

Comparison of OECD Broadband Markets

**A comparison of cost and performance data for
business and residential broadband products in
26 OECD countries**

Report prepared for InternetNZ

Comparison of OECD Broadband Markets: A comparison of cost and performance data for business and residential broadband products in 26 OECD countries

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Executive Summary

This report presents findings from a review of broadband price and performance data from 26 OECD countries in order to objectively compare relative broadband services with those available in New Zealand. The study, commissioned by InternetNZ, is based on 2,586 broadband packages from 388 internet service providers in 26 OECD countries collected in the last week of April and the first week of May 2006. The study covers business and residential products and includes DSL, cable, fibre to the home, satellite and wireless broadband. Key price and performance indicators are assessed on a country by country basis and comparisons of speed, cost and restrictions are made.

The top three countries in this study, Sweden, the Netherlands and Norway, all have significantly more choice, faster plans and either no usage restrictions or limits that in most cases are unlikely to ever affect customers.

New Zealand ranks 22nd in terms of broadband uptake across the OECD, something that is seen as problematic by the Government and many industry commentators. A key focus of the Digital Strategy is an attempt to raise this position. Unfortunately, New Zealand ranks equally poorly in this study.

Based on this analysis of broadband price, performance and restrictions, New Zealand comes 22nd out of 26 countries. New Zealanders face more data caps than any other country and choice is limited when compared to Australia, the UK and Ireland. It is evident from this study that New Zealand's broadband customers are not well served and this is particularly true in the small/medium sized business market.

It is impossible to draw clear conclusions regarding the relationship between regulatory environment and value or between broadband uptake, e-readiness and value from the data in this study. Most likely, it would seem that a combination of a favourable regulatory environment, geography (both physical and human) and an overall national attitude that places value in adopting broadband and other new technologies is the combination that leads to good value. Certainly, this would appear to be true for the top countries in this study.

Introduction

This report describes the results of a study of broadband products in 26 OECD countries. The data was collected during the last week of April and the first week of May 2006 and includes a range of broadband technologies. The report sets out to describe the methodology and background of the dataset. The report is based on an objective analysis of aggregated data for each country. No individual products are identified and all costs are converted into US\$ with a pricing parity adjustment made.

The report describes pertinent product details for each country, starting with an analysis of download speeds, upload speeds and a discussion on synchronous broadband products. Two cost measures are analysed, the monthly subscription and the cost of connection. An analysis of the use of data capping for broadband products identifies the different techniques and the consequences of exceeding that cap, either monetary or performance. The final variable to be analysed is contention ratio, an important detail that is not often readily available. Therefore this discussion is limited to countries where the information was published.

An overview of the dataset is then provided and the data is summarised and ranked to identify which countries have the best overall value broadband in terms of price, performance and restrictions. There follows a brief summary for each of the 26 countries included in the study. Given that the target audience for this report is in New Zealand, the commentary throughout attempts to relate findings to the New Zealand market and this is brought together in the final conclusion.

Methodology

This analysis uses 'as is' current broadband prices and specifications from a range of ISPs in each country surveyed. Data was collected between April 29 and May 7 2006. All prices, including monthly subscription and connection fee, are converted to US\$ at the exchange rate as at May 5, 2006. The Economist's price parity Big Mac Index is then used to index the US\$ cost relative to the country concerned. This produces an equalised set of data that removes the cost of living relativities associated with different countries.

Data was collected from a range of ISPs identified during the research. Depending on the level of information available, data was either collected from one or more aggregation site (such as www.adslguide.co.uk), then verified against an individual ISPs own information or it was collected directly from the websites of ISPs. This presented particular problems in certain countries where price and availability were related directly to location. In these instances a specific city was chosen (such as Paris, France or Melbourne, Australia).

Dataset

This analysis is based on a dataset drawn from information obtained on 2,586 broadband packages from 388 internet service providers in 26 OECD countries. The full OECD dataset would include 30 countries but four were excluded due to difficulties in obtaining accurate data from them in the time available. These are Greece, Japan, Korea and Turkey. The country datasets range up to approximately 90% complete, however, it is not possible to suggest a margin of error in this analysis, as it is impossible to obtain any degree of certainty with regard to percentage complete for most countries and we cannot be certain exactly how many products were available in total on a country-by-country basis. It should be noted that the data is temporal, subject to change and that other packages not included here could affect the results. The intention here is to provide as complete a dataset as possible in a limited timeframe so that a reasoned and real-time comparison can be made.

The dataset includes both business and residential packages and a range of technologies, including variations of Digital Subscriber Line (DSL), cable, fibre to the home (FTTH), wireless and satellite. However, as Table 1 shows, 72% of broadband subscribers across all 26 countries use an xDSL-based product. Over 90% of broadband subscribers in nine countries (Slovak Republic, Norway, Finland, Luxembourg, New Zealand, France, Italy, Germany and Iceland) use xDSL and only three countries (USA, Canada and the Czech Republic) have under half of all subscribers on xDSL. In the case of the US and Canada, 53% and 49% of subscribers use cable. In the Czech Republic 53% of subscribers use either cable, wireless or satellite.

Table 1: Countries and sample

Country	OECD ¹			Dataset	
	Rank	%age subscribers	%age using xDSL	Providers	Products
Australia	17	13.8	78%	60	320
Austria	16	14.1	57%	8	119
Belgium	10	18.3	62%	10	72
Canada	8	21.9	46%	15	85
Czech Republic	24	6.4	47%	7	96
Denmark	4	25	61%	4	45
Finland	6	22.5	87%	6	37
France	14	15.2	94%	16	71
Germany	18	13	97%	28	169
Hungary	25	6.3	65%	3	21
Iceland	1	26.7	97%	3	17
Ireland	23	6.7	75%	65	291
Italy	19	11.9	95%	20	99
Luxembourg	15	14.9	89%	10	58
Mexico	28	2.2	68%	7	39

¹ Latest OECD data is from December 2005. See: www.oecd.org/document/39/0,2340,en_2649_34225_36459431_1_1_1_1,00.html

Netherlands	3	25.3	62%	18	110
New Zealand	22	8.1	90%	11	110
Norway	7	21.9	81%	4	47
Poland	27	2.4	67%	7	44
Portugal	21	11.5	57%	4	30
Slovak Republic	26	2.5	80%	7	41
Spain	20	11.7	79%	17	60
Sweden	9	20.3	66%	8	51
Switzerland	5	23.1	64%	9	74
United Kingdom	13	15.9	72%	30	373
United States	12	16.8	39%	11	107
OECD average		13.6	72%		

Exclusions and Limitations

Data was drawn from publicly available sources in each country. All products below 256Kbps download speed have been excluded from the analysis. Specials were excluded and only packages that did not require specific pre-qualification (such as existing tolls or cable TV customer) were included.

This paper draws on temporal cost and performance data and, therefore, makes no attempt to directly address issues such as infrastructure investment or regulation. However, it will attempt to provide a relevant commentary on these issues where they are pertinent to the dataset. In particular it is impossible to comment on how widely available a particular product might be within that country. This is particularly true for the availability of advertised download and upload speeds. For example, the dataset includes the latest advertised DSL packages from New Zealand ISPs even though there is some debate as to how widely available the advertised top speed of these products is.

Types of Network Technology

The research included all generally available network technologies. As Table 2 shows, the majority of packages reviewed were xDSL based, followed by wireless, which includes both licensed and open spectrum networks. Only 10% of the products sampled were provided directly to the building over fibre or cable networks (in this instance, 'cable' suggests a network provided primarily – or at least originally – for television and fibre suggests a ubiquitous data network).

Table 2: Types of network technology reviewed.

Technology	Products	%age
Cable	226	9%
DSL	1963	76%
FTTH	35	1%
Satellite	102	4%
Wireless	260	10%

Figure 1 shows the distribution of network technologies across each of the 26 countries sampled. Note that this might not accurately reflect the actual availability or prominence of products in the country concerned as not all data was easily available or verifiable. For example, whilst we are aware of both wireless and fibre services in Iceland we were only able to verify price and performance data for ADSL products – although as noted in Table 1, this does account for 97% of all broadband subscribers. Also, there are a significant number of cable providers in the US but most were excluded from this survey because of price discounts associated with multi-product bundling and packaged services for TV and broadband.

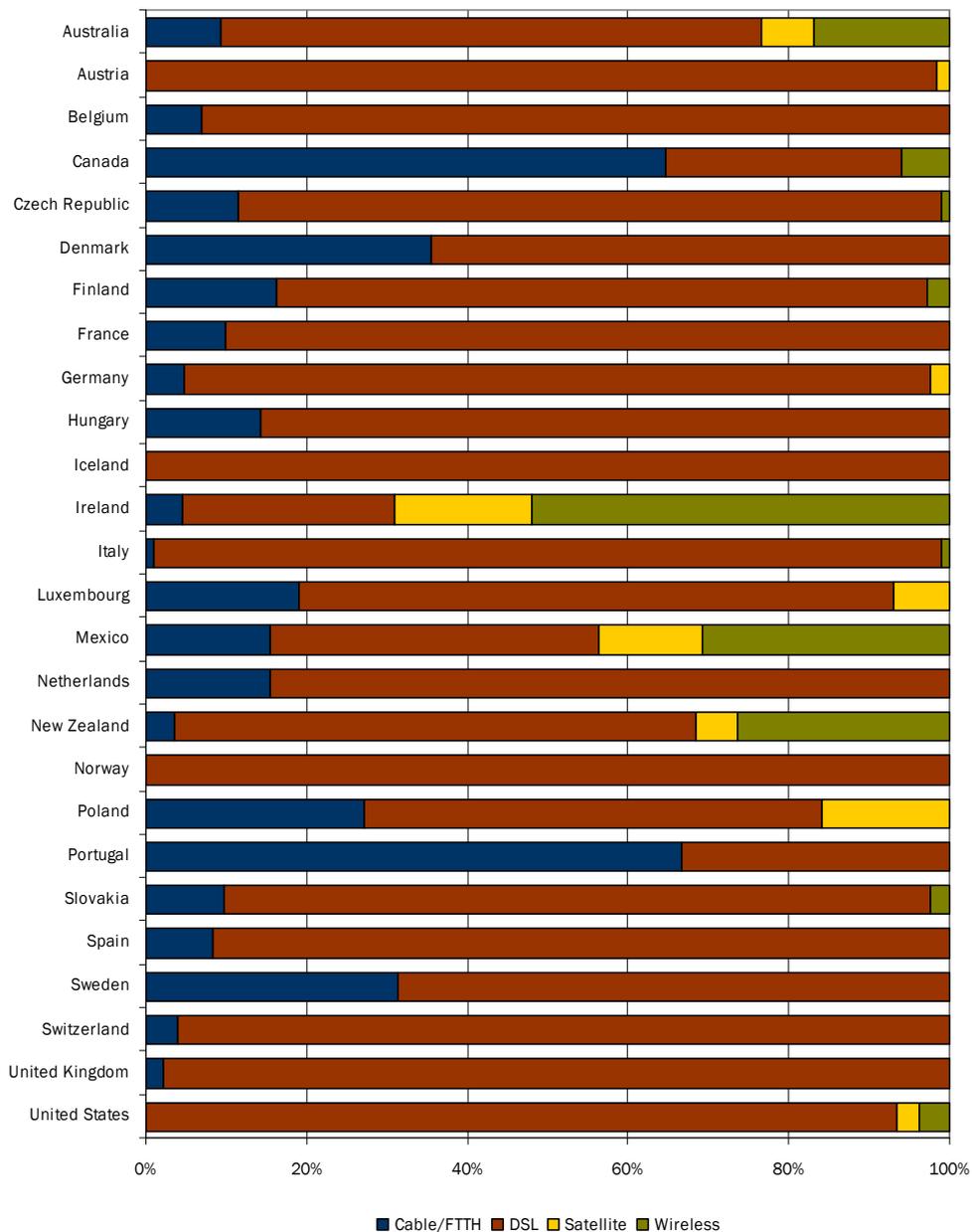


Figure 1: Distribution of different network technologies in sample.

Download speeds

Swedes had access to the fastest broadband service, which was a 100Mb fibre to the home connection at a relatively affordable US\$59 per month. Swedes also had the most choice of high speed providers, with 25% of all products providing download speeds of 20Mb or more.

Australia stands out as having the most broadband plans with a 256Kbps download speed, with 35% of all plans and New Zealand is a significant second with 25%. Poland rates third with 14% of all plans having a 256 Kbps download. Figure 2 shows, ten countries had no such low speed plans. Slovakia had the highest starting range, with all the plans surveyed offering more than 1.5Mbps. The speeds shown are advertised maximum speeds – it is not possible to verify how realistic or widely available they are in practice.

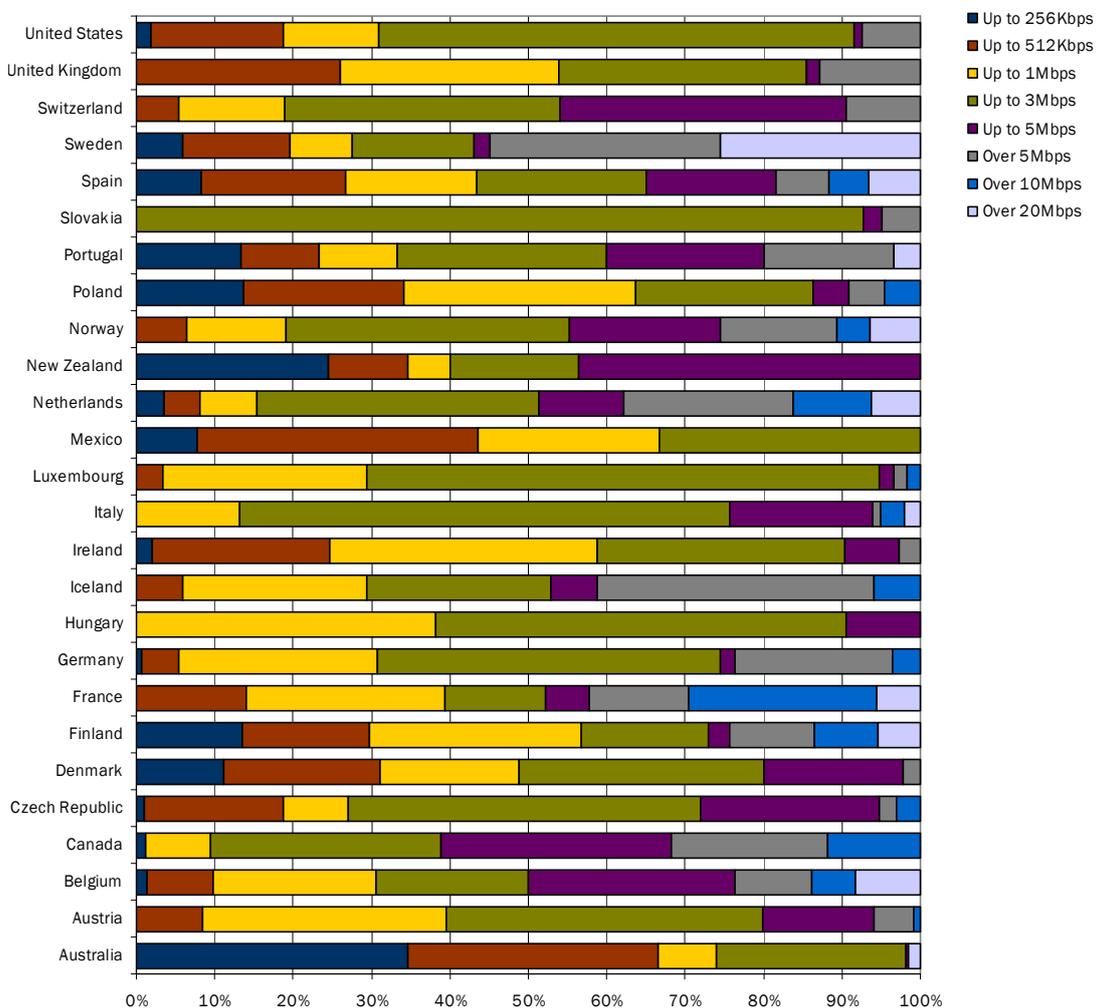


Figure 2: Distribution of download speeds as a percentage of products analysed.

In terms of average broadband speed over DSL, New Zealand is at the mid-point across the 26 countries sampled with an average speed of 2.7Mbps. New Zealand only had one plan over 3.5Mbps and none above 5Mbps. This position reflects the recent increase in DSL performance on the Telecom New Zealand network, an assessment prior to this would have placed New

Zealand in the bottom three². As Figure 3 shows, three countries average above 5Mbps, Sweden, France and the Netherlands. Mexico and Australia report the lowest average rates at 1.2Mbps and 1.3Mbps respectively. When satellite and wireless options are included in the average, both Mexico and Australia fall even further behind with an average of 1.1Mbps and 1.2Mbps.

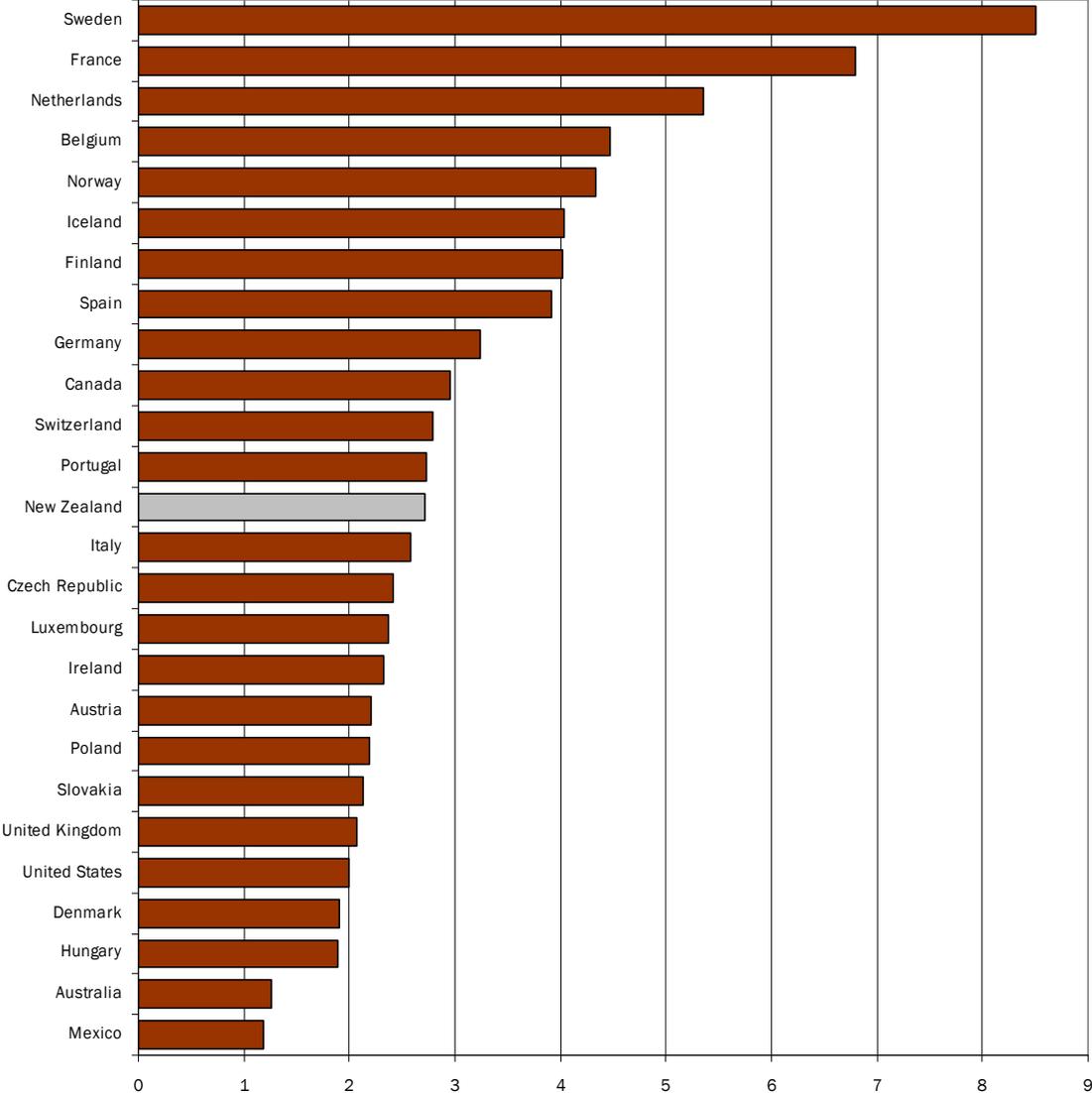


Figure 3: Average download speeds for DSL-based broadband.

Download speeds vary dramatically across the 26 countries and New Zealand is at the mid-point. However, it lacks any real high speed options and it is worth noting that ADSL2 technologies are already appearing in a number of European countries and in Australia, providing significantly higher download speeds to consumers. Nine countries in Figure 3 average over 3Mbps and no countries average below 1Mbps.

² Refer to: Williamson, A. (2006). Comparison of United Kingdom and New Zealand domestic broadband markets. Waitakere City, NZ: Wairua Consulting Limited. Available at: [www.wairua.co.nz/publish/Comparison of UK and NZ consumer broadband Feb-2006.pdf](http://www.wairua.co.nz/publish/Comparison%20of%20UK%20and%20NZ%20consumer%20broadband%20Feb-2006.pdf).

Sweden has the most high-speed packages. Figure 4 shows that more than half of all products surveyed in Sweden and Canada had a download speed of 5Mbps or more. This was the case for more than 40% of products surveyed in France, the Netherlands and Iceland. Conversely, Mexico had no packages at this speed and only 1% of New Zealand broadband packages offered 5Mbps or more. In terms of low speed broadband, Australia was the only country to offer a majority of products with a download speed of less than 1Mbps, followed by 49% of Mexican products and 35% in New Zealand. Figure 4 suggests a shift to high speed instead of, rather than as well as, lower speed broadband.

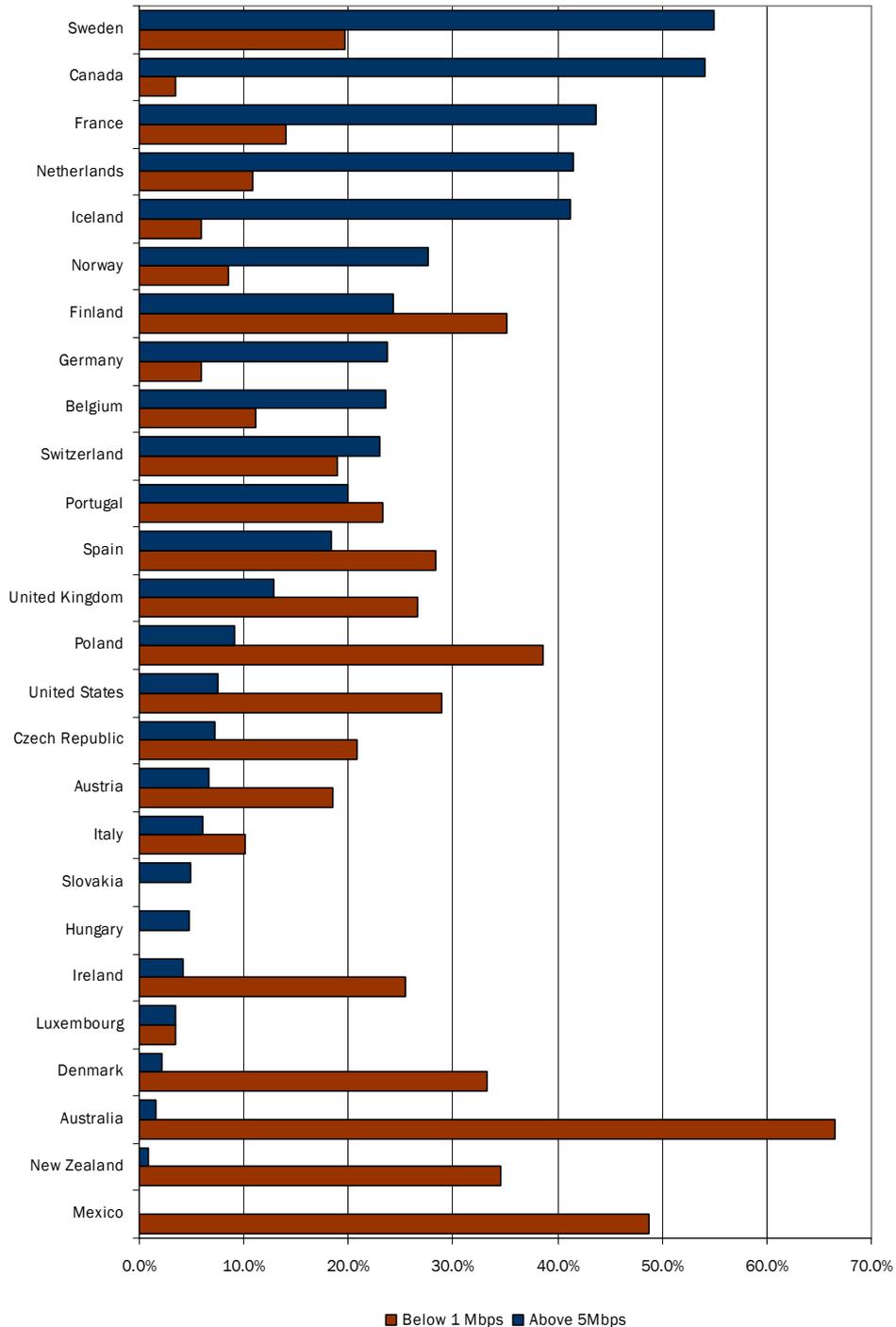


Figure 4: Percentage of products offering less than 1Mbps or 5Mbps and over download speeds.

Upload Speeds

Only two countries, Sweden (1.2Mbps) and Norway (1.07Mbps) achieved an average upload speed greater than 1Mbps for all broadband products surveyed. Thirteen countries had overall upload averages higher than 500Kbps and New Zealand ranked second to last with an average of 280Kbps.

Figure 5 shows that, when only DSL-based products are analysed, Norway leads by a significant margin and New Zealand's average upload speed falls slightly to 250Kbps. New Zealand rises to fourth from last with Hungary, Portugal and Luxembourg averaging lower upload speeds.

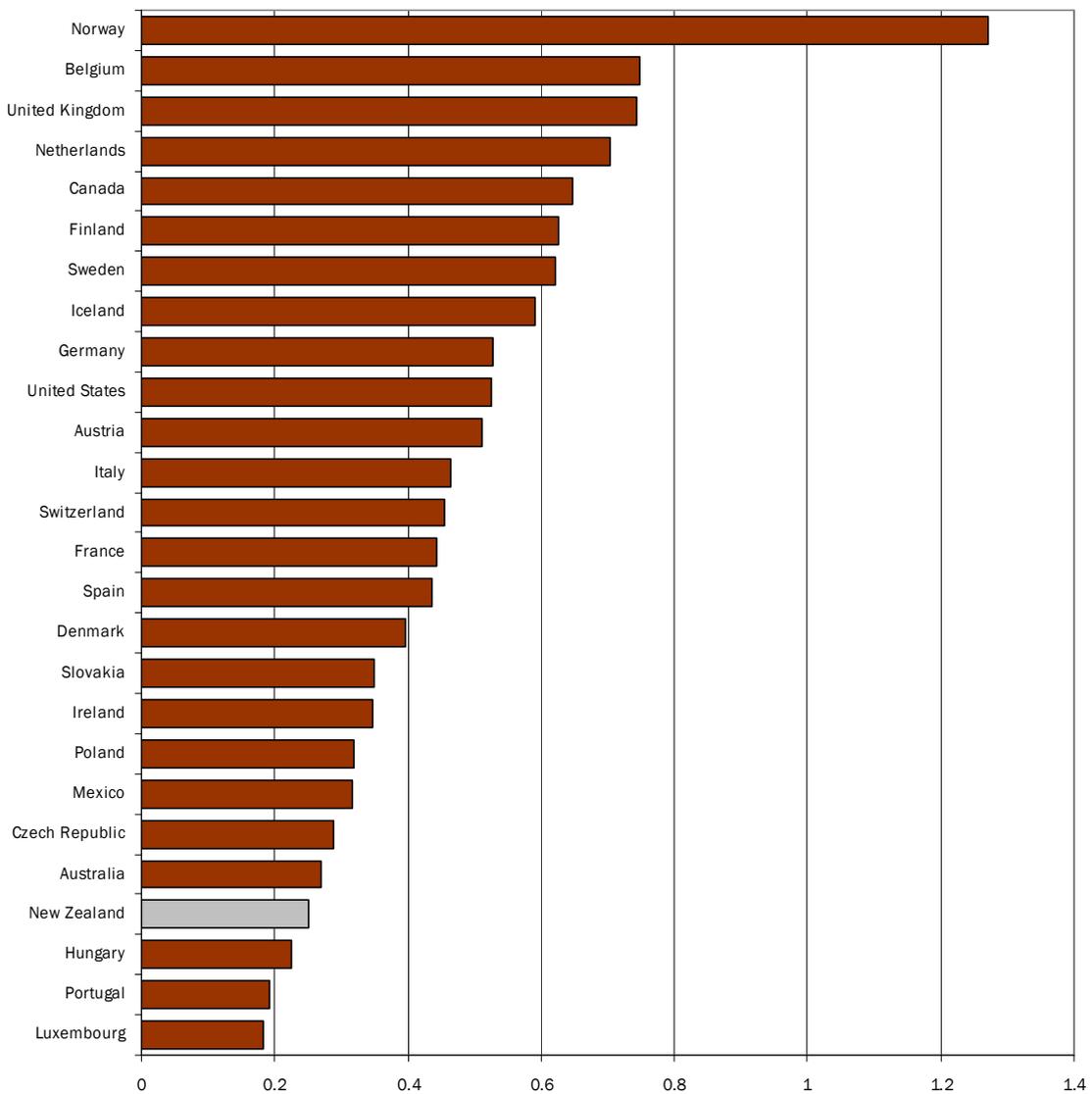


Figure 5: Average upload speeds for DSL-based broadband.

Throughout the 26 countries surveyed here, much is made of download speeds in the promotional material for ISPs. However, upload speed is also important. Increasingly new broadband-related services, such as VoIP, are bi-directional and requirements for uploading larger files (such as photo sharing) are increasing. As such, upload speed is an important factor for

obtaining usable performance over the network and, where slow, is likely to be the weakest link in the connection thereby limiting the effectiveness of the broadband connection for some users.

Table 3 shows the lowest available upload speeds in the packages reviewed, the most widely available speed for that country and the highest that was on offer. As opposed to the average upload speeds shown in Figure 5, Table 3 shows that Canada has the highest typically available upload speed, with 30.6% of products reviewed having an upload speed of 1Mbps, one of the benefits of widespread availability of cable broadband.

Table 3: Lowest, most common and highest upload speeds (in Mbps).

Country	Lowest		Typical		Highest	
	Upload	%age	Upload	%age	Upload	%age
Canada	0.128	5.9%	1.00	30.6%	9.000	1.2%
Austria	0.128	11.8%	0.512	37.8%	4.000	1.7%
Belgium	0.064	1.4%	0.512	25.0%	2.000	13.9%
Czech Republic	0.128	22.9%	0.512	19.8%	1.000	2.1%
Finland	0.128	2.7%	0.512	43.2%	1.000	24.3%
Germany	0.128	10.7%	0.512	49.1%	2.000	3.6%
Iceland	0.256	5.9%	0.512	64.7%	0.832	29.4%
Netherlands	0.128	3.6%	0.512	19.1%	2.300	0.9%
Norway	0.160	2.1%	0.512	17.0%	8.000	2.1%
Spain	0.128	23.3%	0.512	28.3%	2.000	1.7%
Sweden	0.064	2.0%	0.512	33.3%	10.000	2.0%
Hungary	0.128	38.1%	0.384	19.0%	2.048	4.8%
Slovakia	0.256	26.8%	0.384	65.9%	0.512	7.3%
Switzerland	0.128	16.2%	0.384	35.1%	1.800	4.1%
United States	0.128	19.6%	0.384	32.7%	1.500	4.7%
France	0.128	32.4%	0.256	33.8%	4.000	1.4%
Ireland	0.056	2.7%	0.256	21.0%	8.000	0.3%
Italy	0.256	45.5%	0.256	45.5%	4.000	1.0%
Mexico	0.032	7.7%	0.256	35.9%	2.000	2.6%
Poland	0.064	2.3%	0.256	36.4%	2.000	2.3%
United Kingdom	0.128	1.1%	0.256	71.0%	4.000	8.8%
Luxembourg	0.064	1.7%	0.192	55.2%	0.512	6.9%
Denmark	0.064	4.4%	0.128	37.8%	2.300	2.2%
New Zealand	0.128	54.5%	0.128	54.5%	1.000	2.7%
Portugal	0.128	40.0%	0.128	40.0%	2.000	3.3%
Australia	0.064	32.5%	0.064	32.5%	3.000	1.9%

Ten countries offer more 512Kbps upload plans than any other. Five countries offer the most plans with an upload speed below 256Kbps, Luxembourg (192Kbps), Denmark, New Zealand and Portugal (all 128Kbps). Australia lags significantly behind with a most common upload speed of only 64Kbps, but higher speed services are available - up to an upload speed of 3Mbps, whereas

no New Zealand plan exceeded 1Mbps. Sweden and Canada had maximum upload speeds available of 10Mbps and 9Mbps respectively, whereas Slovakia and Luxembourg had no plans over 512Kbps.

Figure 6 shows that four countries have broadband products with an average upload speed below 256Kbps. These are Luxembourg (84.5), Hungary (61.9%), Australia (55.0%) and New Zealand (54.5%). Six countries average more than 10% of products with an upload speeds in excess of 1Mbps (Sweden, Canada, Ireland, Belgium, United Kingdom and Norway). Norway has the highest number of upload speeds in excess of 1Mbps with 27.7% of all products reviewed.

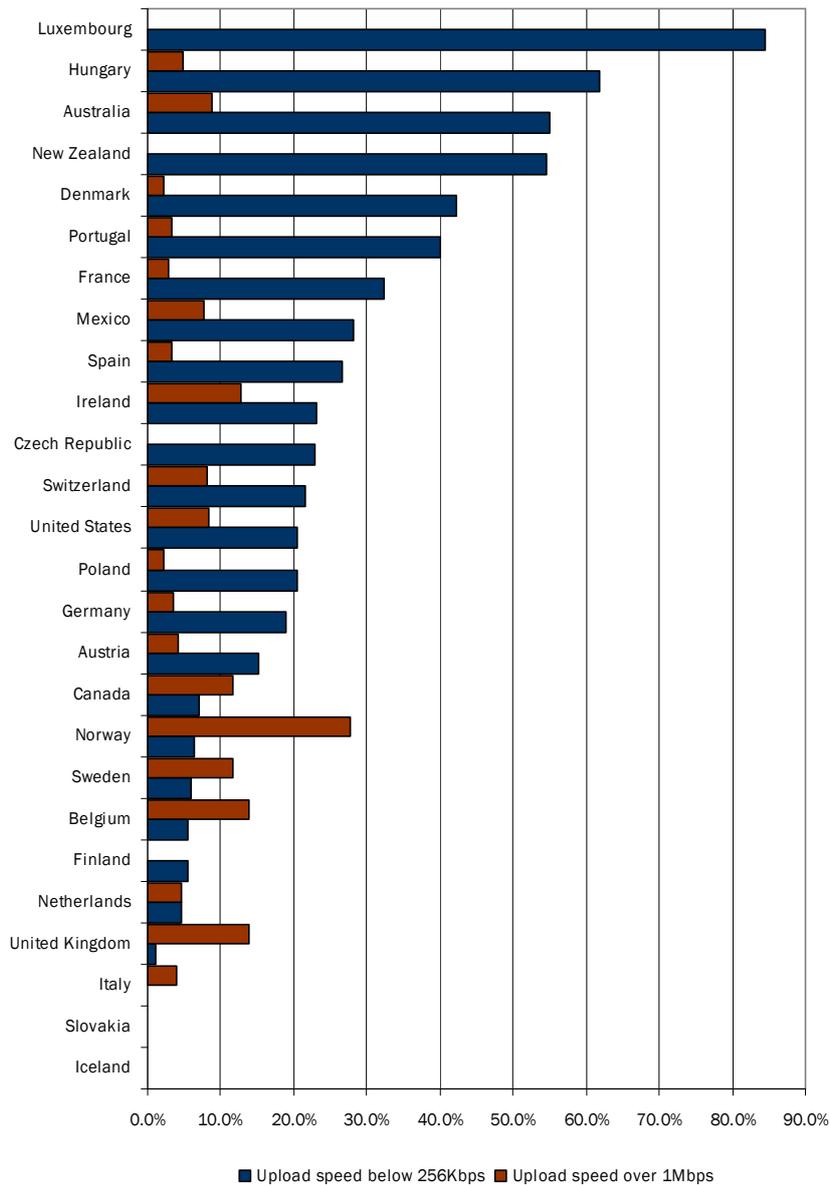


Figure 6: Percentage of products with an upload speed below 256Kbps or above 1Mbps.

Synchronous Broadband

Sixteen percent of the products analysed were synchronous in nature – that is, the download and upload speed is theoretically the same. Asynchronous packages – where download speed is higher than upload speed – remain the most widely available. The synchronous packages reviewed tend to be at the higher end of the market, often targeted at business customers and usually attract a premium price. The average monthly cost across all countries was US\$304 (versus US\$103 for all the products in the study). Table 4 shows that Canada offers the most high speed synchronous connections, followed by France. One third of all products surveyed in Belgium, Ireland and Norway were synchronous. No synchronous products were included from five countries.

Table 4: Summary of synchronous broadband packages.

Country	%age of synchronous products	Most popular speed (Mbps)	Highest available speed (Mbps)	Monthly cost (US\$)
Canada	7.1%	3	3	\$416.80
France	2.8%	2	4	\$59.24
Germany	7.1%	2	2	\$261.23
Ireland	32.0%	2	8	\$187.19
Italy	7.1%	2	4	\$941.60
Norway	34.0%	2	8	\$499.11
United Kingdom	13.4%	2	4	\$476.46
Austria	9.2%	1	4	\$303.23
Belgium	33.3%	1	2	\$664.82
Poland	18.2%	1	2	\$488.63
Portugal	6.7%	1	2	\$200.45
Spain	5.0%	1	2	\$301.91
United States	20.6%	0.768	1.5	\$178.59
Switzerland	21.6%	0.6	1.8	\$431.58
Australia	22.2%	0.512	3	\$163.41
Denmark	15.6%	0.512	2.3	\$173.34
Finland	29.7%	0.512	1	\$31.99
Mexico	25.6%	0.512	2	\$305.40
Sweden	17.6%	0.512	8	\$52.17
Netherlands	9.1%	0.256	2.3	\$134.62
New Zealand	16.4%	0.256	1	\$113.45
Czech Republic	0.0%	-	-	-
Hungary	0.0%	-	-	-
Iceland	0.0%	-	-	-
Luxembourg	0.0%	-	-	-
Slovakia	0.0%	-	-	-

In terms of average speed for synchronous products, Figure 7 shows that only France, Sweden and Canada offered an average speed over 2Mbps and only Finland and New Zealand averaged below 500Kbps. The average speed across all countries offering such as product was 1.4Mbps.

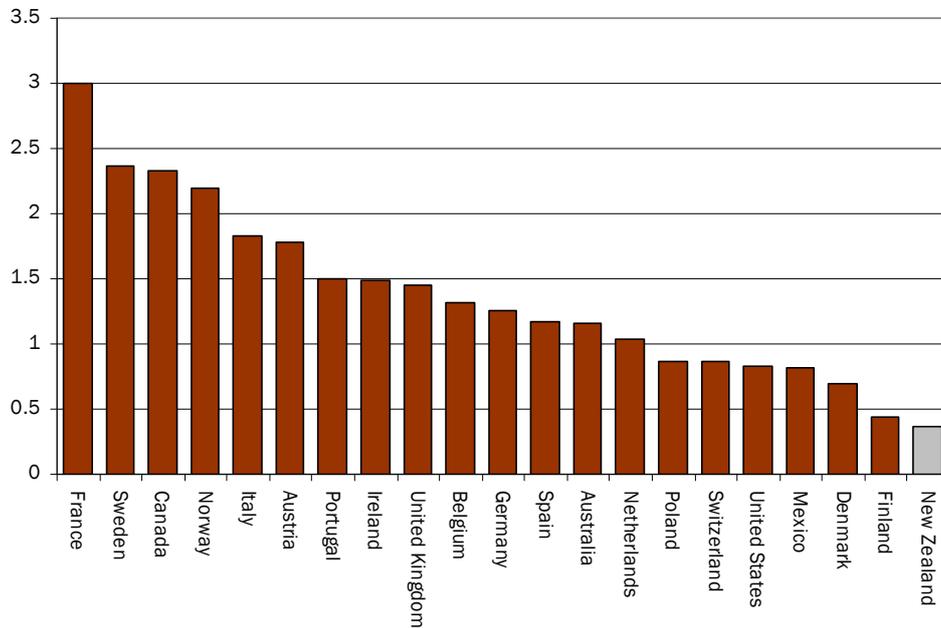


Figure 7: Average speed of synchronous broadband products.

Of the synchronous packages available in New Zealand, the most widely available is 256Kbps. These packages are almost exclusively wireless or satellite based and targeted at business customers (only one DSL-based package was include in the dataset). This is similar to Ireland but differs from Australia and Canada, where cable/fibre dominate synchronous connections, and Belgium, Norway and the UK where synchronous DSL dominates.

Figure 8 shows the seven other countries where synchronous 256Kbps broadband is also available. New Zealand rates poorly in terms of cost, appearing to be significantly more expensive than similar products in Australia, Germany, Finland and Sweden but cheaper than the Netherlands and Mexico. As this represents a very small portion of the overall market, no conclusions can be drawn from this other than to note that such products are relatively new to the New Zealand market and aimed primarily at business or other high-use customers.

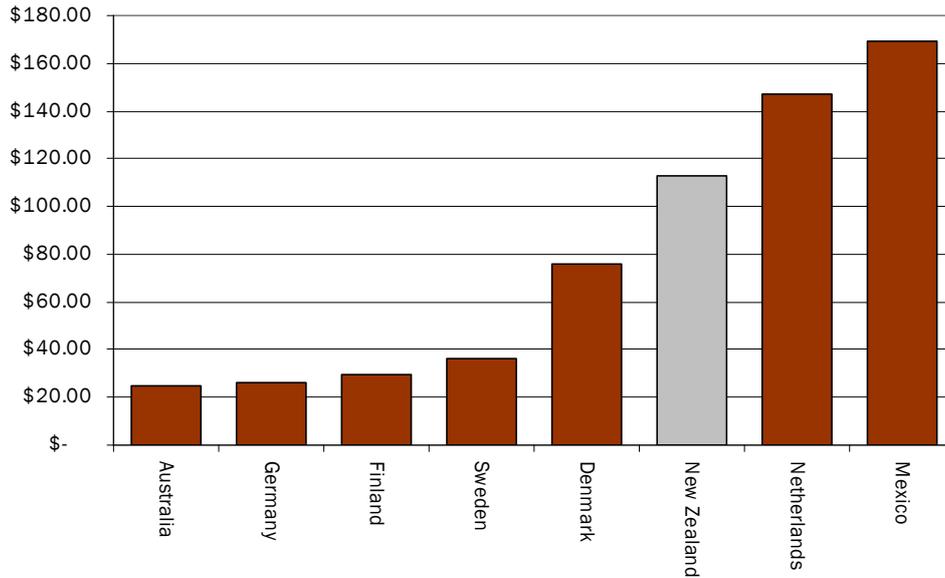


Figure 8: 256 Kbps synchronous packages.

Monthly Subscription Cost

Price comparisons are always difficult to make across jurisdictions as there are considerable social and economic factors that affect price relativity. To avoid currency variations and in order to attempt to level-out the cost of living in the 26 countries sampled, the Economist’s Big Mac Index has been used to assess purchasing-power parity. This is a widely-used device that compares McDonald’s Big Mac prices around the world³. Therefore, all costs shown are in US dollars and adjusted according to the relative cost of a Big Mac. Further refinement of price data has taken place to reflect what the consumer pays. For example, New Zealand residential ISP charges are inclusive of GST but business packages are exclusive of GST. When gathering data, every attempt has been made to remove special offers or deals that require pre-qualification and discounts associated with combined internet and toll/TV calling packages.

Figure 9 shows that, relatively speaking, Belgium, Norway, Switzerland and Mexico have the least affordable broadband pricing. This can however be misleading, as it also represents a wide variety of choice in the market in three of those countries (Belgium, Norway, and Switzerland). New Zealand is well positioned in terms of price in 21st place. Slovakia and Finland represent the lowest average monthly cost of broadband access.

³ See: www.economist.com/markets/bigmac/about.cfm

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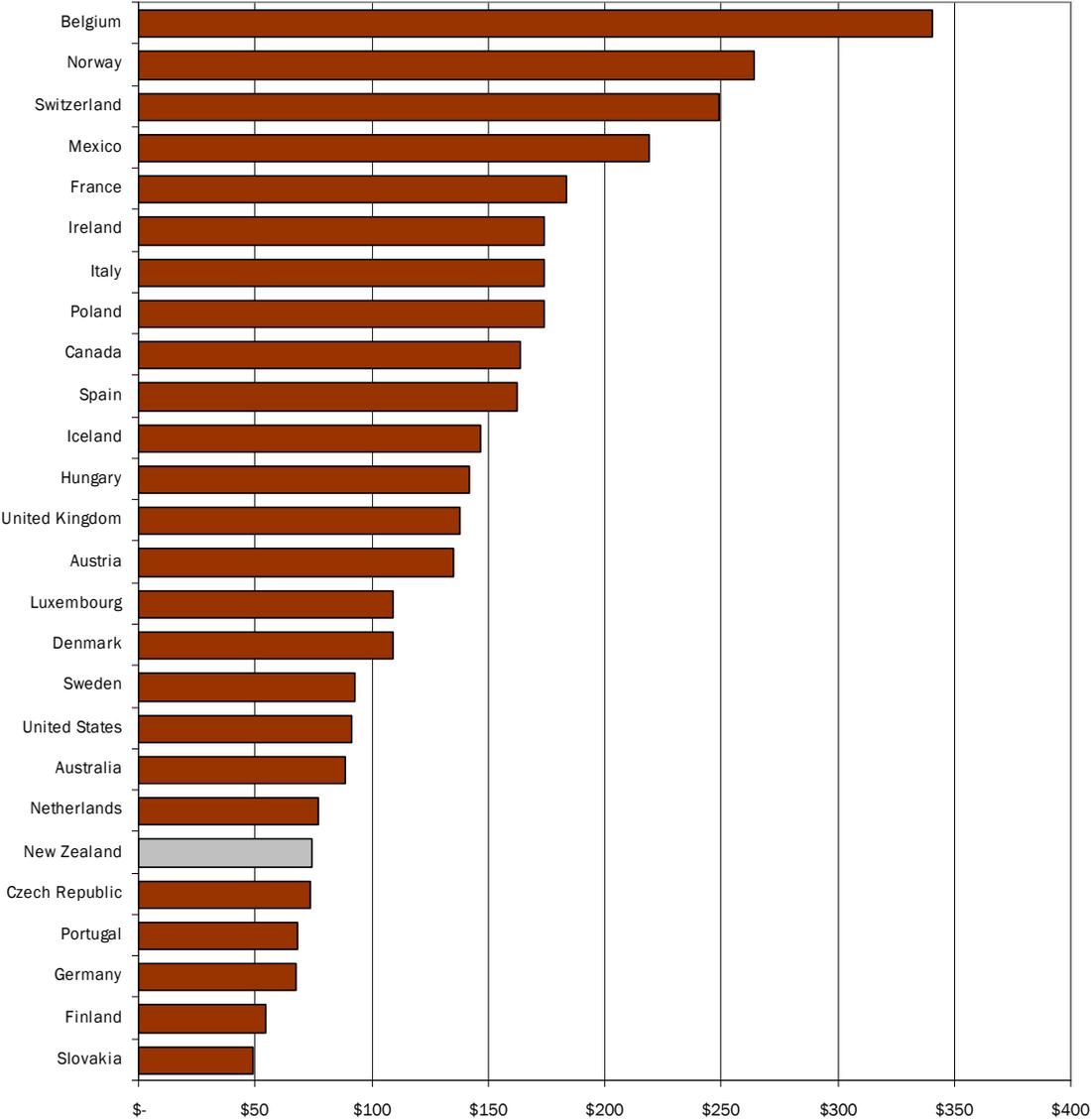


Figure 9: Average monthly cost (US\$) for all broadband packages.

Figure 10 suggests that, in terms of the business-specific broadband packages surveyed, France and Belgium rate poorly for monthly cost, but this is in part skewed by a small number of high end packages. New Zealand’s business broadband prices are 24th lowest, but this is in part because New Zealand ISPs primarily seem to repackage residential services in the form of a business plan rather than providing a range of specialist packages tailored to business needs.

Comparison of OECD Broadband Markets

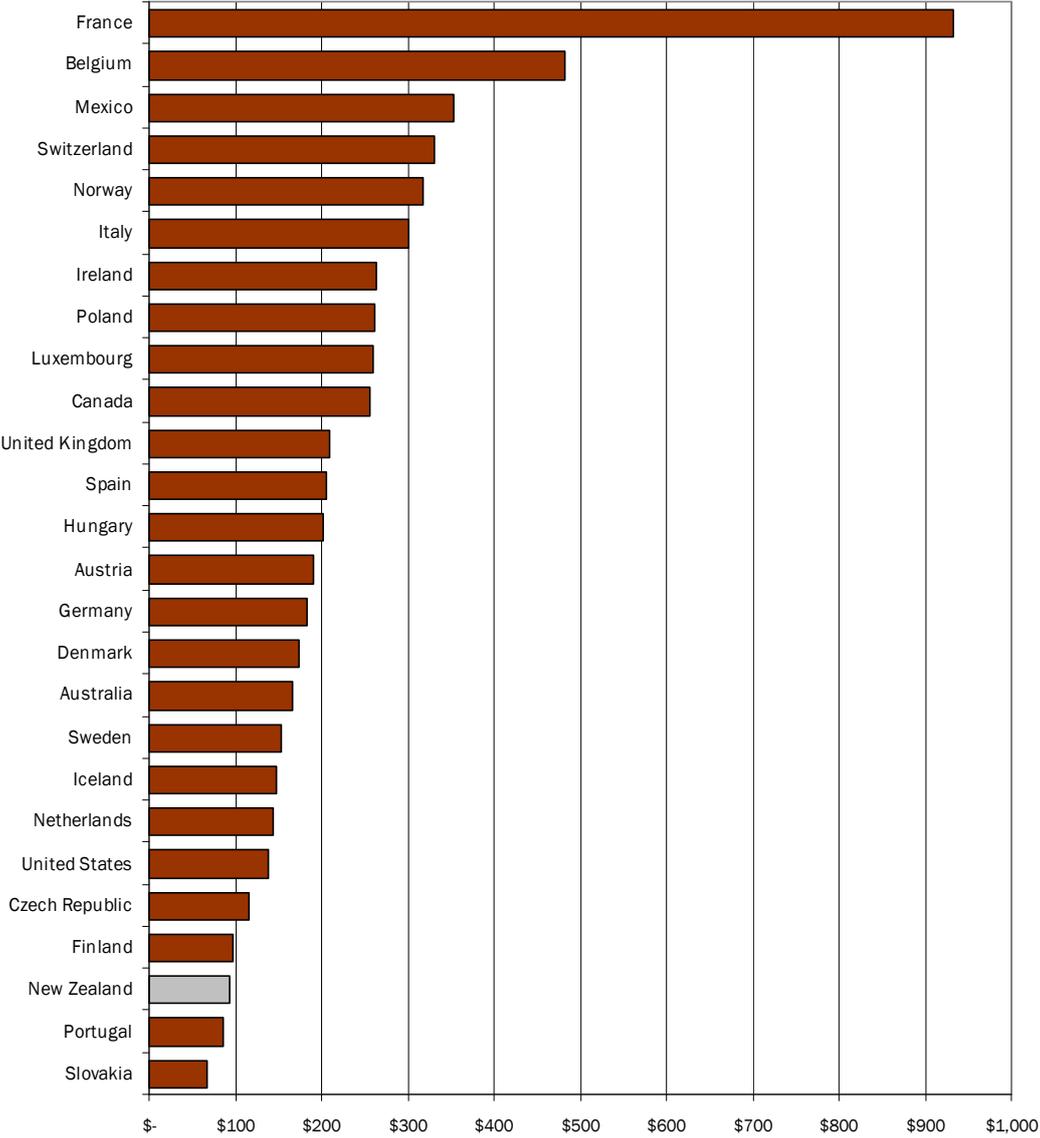


Figure 10: Average monthly cost (US\$) for business-specific broadband packages⁴.

Figure 11 shows price distribution for residential packages across the 26 countries sampled with Iceland, Norway and Mexico the most expensive. New Zealand is placed 15th, in the lower half of the list for residential packages and Slovakia and Germany are the cheapest countries.

⁴ No user-specific products were identified for Iceland. Therefore, Icelandic averages are for all packages analysed.

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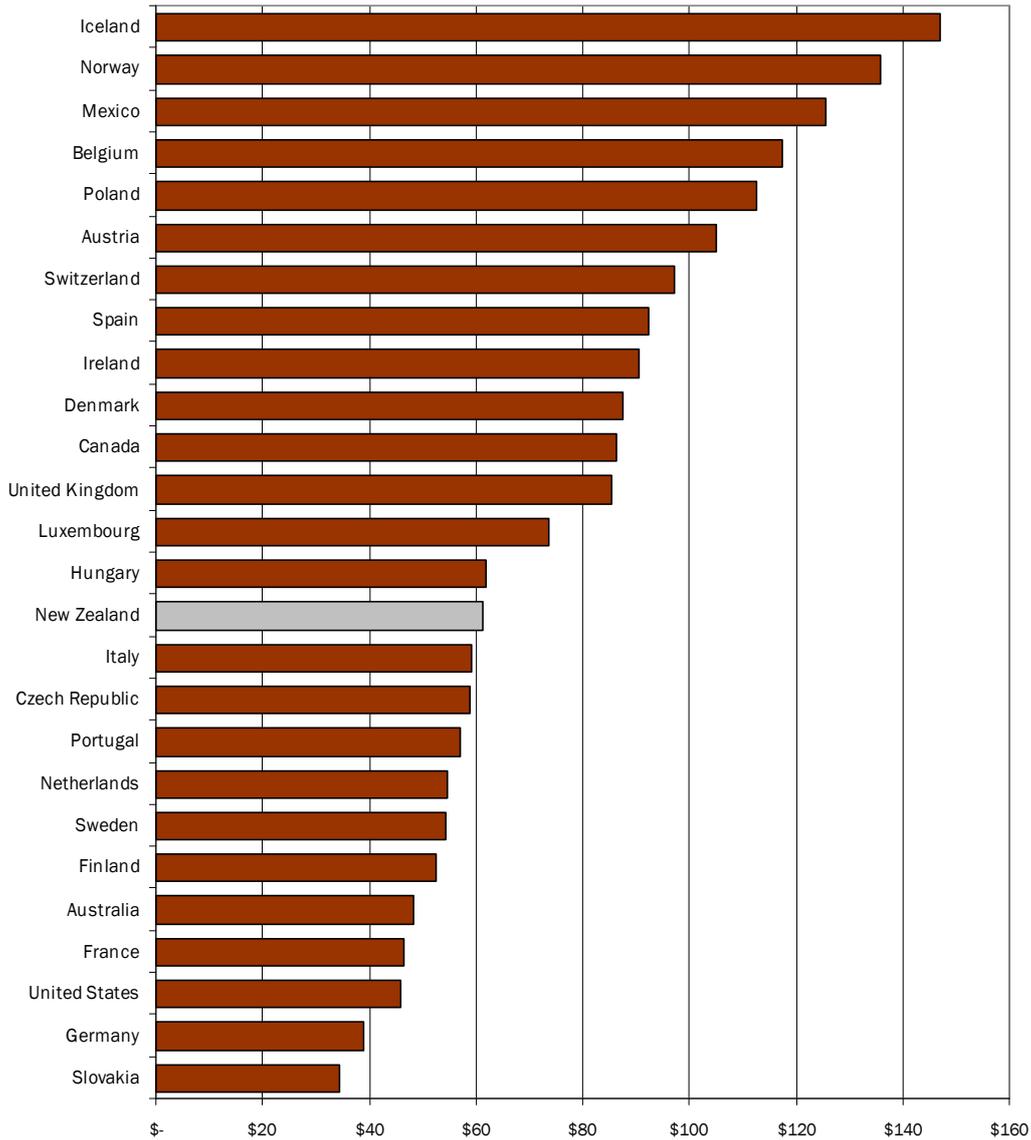


Figure 11: Average monthly cost (US\$) for residential broadband packages.

Limited conclusions can be drawn from the above price data. Whilst New Zealand appears generally price competitive, it is worth exploring what is available for that money. Countries such as France, Belgium and the UK are offering a significantly wider variety of packages, a number of which are high end packages tailored for business users and this tends to raise the average cost for that country. Countries such as Iceland appear more expensive but on average offer higher performance plans. Therefore, a range of lower-end broadband packages were analysed to see if there was any detectable price difference. This subset included asynchronous xDSL packages with download speeds from 512Kpbs up to and including 1Mbps. New Zealand falls to 19th place overall in this analysis and, whilst there is some slight movement across other countries, the outliers remain the same with Poland and Mexico the most expensive and Slovakia, Germany and the US the cheapest. This suggests that the ‘average’ broadband product available in New Zealand is relatively price-competitive by international standards. New Zealand broadband is cheaper than comparative products in Ireland and the UK but more expensive than in Australia.

Connection Fees

When considering connection fees, it is important to also consider the type of network technology being deployed. As Table 5 shows, the aggregated connection cost across 25 of the 26 countries⁵ reveals that satellite broadband is considerably more expensive to install, followed by wireless. This is due to the specialised nature of the equipment required and the relatively small customer base.

Table 5: Average connection fees.

Product type	25 country average	Ireland	Australia	New Zealand
Cable	\$ 43.19	\$ 22.27	-	-
DSL	\$ 138.60	\$ 109.09	\$ 85.40	\$ 16.52
FTTH	\$ 28.66	\$ 147.00	\$ 12.63	-
Satellite	\$1,477.82	\$2,089.62	\$ 450.55	\$1,726.96
Wireless	\$ 220.44	\$ 275.49	\$ 78.76	\$ 265.99

Since DSL-based packages account for the majority of products analysed, these have been used to assess the relative cost of getting connected to broadband across the OECD countries surveyed. The cost of DSL installation can, and often does, include the provision of a basic ADSL modem but excludes any physical installation (and was assessed as such where appropriate).

Figure 12 shows that there is considerable disparity in the typical cost of getting connected, with France, Belgium and the UK being the most expensive. This is due, at least in part, to the wider availability of higher speed, higher quality business-specific packages. New Zealand ranks fourth lowest, just above the Czech Republic, Finland and Slovakia. However in New Zealand's case, this is more a reflection on the lack of choice in the market and a failure to significantly differentiate between business and residential DSL products.

⁵ Insufficient connection fee data was available for Mexico so it has been excluded.

Comparison of OECD Broadband Markets

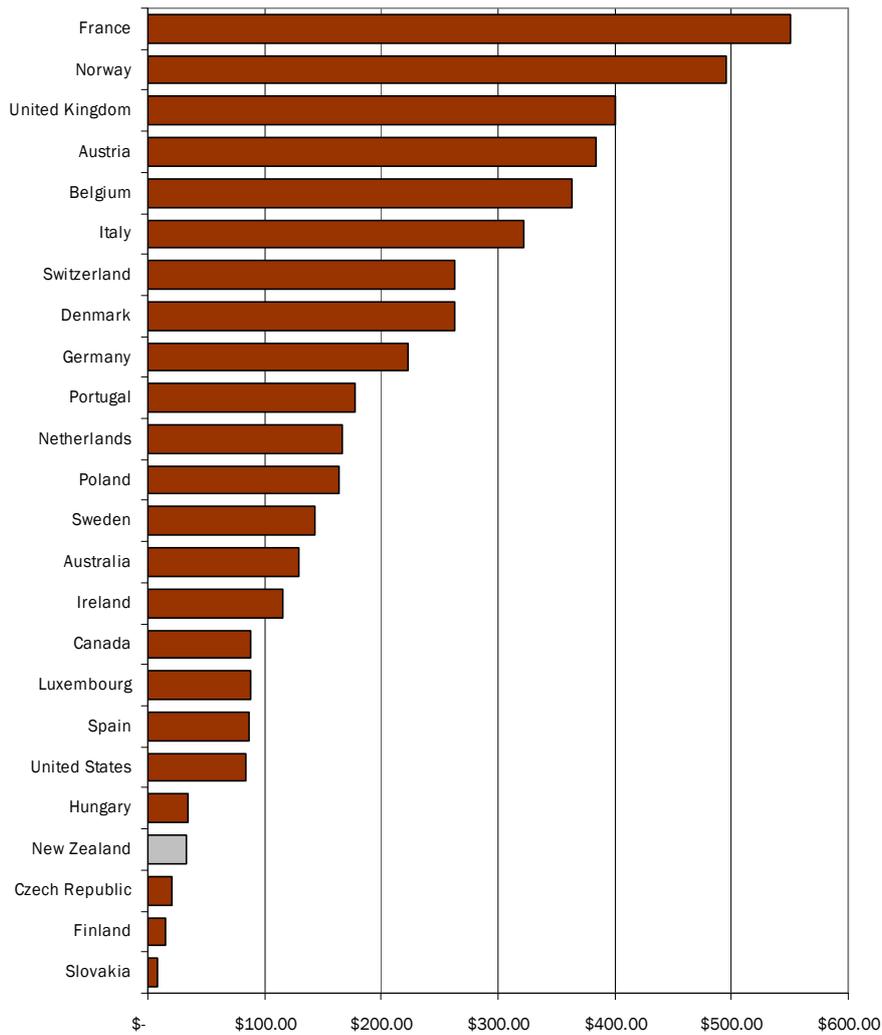


Figure 12: Average connection fees for business DSL-based products.

When average connection fees for residential-oriented DSL products are analysed, as is shown in Figure 13, eight countries average more than US\$100, with Switzerland, Belgium and Iceland the three most expensive. Fourteen of the twenty six countries average less than US\$50 for connection and New Zealand again ranks third from bottom of the list, above Slovakia and Norway. This positioning is at least in part a reflection of the current promotional market in New Zealand, where most ISPs who are retailing Telecom New Zealand’s wholesale service pass on a subsidy to make the standard installation free. This subsidy was included in the dataset as its use is wide-spread, persistent and lacks specific pre-qualifiers (it is available to all new subscribers).

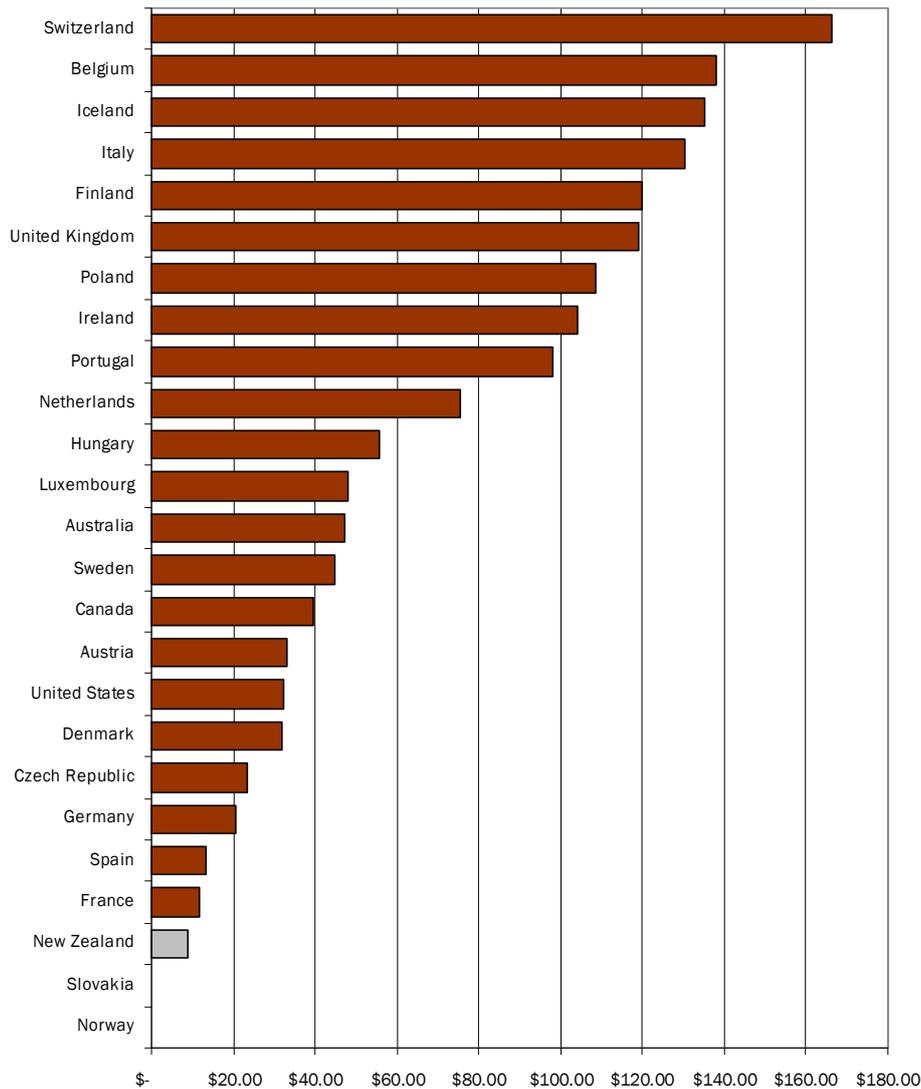


Figure 13: Average connection fees for residential DSL-based products.

In summary, New Zealand is a low-cost country to get started with broadband, providing DSL is available. Satellite options, whilst available are unrealistically expensive and most wireless options incur a start-up cost that makes them uncompetitive. The limited range of products on offer and Telecom New Zealand’s virtual monopoly at the wholesale level has been beneficial to consumers whilst Telecom continues to pass on a rebate for basic installation. If this installation rebate incentive is removed, New Zealand rises rapidly up the table to about 11th position or to where Hungary is in Figure 13 above.

Data Caps

Data caps and excess charges are very difficult to quantify across different countries as no standard is used. For the purposes of this study, a qualitative analysis of data caps and excess charging patterns was carried out. The results suggest a wide variety of approaches to data capping and no one consistent approach even within countries. However, the following patterns emerge when analysing information on data caps:

- Low cost plans with time limit followed by excess charge or speed restrictions
- Low cost plans with low data usage, followed by excess charge or speed restrictions
- Medium cost plans with high data usage, followed by excess charge or speed restrictions
- Fair use policy
- No cap

As Figure 14 reveals, 13 countries had data caps apparent on less than one third of all broadband products and eighteen on less than half. New Zealand was the country with the highest percentage of capped products, reflecting the prominence of a single DSL package where the wholesaler sets the cap – and other products in the market perhaps lack any incentive to differentiate in this way. A qualitative analysis of New Zealand data caps also reveals that they tend to be lower than in most other countries but that the consequence of exceeding them is a speed restriction rather than an extra charge.

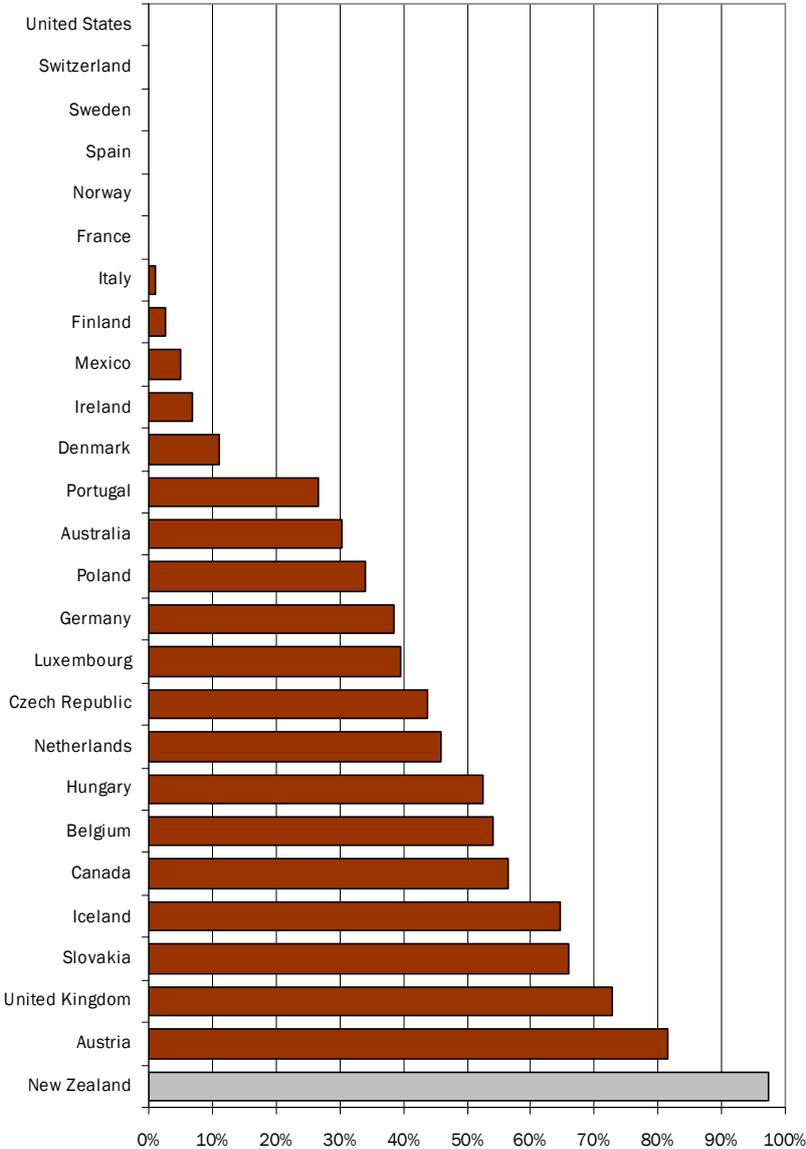


Figure 14: Percentage of plans with a data cap.

It is noted that as the specification (and cost) of the package rises, data caps are set either very high or not applied at all. Entry-level plans were the most likely to attract low data caps, usually set in megabytes but in Ireland and the Hungary a small number of packages placed a time limit (usual 20 hours) on usage per month. Other capping techniques included splitting national and international traffic and having limits with time periods (such as in Slovakia where some plans were measured between 7am and 7pm but open at other times). Forty-seven percent of products in The Netherlands set a data cap but in all but one case this was described as a ‘fair use policy’ which allowed the ISP to restrict excessive use.

Whilst only 30% of Australian products had a data cap but, where a cap did apply, many were low and resulted in high excess charges. For example, a limit of 200MB per month was not unusual and neither was an excess charge in the region of A\$100 per additional gigabyte. The UK followed much the same pattern as New Zealand, albeit for significantly fewer products. This generally reflected the historical situation prior to local loop unbundling (LLU) where ISPs resold British Telecom’s broadband service, which contains speed-restricted data caps. As the UK embraces LLU, there is now a wider variety of plan options available, most with either significantly high or no cap.

Figure 15 below shows the range of data caps for four countries, Australia, New Zealand, Ireland and Iceland. It shows that whilst New Zealand providers are more likely to cap broadband services, they are increasingly likely to do so at a higher rate, 5GB being the most widely used. This represents a shift upwards from earlier analyses of New Zealand data caps, where a limit of 1GB of 3GB was more likely⁶. Iceland applied data caps to 65% of products surveyed and was most likely to apply a low cap, with 1GB being common and 18% of plans having a limit of only 100MB.

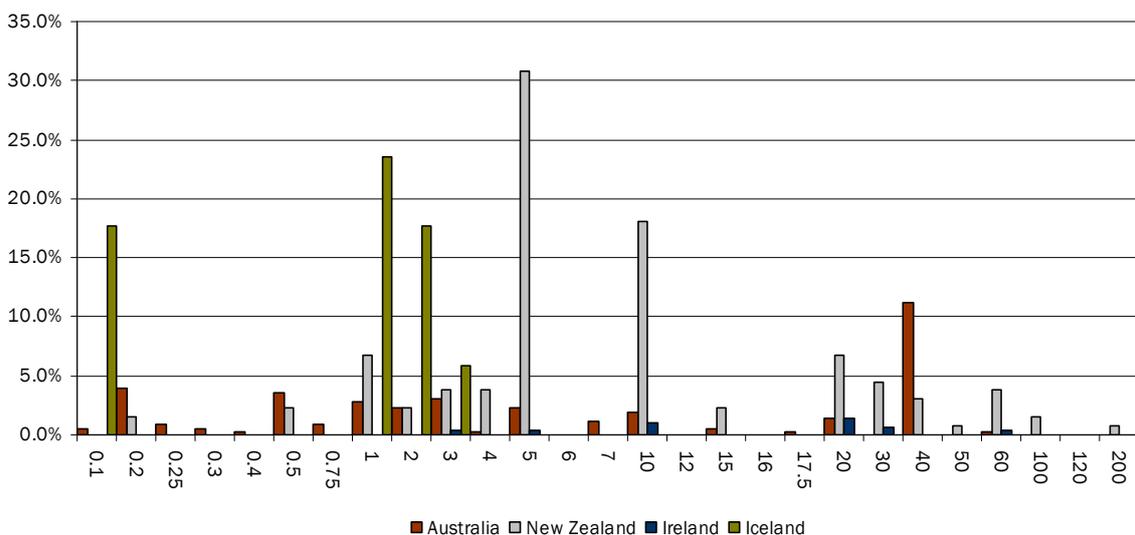


Figure 15: Data cap distribution in GB.

⁶ For example, see: Williamson, A. (2006). Comparison of United Kingdom and New Zealand domestic broadband markets. Waitakere City, NZ: Wairua Consulting Limited.

Contention Ratio

The contention ratio means the number of users competing for the same bandwidth, particularly over xDSL or wireless networks. Although not an exact science and open to interpretation, contention ratio is usually taken to mean one of either network utilisation (simply, the number of people sharing bandwidth on that network) or, in a slightly more complicated calculation, how many users can be expected to be sending or receiving data at a given point. However it is calculated, the higher the contention ratio the more likely that network performance will be adversely affected.

Contention ratio data is difficult to determine in almost all cases. Sufficient data was only available for four of the countries surveyed. As Table 6 shows, where ISPs are able to manage their own network through LLU or provision of other proprietary network equipment, contention ratio becomes an important price-performance consideration – users can pay more for a low contention ratio. In terms of this dataset, the impact of this was most obvious in the UK and Ireland where contention ratios were clearly promoted and casual or low-volume users offered higher contention ratio plans costing less.

Table 6: Contention ratios.

Country	Minimum	Maximum	Average
Czech Republic	4:1	50:1	34:1
Ireland	1:1	50:1	24:1
Slovakia	1:1	45:1	14:1
United Kingdom	1:1	50:1	28:1

New Zealand's monopoly xDSL network, wholesaled by Telecom, does not disclose contention ratios and this is not something that can be controlled or competed on by retail ISPs. Telecom recently suggested that the contention ratio 'averages' 33:1 in New Zealand⁷. If this is the case, it puts New Zealand on a par with the Czech Republic. However, this figure is strongly disputed and others suggest that contention ratios are significantly higher in New Zealand than those seen in the UK and Ireland. According to the ISP Association of New Zealand⁸, New Zealand's high contention ratio is detrimental to network performance and it has been (conservatively) suggested by industry sources that New Zealand's contention ratios can be in the region of 85:1⁹. High contention ratios are a significant issue when deploying faster speeds across existing networks.

Where contention ratios are widely available, pricing is clearly differentiated in terms of the quality of the package. This includes not simply network speed but also contention ratio (which will theoretically impact on actual network performance). Table 7 shows monthly cost data for a range of download speeds across a number of countries. This clearly shows that customers are

⁷ Telecom New Zealand Press Release, April 2006.

⁸ See: Letter to Minister of Communication, June 2005 (www.ispanz.org.nz/press_release4)

⁹ Saarinen, J. (14 February, 2006). High contention rate and low margin leaves ISPs unimpressed. Computerworld. www.computerworld.co.nz/news.nsf/news/28363DAAB75B1F61CC2571140028E35A.

able to make price/performance decisions and, should they wish, pay more for the higher likelihood of better overall performance.

Table 7: Comparison of costs for different contention ratios.

Country	Download speed	Contention ratio	Monthly cost (US\$)
Czech Republic	512Kbps	20:1	91.33
		40:1	45.97
		50:1	43.30
Ireland	512Kbps	20:1	114.48
		48:1	35.33
	1Mbps	10:1	78.32
		20:1	154.67
	2 Mbps	48:1	24.16
		10:1	324.84
Slovakia	1.5Mbps	48:1	32.79
		20:1	70.80
United Kingdom	512Kbps	45:1	46.94
		10:1	293.28
		20:1	83.64
	1Mbps	50:1	36.88
		10:1	387.4
		20:1	79.82
	2Mbps	50:1	43.30
		10:1	473.11
		20:1	100.00
		50:1	51.55

An additional factor to consider when determining broadband performance is the capacity of the backhaul network. Whilst this cannot be determined from the data available in this study, it is obvious that low-capacity backhaul will effectively create a performance bottle-neck for customers. It is noted that the New Zealand DSL network is often reliant on one 2Mbps backhaul link per DSLAM. Actual contention ratios on the Telecom DSL network should most probably be calculated at this point, given that such a narrow backhaul pipe limits potential performance during periods of even moderate demand (and that some advertised plans offer speeds higher than parts of the network can theoretically support).

Overall Assessment

Whilst it is difficult and not necessarily useful to rank different country's broadband products against each other due to significant local variations, an attempt has been made to evaluate the primary variables for both residential and business broadband. These are:

- average download speed
- average upload speed
- average monthly subscription cost
- average connection fee
- number of packages with data caps

Contention ratio is excluded from this assessment as the information is not widely available and is difficult to verify. The ranking methodology takes a country's relative placing in each of the four speed and cost categories for business and for residential. An overall rating is then determined by combining these and adding in that country's placing in terms of data caps:

$$\begin{array}{l} \text{Business [Download + Upload + Monthly Cost + Connection]} \\ \text{Residential [Download + Upload + Monthly Cost + Connection]} \end{array} + \text{Data cap} = \text{Ranking}$$

This data is presented in Table 8 by way of a ranking (1-26) and a grade (A-E), which is explained in detail below.

Table 8 shows that Sweden offers the best overall 'value' for broadband services in terms of cost and performance, followed by the Netherlands and Norway. Table 8 provides a comparison of the price/performance rating from this study with that country's OECD broadband subscriber ranking and the latest e-readiness assessment from the Economist Intelligence Unit (EIU). This suggests that the cost and performance of broadband products is not directly related to uptake in the country, nor is it directly related to that country's e-readiness, which is defined as the "state of play' of a country's information and communications technology (ICT) infrastructure and the ability of its consumers, businesses and governments to use ICT to their benefit."¹⁰ For example, Slovakia appears to offer good value for money and above average performance, though uptake of broadband remains low and e-readiness is low. Conversely, Iceland and Switzerland have high uptake but are comparatively expensive.

¹⁰ Economist Intelligence Unit (2006). The 2006 e-readiness rankings, p.3.

Table 8: Overall 'value' rankings.

Country	Grade	Ranking	Business	Residential	OECD Ranking ¹¹	e-readiness ¹²	
Sweden	A	1	1	2	9	4	
Netherlands	B	2	4	8	3	6	
Norway		3	8	3	7	11	
Canada		4	5	10	8	9	
Germany		5	13	4	18	12	
United States		6	3	6	12	2	
Spain		C	7	6	5	20	23
Slovakia	8		11	9	26	36	
Finland	9		7	7	6	7	
Portugal	10		2	14	21	25	
Czech Republic	11		10	11	24	29	
France	12		25	1	14	19	
Iceland	13		9	23	1	-	
Belgium	14		16	15	10	17	
Denmark	15		12	16	4	1	
Italy	16		18	12	19	24	
Australia	17		21	13	17	8	
Austria	18		17	24	16	14	
Switzerland	D		19	14	17	5	3
United Kingdom			20	23	19	13	5
Hungary		21	15	26	25	30	
New Zealand		22	24	18	22	14	
Luxembourg		23	22	21	15	-	
Ireland		24	20	20	23	15	
Poland		25	19	25	27	32	
Mexico		26	26	22	28	39	

To further simplify the comparison further, each country has also been given a grade (from A-E) based on its overall performance and value relative to the other countries. The grades have been separated at 20% intervals from a maximum available score, so to rate as an 'A' the country must have come top or close to top in all of the categories. This grading system is not intended to be rigorous or scientific, merely to give an easy to follow indicator of relative broadband price and performance value amongst the 26 countries surveyed. As Table 8 shows only Sweden achieves an 'A' and no country was rated 'E'. New Zealand rates a 'D', the same as the UK and Ireland. Australia rates a 'C', along with most European Union Countries.

New Zealand ranks very poorly, coming 22nd out of 26 countries. In terms of average cost and performance data it rates slightly higher but it is let down by having the largest number of capped plans of any of the countries studied. Mexico rates the lowest of all in this analysis and close to

¹¹ OECD Broadband subscribers – December 2005.

¹² Economist Intelligence Unit, The 2006 e-readiness rankings.

the bottom of the OECD and e-readiness analyses also. Switzerland rates highly in terms of broadband uptake and e-readiness but rates poorly here due to the high costs. France is also interesting in that it ranks as best 'value' in terms of residential price/performance and second worst in terms of business, this is largely due to a number of expensive high-end business packages skewing the data.

There is no obvious correlation between value to the customer and legislative environment or e-readiness. Twenty-four of the 26 countries have implemented LLU but in some cases it is too soon to see results and in others factor such as population density can equally well explain high levels of penetration and good value. What cannot be measured here is the perceived value of broadband in a country. New Zealand's high dial-up figures suggest that New Zealanders see value in being online but this has not translated into broadband uptake as might be expected and as has been seen elsewhere, such as the UK and Australia. Conversely, Ireland has relatively low overall levels of internet usage and poor broadband take up rates. However, these have accelerated significantly in the last twelve months.

In terms of comparisons, New Zealand in 22nd place rates above Ireland (24th), just behind the UK (20th) and Australia (17th) but well behind all the Nordic countries (particularly Sweden, Norway and Finland). New Zealand rates relatively poorly for business broadband, in 24th place but is placed slightly higher for residential broadband, rising to 18th place. The analysis shows that New Zealand broadband is relatively cheap but that consumers pay less to get less. On average, New Zealand ranks poorly in terms of performance, even after Telecom's Jetstream speeds were substantially increased. The average download speed is relatively low by international standards, rating half-way for DSL-based broadband but lacking a choice of high-speed packages (only one was over 5Mbps). The same is true for upload speeds where New Zealand rates the third lowest for DSL-based broadband and had the second highest number of products with an upload speed under 256Kbps.

Country Summaries

Having given a commentary on the analysis of key variables relating to broadband price and performance and an assessment of the overall relatively of broadband across each country, the next section provides a brief country-by-country commentary on the data collected and adds any other comments pertinent to or affecting the analysis. It is followed by the report's conclusion.

New Zealand

New Zealand has limited regulatory intervention in broadband and has not implemented LLU. New Zealand has high internet usage but the transition from dial-up to broadband has been poor, with the country currently in 22nd place in the OECD rankings. The New Zealand dataset includes 110 products from 11 different providers. This includes six satellite-based products and 30 wireless, with the remainder DSL based products. New Zealand is a market of two key products – Telecom New Zealand's DSL 'Jetstream' service, re-sold through most ISPs, is the only DSL offering. Broadcast Communications Limited's (BCL) wireless (802.11) service is re-sold by a number of ISPs as well.

New Zealand performs poorly in terms of speed and particularly badly in terms of usage restrictions (it has more products with data caps than any other country), although Telecom's reduction of speed to dial-up equivalents now applies at higher levels than previously seen (typically 1GB and 5GB per month). New Zealand does compete well on price but has a poor selection of products on offer, particularly for businesses. Overall, New Zealand ranks 22nd out of the 26 countries surveyed, the same as its OECD broadband ranking.

Australia

The Australian market is disappointing both in terms of price and service performance. Australia ranked 17th overall in terms of value and the data produced particularly poor results for business-oriented packages, where it ranked 21st. Australia has a wide variety of plans available and a number of high speed options are starting to emerge. However, these are limited and overall performance levels are poor. This was particularly the case for upload speeds, where Australia ranks worst out of all 26 countries. Though only around 30% of plans employed data caps, where they were used they tended to be low and have a high cost implication for exceeding them.

Austria

Austria ranks 18th overall, close to its OECD broadband ranking (16th) and EIU e-readiness ranking (14th). Whilst some satellite options exist, the vast majority of plans surveyed were DSL-based. Austria rated well in terms of download speeds and, whilst the majority of plans were capped, limits were generally very high (typically between 15GB and 25GB).

Belgium

Products reviewed were primarily DSL-based but also included satellite packages. Belgium ranks 14th overall and rates highly in terms of the average download speed that is available and has the second fastest average upload speed. However, Belgium is very expensive, ranking as the overall most expensive country for all broadband products, second most expensive for business DSL and fourth most expensive for residential DSL. The country ranked poorly in terms of connection fees, coming fifth. Almost half of all products (47%) surveyed have no data cap and where a cap does apply it tends to average between 10GB and 20GB. Some entry level packages cap data at 400MB before penalties are incurred.

Canada

Canada is unusual in that, like the US, it relies mainly on cable internet connections for broadband provision. The result is that Canadians enjoy relatively high speeds for both downloads and uploads and this pushes Canada to 4th overall in terms of value. Because internet service is an addition to existing cable, installation costs are relatively low. Note however that 56% of products are capped. Canada rates in the upper third in terms of subscription costs.

Czech Republic

Despite rating low in terms of subscribers (24th) and e-readiness (29th), the Czech Republic represented relatively good overall broadband value, ranking 11th. Fifty-seven percent of products had no monthly data allowance and the lowest cap was 2GB, ranging up to 80GB. Relatively low costs and high basic download speeds were notable for this country.

Denmark

Denmark rated poorly in 15th place, well behind the other Nordic countries. This result is out of step with its 4th place in terms of total broadband subscribers and 4th place in the e-readiness assessment. However, it appears to be a result of high costs and a large number of relatively slow broadband products, particularly in the residential market. Denmark had the second highest percentage of cable subscribers in Europe (after Portugal).

Finland

Finland ranks 9th in terms of value (it has the 6th highest rate of broadband subscribers and is 7th in the e-readiness survey). Finland's broadband is primarily DSL-based but a significant minority (20%) is delivered via cable/fibre. On average, download speeds are high and forty percent of products surveyed offer speeds of 4Mbps. Finland has a proportionally high number of products with download speeds of 1Mbps or less (24%) but ranks well in terms of typical upload speeds.

France

The dataset for France is a tale of two countries. In terms of residential broadband, France rates highest of all the countries for value, but it ranks close to last in terms of business products. This

places it in 12th place overall, close to its OECD broadband ranking (14th) and above its e-readiness ranking of 19th. French broadband users are most likely to receive a slow upload speed – 32.4% are less than 128Kbps and more than two thirds are 256Kbps or less. Whilst it ranks towards the middle for DSL download speeds, 43% of all products surveyed are 5Mbps or over. It is in this statistics that the rating anomaly is explained, as France offers a range of high-specification products for business customers that attract a significant cost premium. For the typical residential or small business customer, there is a wide choice of products at a relatively low cost and France is the fourth cheapest country for residential DSL products. France has the highest connection charges of all the countries reviewed here, again largely influenced by high-end business packages.

Germany

Germany is the second cheapest country for residential, DSL-based broadband but ranks mid-way for business costs and is in the upper third most expensive for connection charges. The most widely available upload speed was 512Kbps (49.1% of products) and Germany ranks ninth in terms of average download and upload speeds. Overall Germany ranks 5th in terms of broadband value.

Hungary

Hungary ranks 25th in terms of OECD broadband subscriptions and 30th for e-readiness. It did not fare much better in this analysis, ranking in 21st place overall (one place ahead of New Zealand) and was in last place for residential products. Mostly DSL-based with a small number of cable providers, 25% of Hungarian products were time-capped. The average download speed was just under 2Mbps, the third lowest, and the average upload 210Kbps, again third lowest. Hungary has the second highest number of products with an upload speed of less than 256Kbps but sits mid-table in terms of cost.

Iceland

Iceland tops the latest OECD rankings for broadband uptake with a broadband subscription rate of 25.9%¹³. Iceland was late to re-regulate the government owned telecommunications and postal monopoly but, like other Nordic countries, has since become a fast adopter of broadband. Iceland has three main providers and has 100% coverage over fibre and 93% coverage using DSL, which accounts for 97% of all broadband subscribers. Since 1995 all new buildings must provide fibre to the curb (FTTC). Lina.Net operates a wireless network in and around Reykjavik.

The high uptake of broadband is reflected in high usage of online commercial and government services and mirrored in the use of mobile communications. The download speeds ranged up to 12Mbps and the average was 4Mbps. Most plans had data caps in place and these tended to be low, ranging from 100MB up to 3GB. Monthly subscriptions are relatively high and installation costs are among the highest that were sampled, placing Iceland 13th in this study.

¹³ See: www.oecd.org/document/39/0,2340,en_2649_34225_36459431_1_1_1_1,00.html

Ireland

Ireland is often compared with New Zealand. Ranking 24th in this study, the two countries also rank closely in terms of broadband subscriptions. Ireland ranks 23rd for broadband uptake and 15th for e-readiness (New Zealand is 22nd and 14th respectively). However, Ireland has significantly lower levels of overall internet uptake than New Zealand and so the transition it is facing is from no-connection to broadband (versus the majority of New Zealanders making the transition from dial-up to broadband). The Irish government has regulated the broadband market and is funding major infrastructure projects for metropolitan fibre and rural networks.

The current environment is perhaps reflected in the plethora of products available, including the highest percentage of wireless products assessed for any country and one third of products offering synchronous connectivity (which pushes the average price up). The Irish are also relatively high users of satellite broadband and therefore the high connection fee and relatively high subscription cost of this and wireless again raises the overall costs of Irish broadband. In summary, Irish broadband is relatively slow and expensive. The average download speed is around 2.2Mbps and 25% of all products are below 1Mbps. Ireland ranks in the bottom quartile in terms of upload speeds, the most widely available being 256Kbps (21% of all products). Whilst premium products do exist, particularly for business users, costs are in the upper third of all countries.

Italy

Although Italy ranks 19th, ahead of New Zealand in terms of broadband uptake, it ranks lower in terms of e-readiness (24th). In terms of this survey, Italy was in 16th place. The vast majority of the 99 products from 20 providers were DSL-based. These products rated just below New Zealand in terms of overall download speed but Italy had fewer plans below 1Mbps and almost double the average upload speed seen in New Zealand, with upload speeds of 256Kbps accounting for 45.5% of all products. Italy had the most expensive synchronous broadband products on offer but it is worth noting that these were also amongst the faster, the most popular being 2Mbps and 4Mbps plans being available. In terms of cost, Italy is at the higher end of the scale, being seventh most expensive overall and sixth for business. Residential products offered better relative value, where Italy was 16th most expensive. Italy was again expensive in terms of connection fees, rating in the upper quartile but data caps featured in only 2% of the products reviewed.

Luxembourg

Luxembourg fared poorly in this study, ranking 23rd in terms of overall value, and one place behind New Zealand. Ranking in 15th place in terms of broadband uptake, it was not included in the e-readiness study. Luxembourg broadband is primarily DSL, with around 18% cable and a subset of satellite services. It ranks below New Zealand in terms of download speed, averaging 2.4Mbps and it has very few plans of 5Mbps or over. Luxembourg is one of only two countries, along with Portugal, where the average upload speed is less than 200Kbps. The lowest plans on offer had a 64Kbps upload and the most widely available upload speed was 192Kbps (55% of products surveyed). No synchronous products were recorded. Luxembourg ranks slightly better on

cost – 15th overall, 9th for business products and 13th for residential. It also has the eighth cheapest connection fees.

Mexico

Mexico, like New Zealand, has limited broadband regulation. It ranks poorly on all counts, being last (26th) in this survey and rating 28th for broadband readiness and 39th for e-readiness. Mexico, whilst primarily using DSL-based broadband, had the second highest number of wireless products in the survey after Ireland, with 30%. Unfortunately it offered the lowest average download speed and had no plans over 2Mbps. Forty-nine percent of products reviewed offered a download speed below 1Mbps. However, it rated slightly better for uploads with an average of 256Kbps (although it did rate the slowest upload speed in the survey with a satellite package offering only 32Kbps upload). Mexico is the third most expensive country for monthly subscriptions but insufficient reliable data was available on connection fees.

Netherlands

The Netherlands, one of the few countries to have implemented voice and data separation, or 'naked DSL', ranks 2nd in terms of value (it is 3rd for broadband and 6th for e-readiness). This analysis includes 110 Dutch broadband products from 18 providers, over 80% of which are DSL-based and the remainder cable.

The Netherlands rates very highly in terms of average speed, which is 5.3Mbps, and speeds in excess of 5Mbps account for 42% of all products surveyed. The average upload speed is 700Kbps and the most widely available (19%) is 512Mbps. Surprisingly, only 9% of products were synchronous and the typical speed 256Kbps, with a maximum of 2.3Mbps. Overall, monthly subscription costs are very similar to New Zealand. It is on average more expensive for business products and cheaper for residential – noting however that the product specification is higher. The Netherlands ranks in the middle in terms of connection fees and also has a significant number of plans with data caps (46%). However, in all but one case this cap is by way of a 'fair use' policy, effectively meaning that there is no actual cap in place.

Norway

Norway ranks 3rd overall in this study. Over 80% of broadband connections in Norway are DSL-based and only DSL packages are included in this analysis. Norwegian broadband rates highly in terms of speed, with an average download speed in excess of 4Mbps. Twenty-eight percent of products were over 5Mbps and only 8% below 1Mbps. Norway ranks highest for average upload speed, averaging 1.25Mbps across all 47 products surveyed, the highest being 8Mbps and the most widely available upload speed is 512Kbps. Thirty-four percent of products surveyed were synchronous, with an average speed of 2.2Mbps. Where Norway loses out is in terms of cost, being the second most expensive country overall and for residential products and fifth most expensive for business products. Norway also had the second most expensive average connection fee. These costs are perhaps a reflection on the high specification of Norwegian broadband. It is noted that the dataset did not record any connection fees for residential broadband packages, nor was there any evidence of data caps.

Poland

Poland comes out 25th in this study, second from last and this is also reflected in broadband uptake statistics (27th out of 30) and e-readiness (32nd). This analysis of 44 DSL, cable and satellite packages ranks Poland in the lower quartile for download speeds, averaging 2.1Mbps with 39% of all products below 1Mbps. Although a small number of products have upload speeds of only 64Kbps, the most widely available speed is 256Kbps (36.4%). The lower specification of broadband services is not reflected in the cost. Poland has the eighth most expensive monthly subscriptions overall and fifth most expensive residential subscriptions. It is the seventh most expensive country in terms of residential connection charges.

Portugal

Given its OECD ranking of 21st and e-readiness ranking of 25th, Portugal was perhaps a surprise to be in 10th place. It has one of the lower rates of DSL use and the highest rate of cable broadband use in the European Union. Because of this, it rates well in terms of both speed and cost but rates in the upper half of the table for connection fees.

Slovakia

Slovakia ranks 8th in this study, the opposite end of the table to its broadband uptake and e-readiness rating. Like Portugal, this suggests that broadband services and costs are good but they are not widely available to people within the country. Slovakia is interesting because no plans were below 2Mbps, a reflection on the relative newness of the infrastructure. However, it also lacked many very high speed products and the average upload speed placed it in the lower half of the table (having said this, the most widely available upload speed was 384Kbps – the case for 66% of the products surveyed). Slovakia was the cheapest country overall for monthly subscription charges and connection fees.

Spain

Ranked in 7th place for value, Spain's broadband is mostly DSL-based. It ranks eighth in terms of average download speed (3.9Mbps) and averaged an upload speed of just over 420Kbps, 512Kbps being available in 28% of products. Spain is the tenth most expensive country overall but has the seventh lowest connection fees.

Sweden

Sweden, perhaps unsurprisingly, rates highest in this study. Whilst the average connection fee is around the mid-point monthly costs are in the bottom third and residential is the seventh cheapest. Where Sweden excels is in speed. 66% of Swedish broadband uses DSL, with cable, fibre and satellite also being used. This is reflected in the highest average download speed of 8.4Mbps and 55% of products surveyed having speeds in excess of 5Mbps (a figure approached only by Canada). Sweden averages an upload speed of over 600Kbps and one third of products had an upload speed of 512Kbps. Sweden rated the highest speed synchronous product (10Mbps) and averaged 2.3Mbps for synchronous broadband, second behind France. Despite

this relatively high level of performance, Sweden rates well in terms of cost, being tenth most expensive overall and seventh in terms of residential broadband. Sweden rates around the mid-point for connection charges and there was no evidence of data caps in the products analysed.

Switzerland

Where Sweden was an unsurprising leader in this analysis, Switzerland was perhaps a surprise tail-ender, ranking only 19th in terms of value despite being placed 5th for broadband uptake and 3rd for e-readiness. Switzerland's weakness is in its costs – it is the third most expensive country and the most expensive for new residential broadband connections. In terms of speed, Switzerland ranks around the mid-point for both download and upload speeds. In summary, Swiss broadband is average and expensive.

United Kingdom

The UK broadband market has undergone a recent transformation with the decision to split the wholesale and retail division of incumbent BT. However, it is too early for this to influence the dataset here and the wide choice and competitive nature of the UK market is derived from early decisions to unbundle the local loop. The UK market is primarily driven by DSL based products and cable. The products on offer are amongst some of the most varied in the study, with customers able to choose from a wide combination of download speeds, uploads speed and, unusually, contention ratios. However, the UK is expensive, particularly for high-specification products and this ensured that it ranked poorly in only 20th place in terms of overall value for money.

United States

Like Canada, the US relies mostly on cable for broadband. This presented this study with a problem because most of the products reviewed were discarded as they required prequalification. That said, the US rated 6th in this study. It is 11th in the OECD rankings and 2nd for e-readiness (no comment is made here about how such studies are skewed towards western-centric attitudes). The study includes 107 products from 11 providers and shows that the US rated poorly for average download speed (2Mbps) but better for upload speeds, the most widely available being 384Kbps (32.7%) and a relatively high number of products (20%) being synchronous. The US rates in the bottom third for monthly costs and is the third lowest-cost for residential products. It ranks well in terms of low connection fees and there was no evidence of data caps.

Conclusion

It is impossible to draw conclusions between regulatory environment and value, or between broadband uptake, e-readiness and value. The Netherlands has adopted a regulatory framework similar to that proposed in New Zealand and ranks highly in this study. However, it is also a densely populated country and this is likely to be a significant factor in its overall rating. Iceland, the OECD's leading adopter of broadband, sits in the middle of table for value due primarily to cost factors. Most likely, it would seem that a combination of favourable regulatory environment, geography (both physical and human) and an overall national attitude that places value in adopting broadband and other new technologies is the combination that leads to success. Certainly, this would appear to be true for the top rating countries in this study.

The top three countries in this study, Sweden, the Netherlands and Norway all have significantly more choice, faster plans and either no usage restrictions or limits that in most cases are unlikely to ever affect customers.

New Zealanders have seen a recent increase in the specification of broadband plans available to them through Telecom's wholesale Jetstream offering. Had this study been conducted before Telecom upgraded the specification of its Jetstream plans, New Zealand would have undoubtedly languished in last place. Even now it still lags well behind many countries and has more data restrictions than any other country in the study.

Questions must also be asked in terms of contention ratio and network capacity. This directly affects the real time performance customers experience and anecdotal evidence suggests that New Zealand lags significantly behind those countries where providers openly disclose – and often compete on – contention ratios. Another negative for New Zealand is upload speed. Though we have improved and are better off than Australia in this regard, it remains at the lower end of the countries in this study. This directly affects the uptake of synchronous communication tools such as web-based video calling or voice over IP (VoIP).

New Zealand does compete favourably on cost. However, New Zealand consumers are paying less for less. The monthly cost of broadband is amongst the lowest, as are connection fees. It is cautioned that the latter is the result of an ongoing free basic DSL installation offer, which could end at any time.

Choice is limited in New Zealand. When compared to Australia, the UK and Ireland, there is significantly less variety in the market. In effect New Zealand broadband consumers have the option of Telecom's Jetstream package or, in distant second, BCL's wireless product. Other providers, such as Woosh, are minor players. It is evident from this study that New Zealand's broadband customers are not well served and this is particularly true in the small/medium sized business market.