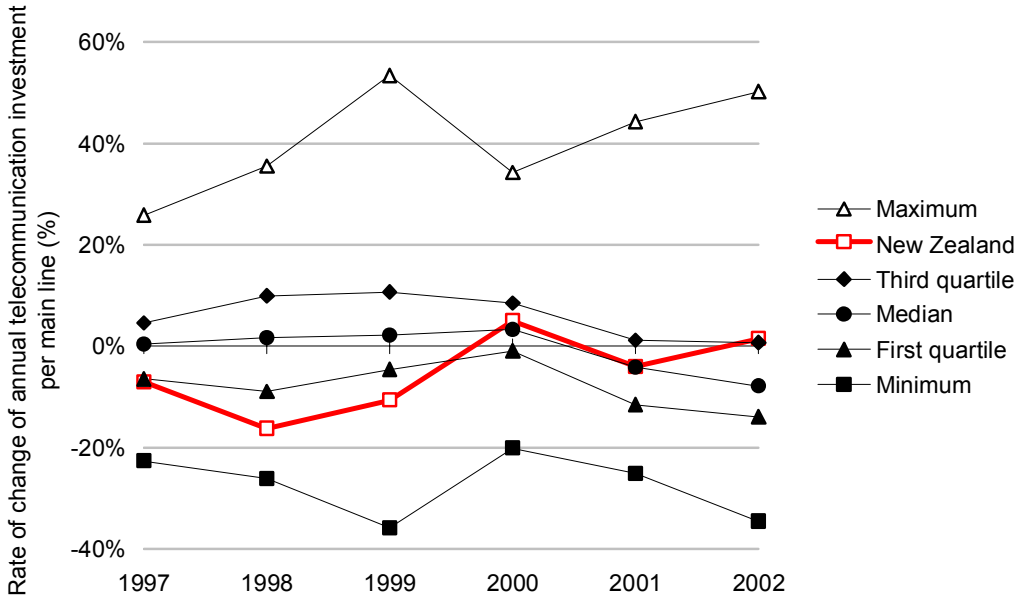

Exhibit 16: *Rates of change of three year moving averages of annual telecommunication investment per main line [Source: ITU, Network Strategies]*

2.3 Summary

The levels of investment in New Zealand are comparably low for an OECD country and have declined over the period from the mid 1990s. New Zealand's ranking amongst OECD countries fell from 16 to 22 between 1997 and 2001 (based on OECD investment data) and from 12 to 25 between 1996 and 2000 (based on ITU investment data). Over these periods in New Zealand:

- the public telecommunication investment per access channel decreased by 26% between 1997 and 2001 (OECD)
- the annual telecommunication investment per main line decreased by 42% between 1996 and 2000 (ITU).

3 Interconnection prices

The available interconnection prices for our sample of OECD countries are provided in Exhibit 17. Of the countries studied New Zealand had the second most expensive price for interconnection in 2001. The decline in price after 2001 has brought New Zealand's price below the median. The method used to standardise the prices is described in Annex A.

Jurisdictions	*Interconnection price (US cents – average annual exchange rate)*						
	1997	*1998*	*1999*	*2000*	*2001*	*2002*	*2003*
Switzerland	n.a.	2.73	2.02	1.32	1.30	1.28	2.44
Greece	n.a.	n.a.	n.a.	1.22	1.08	0.95	1.14
Austria	n.a.	n.a.	1.65	0.87	0.80	0.81	0.97
Portugal	n.a.	n.a.	3.20	1.17	0.95	0.84	0.92
Spain	n.a.	n.a.	n.a.	1.03	0.71	0.75	0.82
Belgium	n.a.	n.a.	1.26	0.91	0.69	0.73	0.82
Italy	n.a.	n.a.	n.a.	n.a.	0.75	0.74	0.76
Median	**1.11**	**1.21**	**1.26**	**0.87**	**0.69**	**0.70**	**0.76**
France	n.a.	1.79	1.34	0.79	0.70	0.65	0.76
Germany	n.a.	n.a.	n.a.	n.a.	0.60	0.70	0.76
Netherlands	1.11	0.99	1.09	0.82	0.60	0.60	0.68
New Zealand	**n.a.**	**n.a.**	**n.a.**	**n.a.**	**1.45**	**0.48**	**0.57**
Ireland	n.a.	1.10	0.99	0.51	0.51	0.50	0.56
Denmark	1.34	1.32	0.88	0.63	0.59	0.59	0.53
United Kingdom	0.66	0.64	0.60	0.53	0.48	0.47	0.48
Australia	n.a.	n.a.	n.a.	n.a.	0.42	0.43	0.45
Finland	n.a.	n.a.	n.a.	n.a.	1.29	n.a.	n.a.
Iceland	n.a.	n.a.	n.a.	n.a.	0.68	n.a.	n.a.
Sweden	n.a.	n.a.	n.a.	n.a.	0.62	n.a.	n.a.
Norway	n.a.	n.a.	n.a.	n.a.	0.55	n.a.	n.a.

Exhibit 17: *Standardised interconnection prices for a sample of OECD countries [Source: Network Strategies]*

If PPP rates are used instead of average annual exchange rates the trends in prices over time are smoother. Exhibit 18 shows the interconnection prices converted into New Zealand cents using PPP rates. Under this method of currency conversion New Zealand's price is very similar to the median for the sample once regulation is introduced in 2001.

Jurisdictions	*Interconnection price (NZ cents – PPP)*						
	1997	*1998*	*1999*	*2000*	*2001*	*2002*	*2003*
Greece	n.a.	n.a.	n.a.	2.70	2.53	2.11	2.05
Portugal	n.a.	n.a.	6.64	2.78	2.35	1.93	1.73
Switzerland	n.a.	3.01	2.23	1.66	1.66	1.52	1.40
Spain	n.a.	n.a.	n.a.	2.16	1.54	1.51	1.34
Austria	n.a.	n.a.	2.39	1.47	1.41	1.33	1.32
Belgium	n.a.	n.a.	1.82	1.52	1.26	1.24	1.14
Italy	n.a.	n.a.	n.a.	n.a.	1.49	1.35	1.14
France	n.a.	2.53	1.95	1.34	1.27	1.11	1.07
Median	**1.50**	**1.57**	**1.82**	**1.47**	**1.26**	**1.11**	**1.07**
New Zealand	**n.a.**	**n.a.**	**n.a.**	**n.a.**	**3.46**	**1.03**	**0.99**
Germany	n.a.	n.a.	n.a.	n.a.	1.01	1.10	0.99
Netherlands	1.58	1.43	1.58	1.38	1.06	0.98	0.91
Australia	n.a.	n.a.	n.a.	n.a.	0.90	0.86	0.74
Ireland	n.a.	1.63	1.45	0.83	0.83	0.76	0.72
United Kingdom	0.94	0.89	0.83	0.79	0.77	0.72	0.67
Denmark	1.50	1.50	1.04	0.86	0.86	0.79	0.58
Finland	n.a.	n.a.	n.a.	n.a.	2.15	n.a.	n.a.
Iceland	n.a.	n.a.	n.a.	n.a.	1.08	n.a.	n.a.
Sweden	n.a.	n.a.	n.a.	n.a.	0.99	n.a.	n.a.
Norway	n.a.	n.a.	n.a.	n.a.	0.79	n.a.	n.a.

Exhibit 18: *Standardised interconnection prices (PPP) for a sample of OECD countries [Source: Network Strategies]*

4 Concluding remarks

Our investigation of telecommunications investment has shown that the level of investment in New Zealand is well below the OECD median. New Zealand's interconnection prices in 2001 were very high compared to other OECD countries, but were below the median of the sample in 2003.

Annex A: Standardisation of interconnection prices

A.1 New Zealand prices

Interconnection rates for New Zealand in 2001 were obtained from a Telstra Saturn contract, with a commencement date of 1 August 2000. For 2002 and 2003 the rates for periods one and two of the TSLRIC draft determination[6] were used.

A.2 Standardised prices

This section explains the methodology and key assumptions used to derive the interconnection prices used within our subsequent analysis of the relationship between investment and interconnection prices. The key steps in our approach are:

- collect the terminating interconnection charges at 31 December of each available year
- calculate the average per minute price for each call type
- determine a weighted average interconnection price
- convert the local prices into a common currency (in this instance USD).

Collection of sample data

Termination rates valid as at 31 December each year were obtained for the following call types:

- local interconnection
- single tandem
- double tandem.

6 Commerce Commission (2005). *Draft Determination on the application for pricing review for designated interconnect services*. 11 April 2005. Available at http://www.comcom.govt.nz.

Average per minute price

Some operators apply not only a per-minute charge for interconnection, but also a call set-up (per call) charge. For those countries in which call set-up fees are charged, the calculation of an average per-minute rate requires an assumed call duration. This study uses a duration of 3.73 minutes, which is consistent with the Commerce Commission's 2002 interconnection benchmarking[7].

Weighted average interconnection price

To calculate a weighted average interconnection price for each country the prices must be averaged across the different pricing periods (peak/off peak) and different call types. In order to calculate the weighted average over different times of the day a fixed traffic profile is used (provided in Annex B). To determine the weighted average price over different call types the following interconnection traffic profile was used:

- local – 34.08%
- single tandem – 64.55%
- double tandem – 1.33%.

Currency conversion

Prior to 1 January 2002 the prices in euro zone countries were expressed in the original pre-euro currency. Interconnection charges in euro zone countries prior to this date were converted to euros at the fixed exchange rate detailed in Annex C.

7 Commerce Commission (2002). *International benchmarking report: a comparative review of interconnection pricing*. 2 September 2002. Available at http://www.comcom.govt.nz.

The OECD average annual exchange rates used to convert interconnection prices to USD are provided in Annex D.

Annex B: Traffic profile

Exhibit B.1 shows the proportions of fixed traffic made each hour of the day.

Hour beginning	*Hour ending*	*Weekdays*	*Saturday*	*Sunday*
0:00	1:00	0.42%	0.10%	0.10%
1:00	2:00	0.07%	0.03%	0.01%
2:00	3:00	0.07%	0.01%	0.01%
3:00	4:00	0.06%	0.01%	0.01%
4:00	5:00	0.06%	0.01%	0.01%
5:00	6:00	0.06%	0.01%	0.01%
6:00	7:00	0.38%	0.03%	0.03%
7:00	8:00	1.42%	0.14%	0.12%
8:00	9:00	3.32%	0.49%	0.37%
9:00	10:00	5.29%	0.73%	0.61%
10:00	11:00	4.79%	0.65%	0.60%
11:00	12:00	4.74%	0.51%	0.46%
12:00	13:00	3.66%	0.43%	0.37%
13:00	14:00	4.05%	0.45%	0.40%
14:00	15:00	4.48%	0.38%	0.35%
15:00	16:00	4.41%	0.36%	0.40%
16:00	17:00	4.29%	0.40%	0.55%
17:00	18:00	2.35%	0.41%	0.61%
18:00	19:00	4.17%	0.45%	0.77%
19:00	20:00	10.77%	1.27%	2.42%
20:00	21:00	11.67%	1.26%	2.41%
21:00	22:00	6.24%	0.65%	1.15%
22:00	23:00	1.63%	0.20%	0.27%
23:00	0:00	0.40%	0.07%	0.07%

Exhibit B.1: New Zealand fixed traffic profile [Source: Network Strategies]

Annex C: Euro exchange rates

The fixed exchange rates used to convert prices prior to 1 January 2002 into euros are provided in Exhibit C.1.

Country	*Equivalent to 1 euro*
Austria	13.76
Belgium	40.34
France	6.56
Greece	340.75
Ireland	0.79
Netherlands	2.20
Portugal	200.48
Spain	166.39

Exhibit C.1: *Euro exchange rates [Source: European Commission]*

Annex D: OECD average annual exchange rates

Exhibit D.1 shows the average annual exchange rates used to convert interconnection prices to USD.

Jurisdiction	*1995*	*1996*	*1997*	*1998*	*1999*	*2000*	*2001*	*2002*	*2003*
Australia							1.93	1.84	1.54
Austria					0.94	1.09	1.12	1.06	0.89
Belgium					0.94	1.09	1.12	1.06	0.89
Denmark			6.60	6.70	6.98	8.08	8.32	7.88	6.58
Finland							1.12		
France				0.90	0.94	1.09	1.12	1.06	0.89
Germany							1.12	1.06	0.89
Greece							97.42		
Iceland							1.12	1.06	0.89
Italy				0.89	0.94	1.09	1.12	1.06	0.89
Ireland			0.89	0.90	0.94	1.09	1.12	1.06	0.89
Netherlands							2.38	2.16	1.72
New Zealand							8.99		
Norway					0.94	1.09	1.12	1.06	0.89
Portugal				0.90	0.94	1.09	1.12	1.06	0.89
Spain							10.33		
Sweden				1.45	1.50	1.69	1.69	1.56	1.35
Switzerland							1.93	1.84	1.54
United Kingdom	0.63	0.64	0.61	0.60	0.62	0.66	0.69	0.67	0.61

Exhibit D.1: *Average annual exchange rates to USD [Source: OECD]*

Annex E: OECD PPP rates

	1997	*1998*	*1999*	*2000*	*2001*	*2002*	*2003*
Australia	0.91	0.90	0.90	0.92	0.91	0.93	0.95
Austria	0.64	0.64	0.65	0.64	0.63	0.64	0.65
Belgium	0.64	0.64	0.65	0.65	0.62	0.62	0.63
Canada	0.83	0.82	0.83	0.84	0.81	0.82	0.84
Czech Republic	8.68	9.46	9.82	9.82	9.73	10.13	10.24
Denmark	5.89	5.86	5.86	5.92	5.75	5.94	5.97
Finland	0.66	0.67	0.68	0.69	0.67	0.70	0.69
France	0.64	0.64	0.65	0.64	0.62	0.63	0.63
Germany	0.69	0.69	0.70	0.69	0.67	0.68	0.68
Greece	0.44	0.46	0.47	0.48	0.48	0.48	0.49
Hungary	57.39	63.68	69.60	75.46	75.93	81.41	85.64
Iceland	52.65	54.27	56.48	58.58	61.18	65.46	65.81
Ireland	0.57	0.60	0.64	0.67	0.68	0.70	0.69
Italy	0.56	0.55	0.56	0.57	0.56	0.58	0.59
Japan	116.47	114.61	112.94	108.16	101.69	99.90	96.29
Korea	518.47	536.62	526.18	508.06	497.32	504.90	505.50
Luxembourg	0.70	0.69	0.68	0.70	0.69	0.70	0.70
Mexico	3.00	3.40	3.93	4.30	4.37	4.56	4.74
Netherlands	0.62	0.62	0.64	0.65	0.63	0.65	0.66
New Zealand	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Norway	6.25	6.42	6.42	6.35	6.28	6.48	6.53
Poland	1.02	1.12	1.21	1.28	1.27	1.29	1.28
Portugal	0.44	0.44	0.45	0.46	0.45	0.46	0.47
Slovak Republic	9.79	10.15	10.89	11.28	11.21	11.42	11.87
Spain	0.50	0.50	0.51	0.52	0.52	0.53	0.54
Sweden	6.45	6.50	6.51	6.47	6.43	6.62	6.68
Switzerland	1.34	1.31	1.36	1.35	1.32	1.31	1.29
Turkey	49 229	85 195	133 631	190 672	292 239	424 327	522 011
United Kingdom	0.43	0.43	0.45	0.45	0.43	0.43	0.44

Exhibit E.2: PPP rates [Source: OECD]