

Technology Policy Institute

From the Selected Works of Scott J. Wallsten

November, 2010

Residential and Business Broadband Prices: Data Appendix

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Available at: https://works.bepress.com/scott_wallsten/61/

Data Appendix

This appendix has two parts. The first part of the appendix reproduces the description of our dataset, which appeared in *Part 1: An Empirical Analysis of Metering and Other Price Determinants*. The second part of the appendix shows detailed data for each country included in the paper's analyses.

A. Data discussion, reprinted from Part 1 of this project

Broadband prices are difficult to decipher and compare for several reasons. Broadband is not a homogeneous product. It is available with different download and upload speeds and other features, and frequently comes bundled with telephone and video services, each of which has its own set of features. Additionally, it is marketed in numerous ways—with contracts and promotions that vary considerably from plan to plan, even within a company. This complexity has contributed to, as the FCC's National Broadband Plan puts it, “a dearth of consistent, comprehensive, and detailed price data”¹

To address this problem we follow and build upon the approach taken by Greenstein and McDevitt (2010). In particular, we construct a new dataset from information available from Point Topic, a UK-based consultancy that compiles data on plans from the “major broadband operators” in countries around the world.²

Point Topic records some of the data, such as company name and upload and download speeds, systematically, but unfortunately many of the details necessary to characterize plans accurately were included in written notes that had no consistent pattern. Quantifying details in the notes, which included factors such as contracts, bitcaps, promotions, and rebates, was a heavily labor-intensive process.³ Often those details implied that one particular plan in the Point Topic data contained, in reality, multiple service options. For example, the notes for one plan might include statements like, “activation fee waived if user signs a 2-year contract, otherwise activation fee of \$75.” In that case, what Point Topic and probably even the Internet Service Provider (ISP) consider to be a single plan becomes two plans in our dataset: one with an activation fee and a one-year contract, and another with no activation fee and a two-year contract. These alterations become more complicated when factoring in notes on promotions and extra features.⁴

¹ Federal Communications Commission (2010b, 38).

² Specifically, we used data from Point Topic's Operator Source dataset (combining individual spreadsheets kept for each quarter, downloaded in April 2010), which has information on broadband plans offered by a large number of providers around the world.

³ One consequence of this exercise is that after months of reading the “fine print” on thousands of broadband plans, Riso has little sympathy for anyone who complains about reading the details for a single plan.

⁴ The data are complicated in many ways. For example, many records indicate prices are not uniform throughout a provider's footprint. Over a third of Bell Canada plans in our dataset note “Tariffs mentioned for Ontario region. Different services and promotional offers for Quebec region.” Other notes are less explicit; e.g. almost all Comcast plans mention that prices are applicable for Philadelphia but “may vary for other regions.” Our data are unfortunately unable to capture those regional differences within plans. In addition, some promotional prices are offered generally, whereas others are targeted specifically at existing customers or apply only to new customers. We ignore these distinctions and use the lowest available discounted price.

The final dataset yielded a total of 25,279 unique broadband plans from 169 companies in 12 quarters (2007Q1–2009Q4). Table 1 shows the breakdown of these plans by residential or business classification and other services with which they are bundled.

Table 1
Number of Broadband Plans in the Dataset by Type

Type of Broadband Plan:	Residential	Business
Standalone	8,422	8,855
Bundle with		
Fixed voice	2,800	1,299
Video, fixed voice (triple play)	2,087	55
Video	855	29
Fixed voice, mobile voice	328	170
Video, fixed voice, mobile voice	283	4
Video, mobile voice	45	15
Mobile voice	30	2
Total	14,850	10,429

The table shows that standalone plans are the most common in the dataset, followed by broadband bundled with fixed voice and broadband bundled with telephone and video—the so-called triple play. The table also shows a small number of plans bundled with mobile voice services.⁵

⁵ ISPs now appear to be bundling mobile broadband service with fixed broadband services, though that type of bundle does not appear in our dataset. In the United States, Comcast and Time Warner Cable offer Clearwire’s 4G service as an added feature in areas in which Clear offers service (<http://www.comcast.com/About/PressRelease/PressReleaseDetail.ashx?PRID=887> http://news.cnet.com/8301-1035_3-10300017-94.html). Clearwire itself sells fixed and mobile wireless broadband service as a bundle (<http://www.clear.com/shop/quickshop?id=975&market=71>).

Table 2
Distribution of Plans by Country and Company

Country	Number of Companies	Number of Plans
Australia	4	1331
Austria	2	525
Belgium	6	577
Canada	11	2050
Czech Rep.	2	309
Denmark	7	1332
Finland	3	557
France	7	464
Germany	13	1233
Greece	3	396
Hungary	4	600
Iceland	1	106
Ireland	5	1221
Italy	3	477
Japan	8	978
Luxembourg	1	67
Mexico	4	336
Netherlands	8	945
New Zealand	2	484
Norway	8	1146
Poland	5	750
Portugal	3	590
Slovakia	1	319
South Korea	4	538
Spain	6	875
Sweden	7	1487
Switzerland	4	581
Turkey	2	75
UK	10	1188
USA	29	3869

Readers should take care when interpreting these tables. The distributions of plans by type and country are potentially misleading in two ways. First, the number of plans offered by a company is not necessarily related to a company's subscriber base. For example, in our dataset Cincinnati Bell offered 177 plans over the time period while Comcast offered only 86, even though Comcast is over 60 times larger than Cincinnati Bell.⁶

⁶ At year-end 2009 Cincinnati Bell had 244,000 DSL and fiber subscribers, compared with Comcast's 15.93 million High-Speed Internet customers. See company releases at

Second, we do not know the number of subscribers to each plan. To our knowledge, those data are not available, and certainly not for the way we define plans. We therefore cannot say what a typical consumer would pay, but only what a consumer would pay if subscribing to a particular available plan. In this paper we deal, imperfectly, with these problems by including firm fixed-effects in the regressions.

Attributes of broadband plans

In addition to customer group (business or residential) and bundle type, our dataset also includes a number of variables relevant to decomposing prices and attributes. Table 3 highlights those variables.

Table 3
Relevant Variables in the Dataset

Description
Regular monthly service charge
Monthly service charge promotional rate that applies for a portion of customer lifetime
Number of months customer receives promotional rate for service charge.
Activation fee less any discounts noted
Installation fee less any discounts noted
Equipment fee less any discounts noted (generally distinct from on-going rental costs)
Misc. monthly fee required on top of those named above, if noted (usually line rental)
Monthly service charge named requires contract of at least length entered (in months)
Downstream speed
Upstream speed
Plan has a data cap (bitcap)
Amount of data transfer allowed under cap, in megabytes
Number of TV channels, excluding music/radio where possible
Price includes tax (indicator)
Annual purchasing power parity (for GDP) exchange rate as published by OECD

Table 4 shows selected summary statistics about the plans we observe. The table illustrates that bitcaps are common in many countries, with service providers in 24 of the 30 countries offering plans with bitcaps. Nine of the countries listed have bitcaps on over 50% of the plans offered. In three countries, Australia, New Zealand and Belgium, 75% or more of the plans offered contain bitcaps. While we are unaware of research explaining why caps are more common outside the United States, one possible reason is that because local landline phone calls were historically metered in countries other than the U.S., residents of those countries never experienced truly unlimited dialup service and were, therefore, less likely to expect unlimited broadband from ISPs.

<http://investor.cincinnati-bell.com/phoenix.zhtml?c=111332&p=irol-newsArticle&ID=1387040&highlight> and http://files.shareholder.com/downloads/CMCSA/845254023x0x348274/c7755491-8d6d-4027-b3ae-0a061f45fc5f/Comcast_Q4Trending_2.2.10.pdf

The table also shows that plans that bundled video packages include far more television channels in the U.S. than in other countries. The median number of channels included in a video package in the U.S. is 160, far above the amount of channels offered in most other countries. Plans in Canada offer the second-largest number at 116.

Table 4
Characteristics of Residential Broadband Plans, 2007-2009

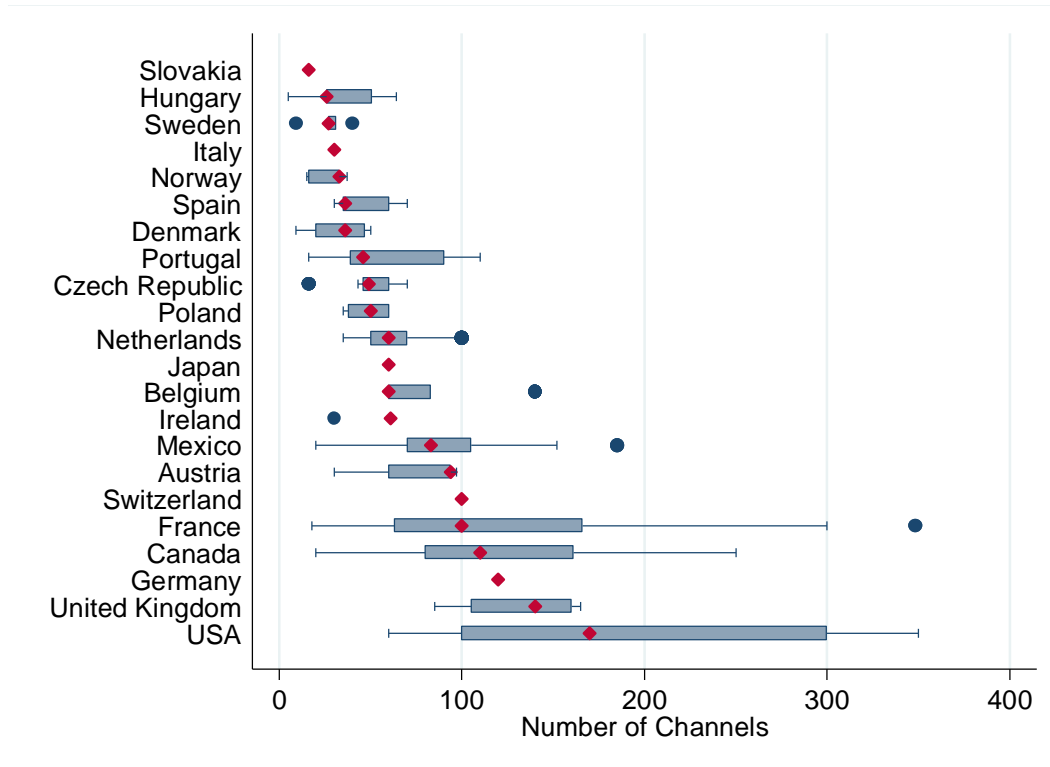
	Median Speed (kbps)		Bitcap ⁷		Median number of video channels
	Download	Upload	Share with	Median size (GB)	
Australia	8000	256	99%	12	
Austria	8192	768	11%	5	94
Belgium	10000	256	75%	20	60
Canada	1500	640	52%	30	116
Czech Republic	3072	256	15%	20	49
Denmark	6144	1024	21%	0.05	36
Finland	2048	600	0%		
France	28000	800	0%	50	100
Germany	6144	608	1%	1.5	60
Greece	2048	256	10%	3	
Hungary	4096	480	14%	1	47
Iceland	8000		63%	6	60
Ireland	3000	256	46%	20	61
Italy	20000	1000	0%		30
Japan	26000	2000	0%		60
Luxembourg	8000	384	64%	15	
Mexico	1024	128	1%	4	83
Netherlands	8000	1024	2%	100	53
New Zealand	4000	2000	94%	20	
Norway	5000	1000	0%		33
Poland	1024	256	7%	17	40
Portugal	8192	256	61%	14	46
Slovakia	1536	256	53%	1	16
South Korea	20000	6000	0%		
Spain	6000	320	6%	1	36
Sweden	10000	3000	1%	0	27
Switzerland	5000	425	10%	0.02	100
Turkey	1024	256	27%	6	
UK	8000	448	42%	10	100
USA	5000	768	4%	250	160

Note: None of the 45 residential plans reported in Iceland (all offered by Siminn) named upload speed. Upload data is missing in over 2680 plans (vs. 184 missing download speed).

⁷ Some of the bitcaps seem, at first glance, implausibly small, but appear to be legitimate. For example, the plans in Denmark with 50 MB monthly caps also capped additional usage charges at DKK 400 (approximately USD 75) per month.

Figure 1 provides detail on triple-play video packages by showing the range of the number of channels available in video packages in each country. The figure shows that the U.S. has the highest median number of channels (160) and also the widest range of number of channels. The UK has the second highest median number of channels (140), followed by Germany (120), Canada (100), and France and Switzerland (both with 100).

Figure 1
Number of Channels Included in Residential Triple Play Packages by Country, 2007-2009



Note: Box plot shows median (diamond), 25th to 75th percentiles or interquartile range (shaded box), values within 1.5 times the interquartile range (whiskers) and outliers (dots). Channel distributions differ from Table 4 because this figure isolates triple play plans.

The number of channels included in a video package is one important indicator of the value of a video bundle. After all, video distributors themselves frequently use that indicator in their advertising. Nevertheless, other factors also affect how consumers value the bundle and how costly the programming is to the video distributors. For example, consumers may care about the availability of high-definition (HD), premium, and sports channels. Meanwhile, programmers have differing abilities to bundle their own programming and to charge the distributor. Unfortunately, we do not have any such information across countries, meaning that our channel count, while the best available, is a highly imperfect indicator of the quality of video bundles.

Creating a comparable price variable

As mentioned above, comparing broadband prices is not straightforward. Factors like promotions and miscellaneous fees mean that simply examining advertised monthly prices is likely to yield inaccurate and potentially misleading comparisons. Instead, we require a variable that is comparable across plans, companies, and countries.⁸ We create such a variable by calculating the total price a consumer would pay for a year of service for each plan, as shown in equation (1) below.

$$(1) \text{ Net price for one year} = (\text{promotional price} * \text{number of months promotion lasts}) + (\text{standard price} * (12 - \text{number of months promotion lasts})) + \text{installation fee} + \text{activation fee} + \text{equipment charges} + \text{other and hidden fees} - \text{rebates}$$

The implicit assumption behind this variable is that consumers consider their total expected payments over a year when choosing a broadband plan. Certainly, not all consumers think that way. More practically, this variable overstates payments for consumers whose plans have contracts of less than one year or no contract and who aim to shop for a new service as soon as possible. Similarly, it understates payments for consumers whose contracts exceed one year. Nevertheless, we believe the variable is appropriate because it allows for a consistent and comparable measurement of prices that takes into account many of the factors included in the price a consumer pays.

Table 5 shows some basic descriptive statistics for this variable. Specifically, the table shows the median unweighted prices of the different residential and business bundle types in the data. Because they are unweighted, they do not necessarily reflect the price a typical OECD consumer would pay, but they do give a sense of some the differences across plans. The table shows, for example, that business plans tend to be more expensive than residential plans, with the unweighted price for business more than double that for residential. Note that while the table shows the median for bundles that include mobile voice, the sample sizes for those plans are quite small, so those figures may not be especially meaningful and we do not explore them further in the analysis.

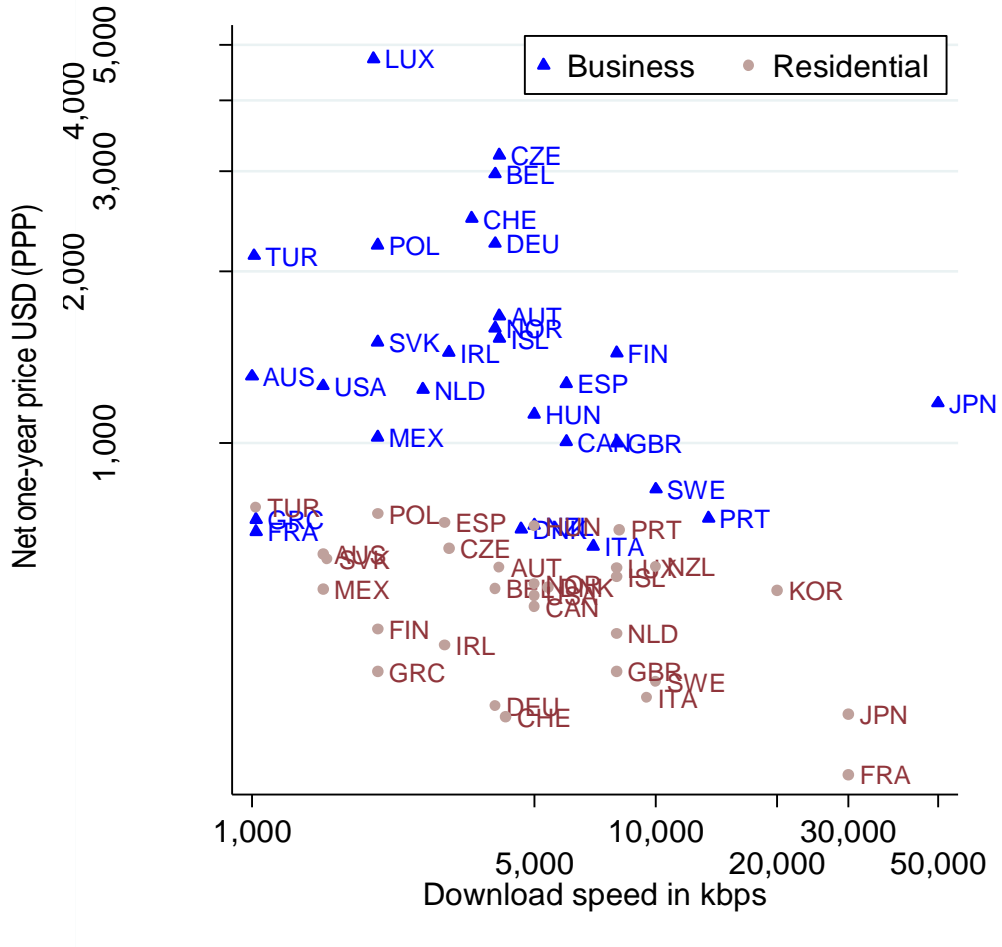
Table 5
Median Unweighted Broadband Bundle Prices Across all Countries, 2007-2009

Bundle type	Residential	Business
Standalone broadband (no bundle)	\$499	\$1,190
Bundle with		
Fixed voice	544	904
Video	674	-
Fixed voice, video ("triple play")	904	-
Fixed voice, mobile voice, video	974	-
Fixed voice, mobile voice	672	963

⁸ Note that all currency values are converted to U.S. dollars at annual purchasing power parity (PPP). All discussion and figures are presented in dollars by PPP. Rates available from the OECD at http://stats.oecd.org/Index.aspx?datasetcode=SNA_TABLE4.

Figure 2 provides additional information on the residential-business price difference. The figure shows that business plans are consistently more expensive than residential plans even where, as is the case in many countries, residential plans tend to be faster.

Figure 2
Median Net One-Year Price and Download Speed for Business and Residential Standalone Broadband Plans, 2007-2009⁹



⁹ ISO abbreviations per <http://unstats.un.org/unsd/methods/m49/m49alpha.htm>

B. Data by country

This section of the data appendix details the methods we use to approximate the distribution of downstream speeds in each country from 2007-2009 and to estimate “representative middle” prices. The representative middle, which was related less formally in Part 2 of this project, is calculated as follows.

For each (Residential standalone, Residential triple play, Business standalone):

$$\text{Weighted Median}_{ist} = \frac{1}{\text{subscribers}_{it}} \sum_j \text{median}(\text{Net One Year Price})_{jst} \times \text{subscribers}_{jt}$$

$$\text{Representative Middle Price}_{it} = \frac{1}{\text{lines}_{it}} \sum_s \text{Weighted Median}_{ist} \times \text{lines}_{ist}$$

Where

- i = OECD country
- s = speed tier, as described for country i in “Connections by speed tier” tables
- t = 1H2007, 2H2007, ... 2H2009
- j = ISP (operating within a single country)

The “subscribers” variable is derived from Point Topic firm data, whereas “line” weights are connection counts from the regulator or other market data by speed tier. “Net one year price” and other details are explained elsewhere.

The table below presents a summary of weighted median prices from 2007-2009. Countries are grouped alphabetically within common download speed tier schemes, which are dictated by the source of the tier definitions (detailed below). Note that some countries are excluded due to a lack of adequate subscriber counts or price data. Due to our high-level averaging and the roughness of download speed as a quality control, some results may appear counterintuitive (i.e. lower speeds sometimes show higher prices than a faster tier in a given market).

**Median Weighted Prices for Representative Middle Calculation
Average Price (in USD, PPP) Over all Periods, by Tier**

Australia	256kbps - 512 kbps	512kbps - 1.5Mbps	1.5 Mbps - 8 Mbps	8 Mbps - 24 Mbps	> 24Mbps
Residential Standalone	568	660	732	673	
Residential Triple Play					
Business Standalone	1510	1719	6329	903	1392

Canada	300 kbps - 1400 kbps	1.5 Mbps - 4 Mbps	5 - 9 Mbps	10 Mbps – 15 Mbps	16 Mbps – 100 Mbps
Residential Standalone	305	518	467	572	948
Residential Triple Play	787	957	937	1137	
Business Standalone	594	850	992	1068	1562

	<= 512 kbps	512 kbps - 1 Mbps	1 Mbps – 2 Mbps	2 Mbps – 8 Mbps	> 8 Mbps
Austria					
Residential Standalone		386	508	697	681
Residential Triple Play		707		647	897
Business Standalone	3318	1257	1342	1778	2211
Netherlands					
Residential Standalone	267		269	420	694
Residential Triple Play		804	765	770	901
Business Standalone	1268	1158	1537	1387	948
Norway					
Residential Standalone	301	324	410	563	760
Residential Triple Play		312		920	1394
Business Standalone	664	1197	2166	1717	3500

France	<= 50 Mbps	> 50 Mbps
Residential Standalone	315	373
Residential Triple Play	441	608
Business Standalone	761	371

Japan	<= 47 Mbps	> 47 Mbps
Residential Standalone	372	374
Residential Triple Play	862	318
Business Standalone	911	1792

South Korea	256 kbps - 50 Mbps	>50 Mbps
Residential Standalone		553
Residential Triple Play		573
Business Standalone		1203

**Median Weighted Prices for Representative Middle Calculation
Average Price (in USD, PPP) Over all Periods, by Tier (cont.)**

	144 kbps - 2 Mbps	2 Mbps - 10 Mbps	10 Mbps+
Belgium			
Residential Standalone	373	529	760
Residential Triple Play	635	701	884
Business Standalone	2722	2585	1206
Czech Republic			
Residential Standalone	588	679	875
Residential Triple Play	1037	1115	1626
Business Standalone	336	4017	3834
Denmark			
Residential Standalone	350	463	686
Residential Triple Play	445	486	711
Business Standalone	370	632	985
Finland			
Residential Standalone	356	497	596
Residential Triple Play			
Business Standalone	612	1363	3413
Germany			
Residential Standalone	247	328	369
Residential Triple Play		460	475
Business Standalone	2518	2561	1863
Greece			
Residential Standalone	307	536	544
Residential Triple Play			
Business Standalone	734	962	
Hungary			
Residential Standalone	401	613	935
Residential Triple Play	593	980	1313
Business Standalone	582	1419	2232
Ireland			
Residential Standalone	414	524	464
Residential Triple Play	672	685	902
Business Standalone	732	960	1704
Italy			
Residential Standalone	268	368	486
Residential Triple Play		490	756
Business Standalone	875	729	787

**Median Weighted Prices for Representative Middle Calculation
Average Price (in USD, PPP) Over all Periods, by Tier (cont.)**

	144 kbps - 2 Mbps	2 Mbps - 10 Mbps	10 Mbps+
Luxembourg			
Residential Standalone	368	595	961
Residential Triple Play			
Business Standalone	6619	8716	4521
Poland			
Residential Standalone	665	1143	1284
Residential Triple Play	915	869	
Business Standalone	1280	2551	3497
Portugal			
Residential Standalone	492	561	901
Residential Triple Play	883	941	1012
Business Standalone	476	565	969
Slovakia			
Residential Standalone	678	537	551
Residential Triple Play	1299	719	
Business Standalone		1422	1500
Spain			
Residential Standalone	518	700	900
Residential Triple Play	788	776	841
Business Standalone	1766	1170	1314
Sweden			
Residential Standalone	317	482	523
Residential Triple Play		541	596
Business Standalone	502	883	1156
United Kingdom			
Residential Standalone	314	349	585
Residential Triple Play		533	1210
Business Standalone	5127	1132	880

As shown in equations above, in order to create representative middle price indices we weight prices with fixed broadband subscriber ("line") counts. The data used for this step are detailed below. In many cases, these connection count source data are not for the exact period named, but we attempt to align the dates as well as possible. We were unable to locate reliable tier counts for several countries. Most counts combine business and residential, meaning we are forced to apply the same weights for the two groups. The exceptions are Australia and the United States, for which we employ separate connection counts by tier for business broadband.

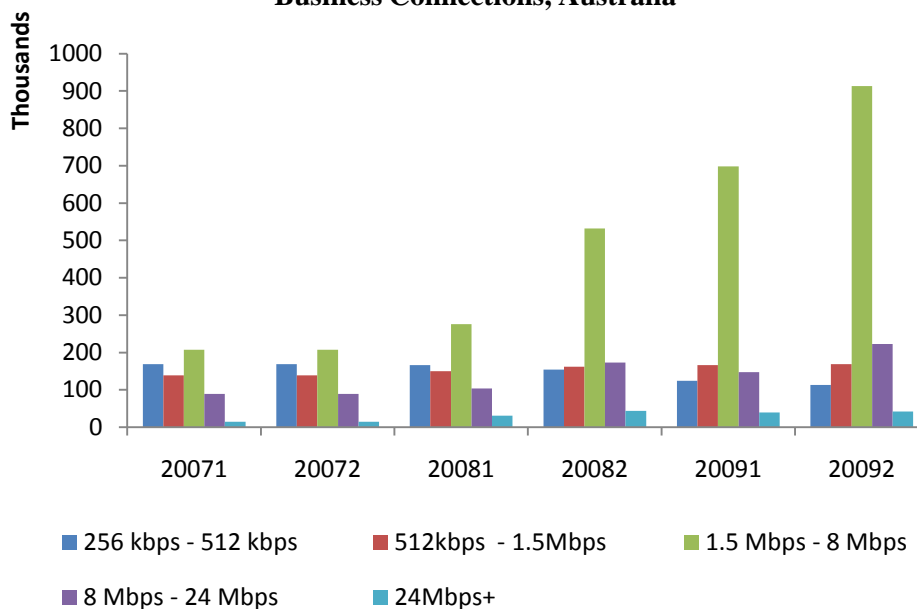
Bracketed values in the tables indicate that the value from the named half year was also applied to the row where it is entered, due to lack of complete data. So, for example, [20072] in the tables for Australia for below mark that the counts from the second half of 2007 were also used for the first half of that year. The bar charts include these repeated data. Notes on our methodology relevant only to a specific country follow that country's connection count graph(s) when applicable. Additional notes on the sources cited for each country are found at the end of this appendix.

Australia

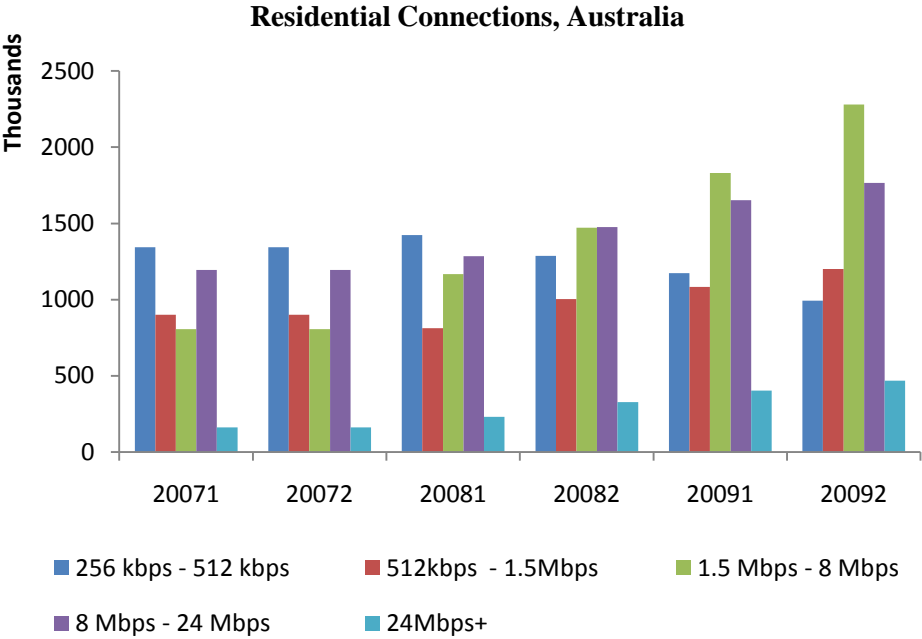
Connections by Speed Tier

		256kbps - 512 kbps	512kbps - 1.5Mbps	1.5 Mbps - 8 Mbps	8 Mbps - 24 Mbps	24Mbps+
Business	20071			[20072]		
	20072	169000	139000	207000	89000	15000
	20081	166000	150000	276000	104000	31000
	20082	154000	162000	532000	173000	44000
	20091	124000	166000	698000	147000	39000
	20092	113000	169000	913000	223000	42000
Residential	20071			[20072]		
	20072	1343000	901000	807000	1194000	161000
	20081	1423000	813000	1168000	1286000	231000
	20082	1287000	1003000	1471000	1477000	328000
	20091	1173000	1084000	1831000	1652000	404000
	20092	994000	1201000	2281000	1766000	469000

Business Connections, Australia



Australia, cont.

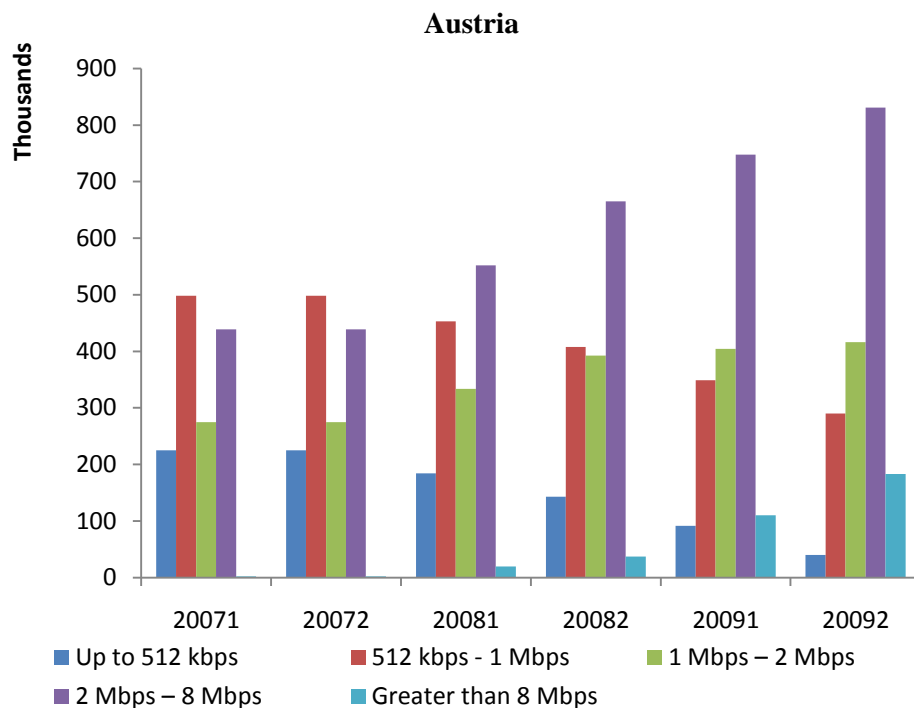


Source: Australian Bureau of Statistics (see notes)
 We apply December 2007 counts to 1H07 (prior to December 2007 Australia did not further classify speeds greater than 1.5 Mbps)

Austria

Connections by Speed Tier

	Up to 512 kbps	512 kbps - 1 Mbps	1 Mbps – 2 Mbps	2 Mbps – 8 Mbps	Greater than 8 Mbps
20071			[20072]		
20072	225000	498000	275000	439000	2000
20081	184000	452750	333750	552000	19500
20082	143000	407500	392500	665000	37000
20091	91400	348750	404250	748000	110000
20092	39800	290000	416000	831000	183000

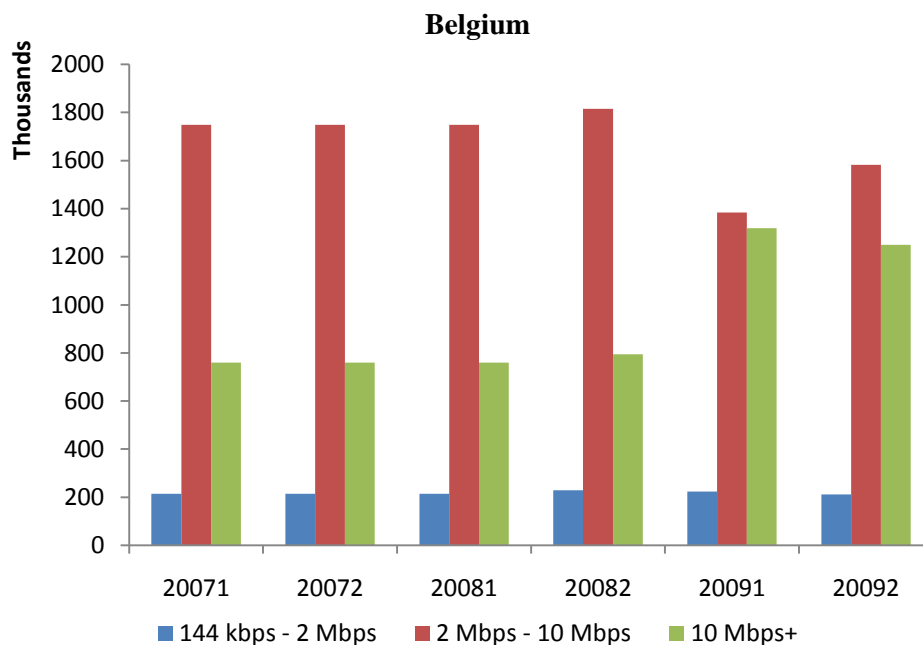


Source: IDATE (see notes).

Belgium

Connections by Speed Tier

	144 kbps - 2 Mbps	2 Mbps - 10 Mbps	10 Mbps+
20071		[20081]	
20072			
20081	214165	1748864	759443
20082	229040	1815314	794811
20091	223007	1383585	1319413
20092	211814	1582576	1248986

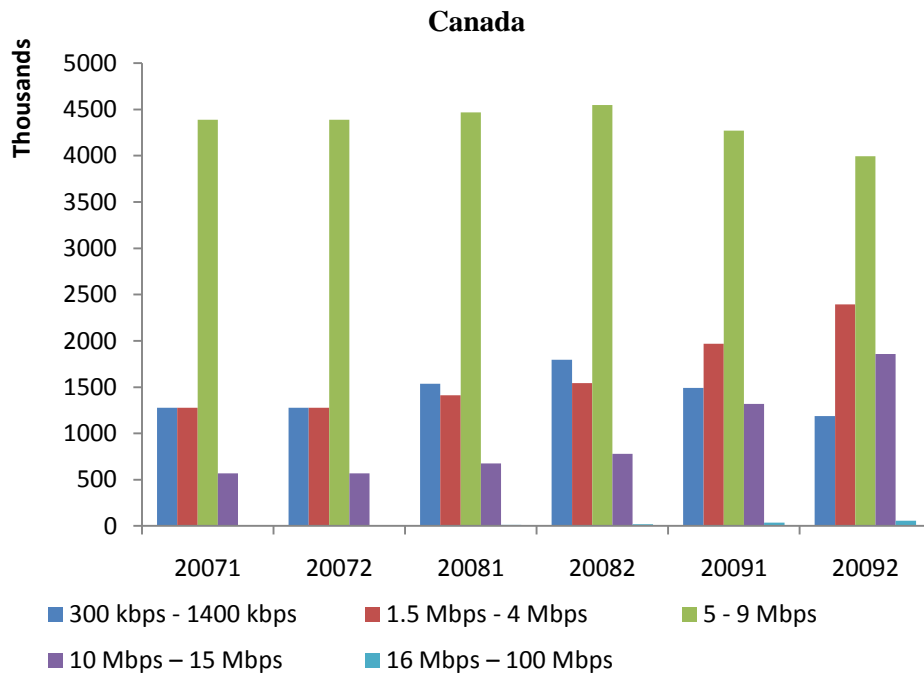


Source: European Commission (see notes).

Canada

Connections by Speed Tier

	300 kbps - 1400 kbps	1.5 Mbps - 4 Mbps	5 - 9 Mbps	10 Mbps – 15 Mbps	16 Mbps – 100 Mbps
20071			[20072]		
20072	1278468	1278468	4386900	568208	8356
20081	1537857	1410779	4467239	674415	13255
20082	1797246	1543090	4547577	780622	18154
20091	1492335	1968545	4270385	1319183	37805
20092	1187424	2394000	3993192	1857744	57456

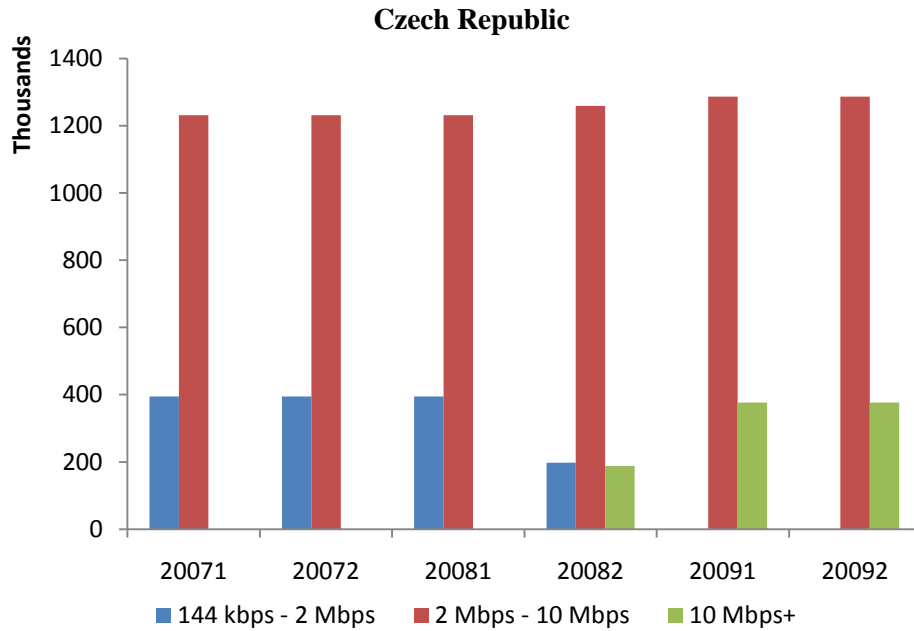


Source: CRTC (see notes).

Czech Republic

Connections by Speed Tier

	144 kbps - 2 Mbps	2 Mbps - 10 Mbps	10 Mbps+
20071			
20072		[20081]	
20081	395000	1231330	0
20082	197500	1258885	188298
20091	0	1286439	376596
20092		[20091]	



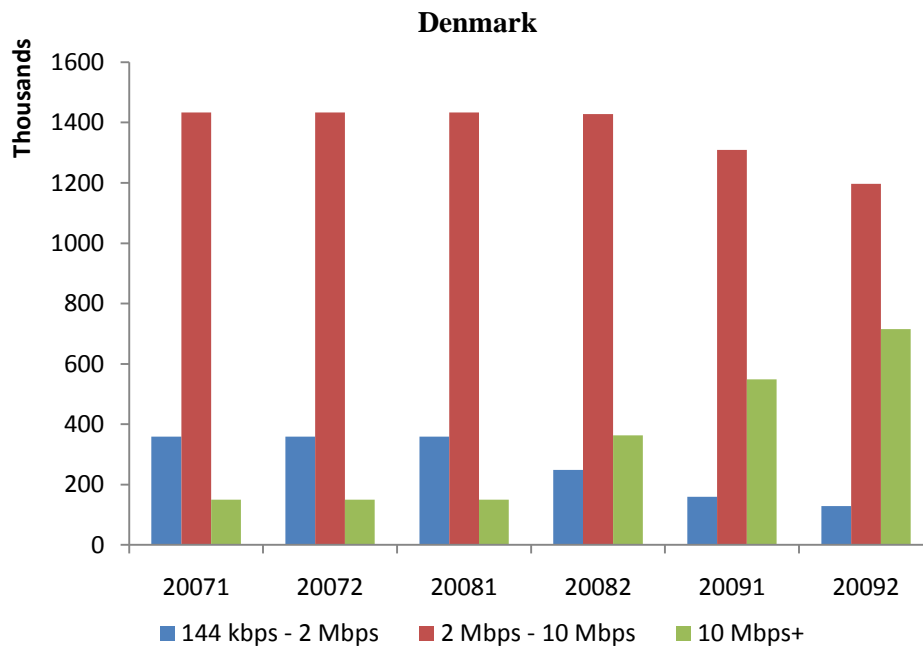
Source: European Commission (see notes)

Czech Republic data missing for 2H08 and 2H09 (in addition to standard EC gaps); we apply 1H numbers to the entire calendar year for 2009 and average 1H08 and 1H09 for 2H08.

Denmark

Connections by Speed Tier

	144 kbps - 2 Mbps	2 Mbps - 10 Mbps	10 Mbps+
20071			
20072		[20081]	
20081	359141	1433136	150282
20082	249043	1428278	363379
20091	159693	1309016	548369
20092	129000	1197000	715000

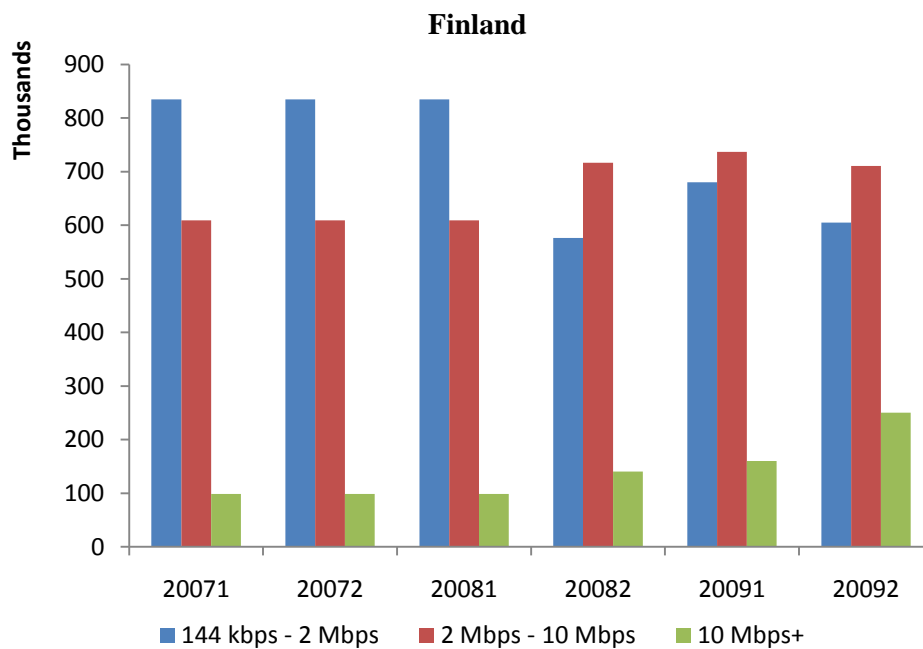


Source: European Commission (see notes).

Finland

Connections by Speed Tier

	144 kbps - 2 Mbps	2 Mbps - 10 Mbps	10 Mbps+
20071			
20072		[20081]	
20081	834657	609214	98538
20082	576100	716600	140300
20091	680396	736800	159800
20092	604800	710500	250200

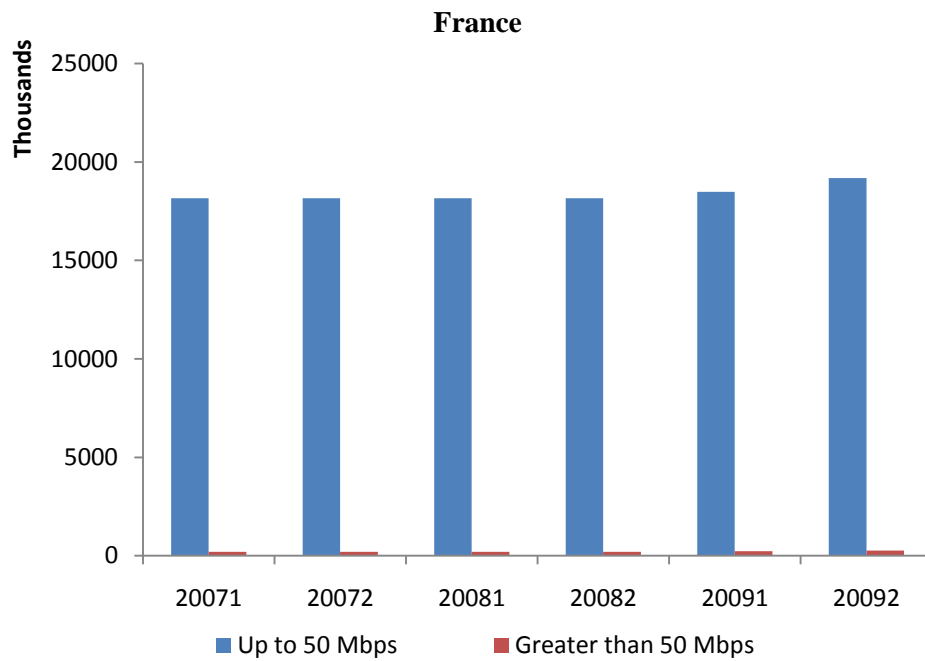


Source: European Commission (see notes).

France

Connections by Speed Tier

	Up to 50 Mbps	Greater than 50 Mbps
20071		
20072		[20082]
20081		
20082	18164000	202000
20091	18484000	227000
20092	19179000	270000

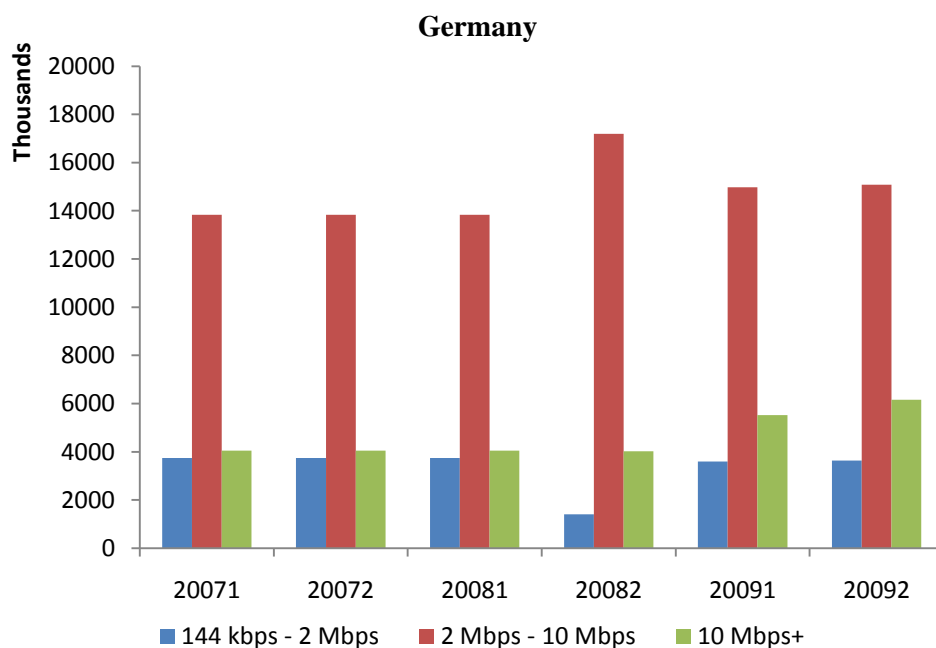


Source: ARCEP (see notes).

Germany

Connections by Speed Tier

	144 kbps - 2 Mbps	2 Mbps - 10 Mbps	10 Mbps+
20071			
20072		[20081]	
20081	3740379	13827274	4050647
20082	1406300	17187600	4024100
20091	3596417	14974423	5528068
20092	3630970	15076250	6153080

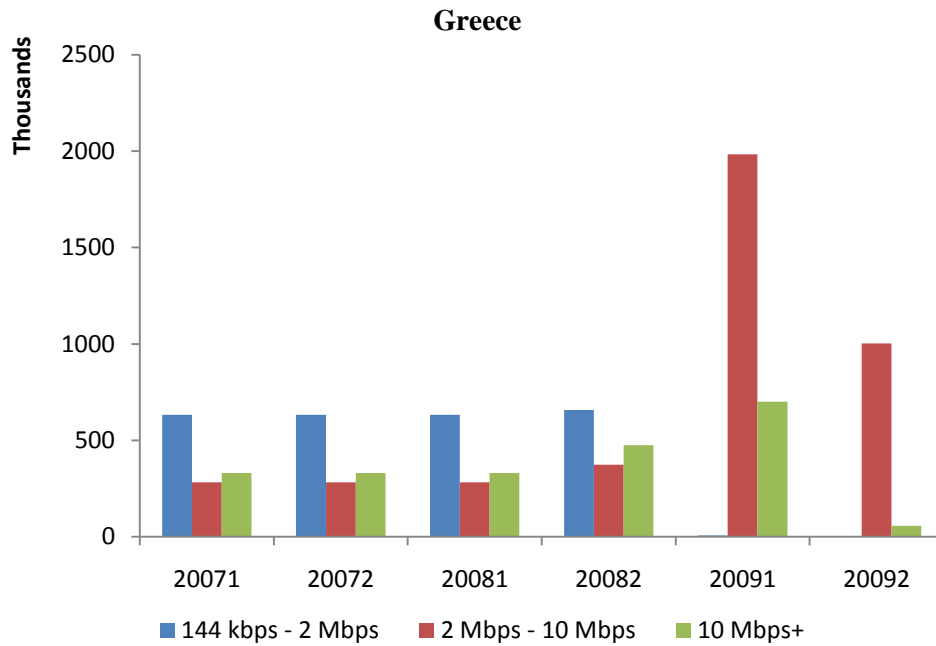


Source: European Commission (see notes).

Greece

Connections by Speed Tier

	144 kbps - 2 Mbps	2 Mbps - 10 Mbps	10 Mbps+
20071			
20072		[20081]	
20081	632045	282576	331353
20082	657889	373453	475272
20091	6273	1984408	700209
20092	0	1003473	57348

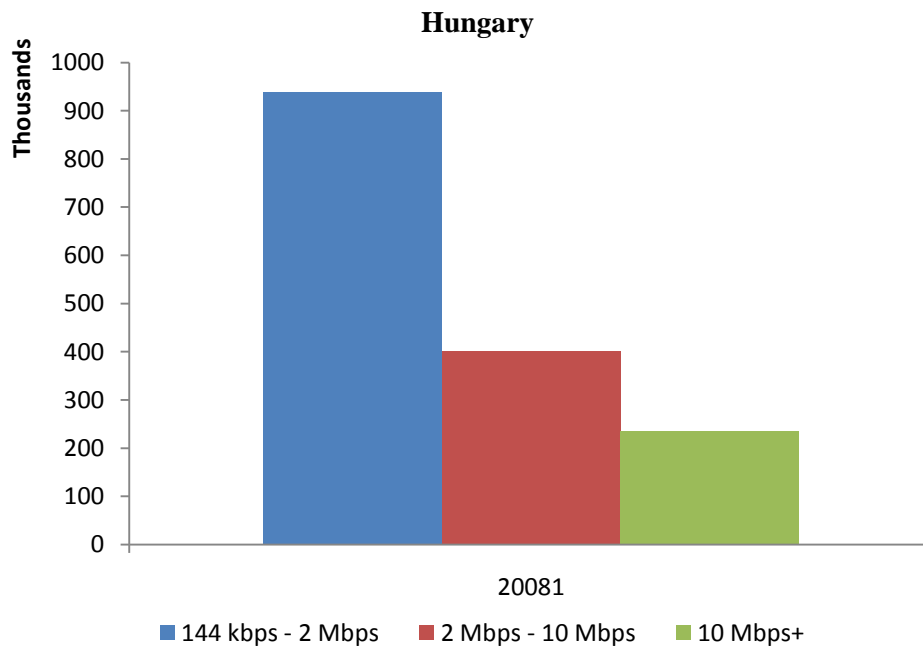


Source: European Commission (see notes).

Hungary

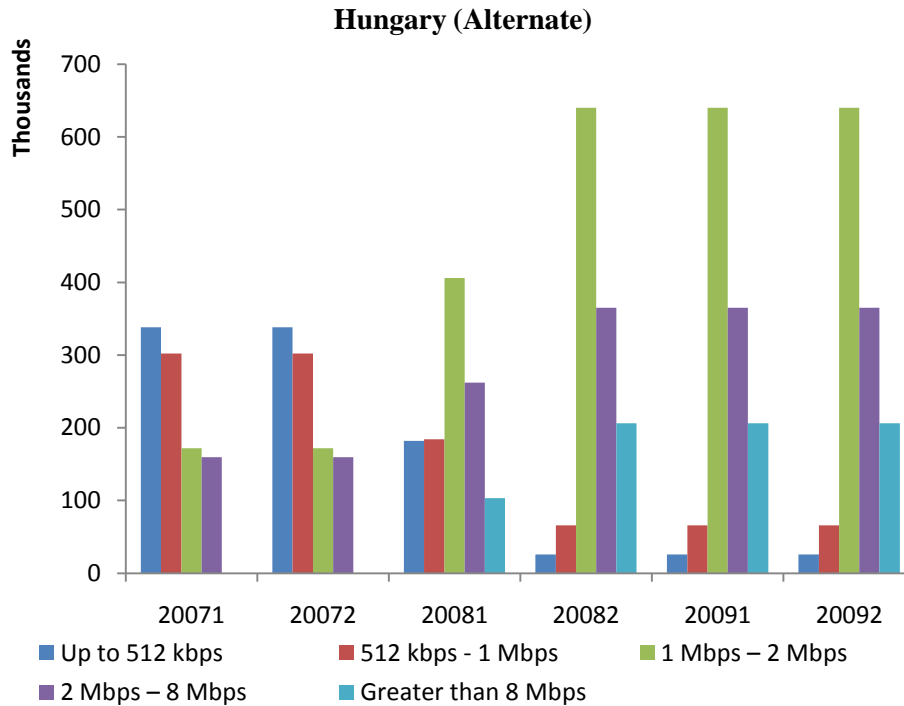
Note: Hungary present in EC reports for only one period (our 20082). See alternate distribution below—which was unsuitable for price indexing—for general trends.

	Connections by Speed Tier		
	144 kbps - 2 Mbps	2 Mbps - 10 Mbps	10 Mbps+
20071		[20081]	
20072			
20081	939283	402340	235314
20082			
20091		[20081]	
20092			



Source: European Commission (see notes)

Hungary, cont.



Source: IDATE (see notes).

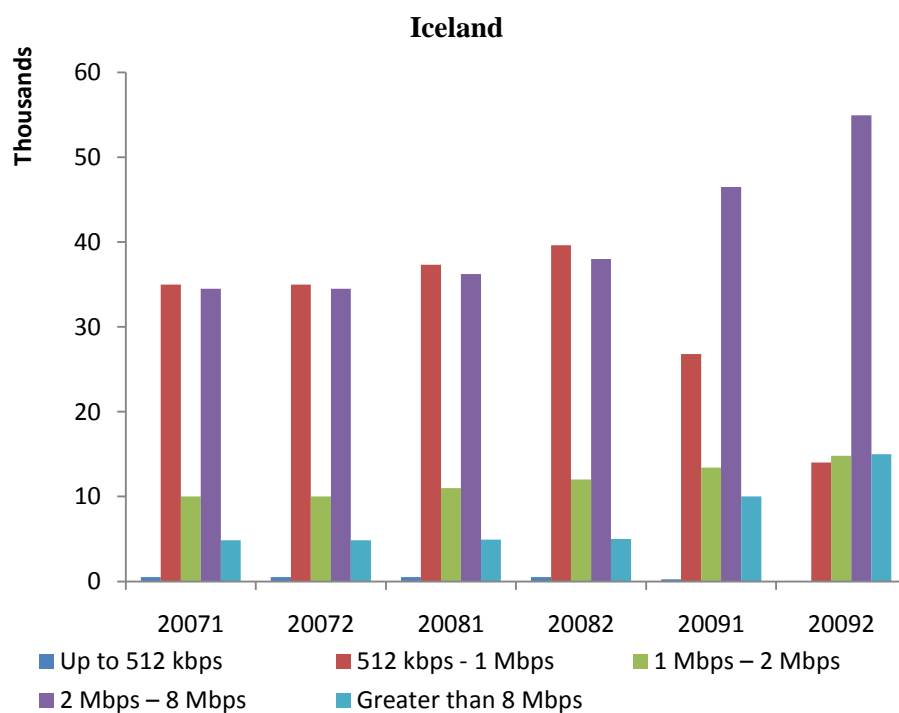
Tier boundaries changed in 2009 in a way which is irreconcilable with the 2007/2008 tier scheme. We apply the same “2007” data to 20071 and 20072, employ the 2008 counts for 20082, 20091, and 20092, and average these two levels for 20081.

Note: these tier definitions were too granular to allow for reliable calculation in price indexing. We employ static tier data from the EC Hungary data.

Iceland

Note: We omit Iceland from the price indices as the data are not sufficient for those analyses.

	Connections by Speed Tier				
	Up to 512 kbps	512 kbps - 1 Mbps	1 Mbps – 2 Mbps	2 Mbps – 8 Mbps	Greater than 8 Mbps
20071			[20072]		
20072	500	35000	10000	34500	4850
20081	500	37315	11000	36250	4925
20082	500	39630	12000	38000	5000
20091	250	26815	13400	46481	10000
20092	0	14000	14800	54962	15000



Source: IDATE (see notes).

Ireland

Connections by Speed Tier

	144 kbps - 2 Mbps	2 Mbps - 10 Mbps	10 Mbps+
20071			
20072		[20081]	
20081	448177	387736	5677
20082	420053	444145	26173
20091	536701	819453	69391
20092	308026	595037	88095

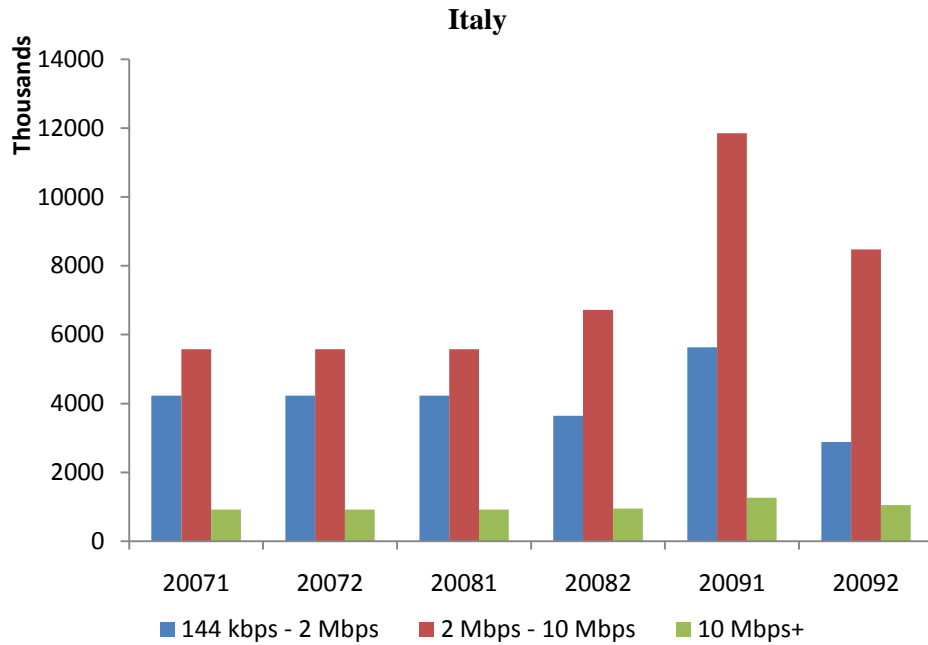


Source: European Commission (see notes).

Italy

Connections by Speed Tier

	144 kbps - 2 Mbps	2 Mbps - 10 Mbps	10 Mbps+
20071			
20072		[20081]	
20081	4228365	5579358	919928
20082	3645110	6715610	943802
20091	5629244	11852477	1265519
20092	2878165	8472461	1044480

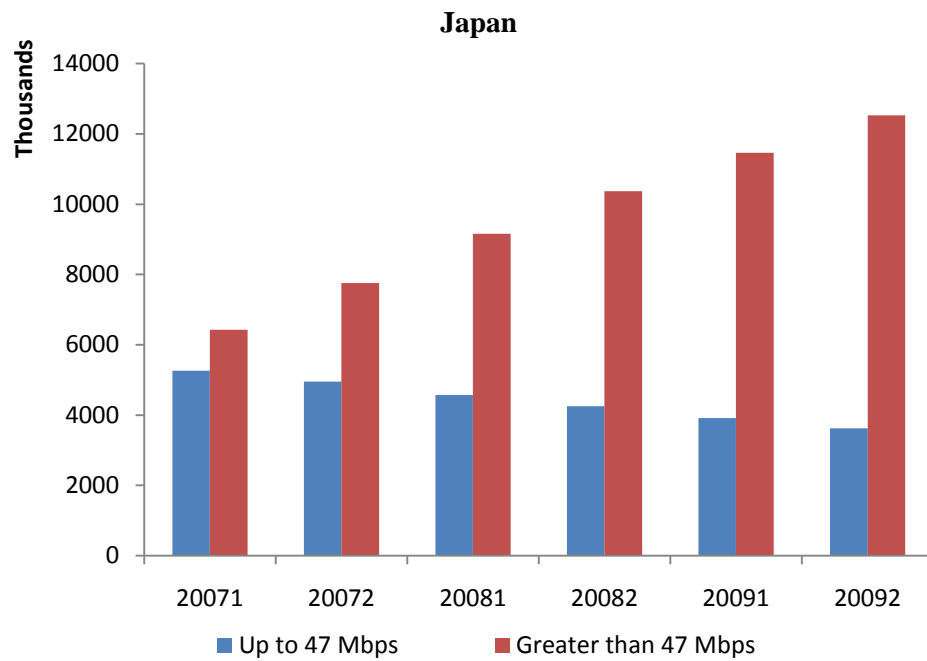


Source: European Commission (see notes).

Japan

Connections by Speed Tier*

	Up to 47 Mbps	Greater than 47 Mbps
20071	5258000	6429000
20072	4953500	7760000
20081	4571000	9159000
20082	4256000	10366000
20091	3913000	11463500
20092	3620500	12528500



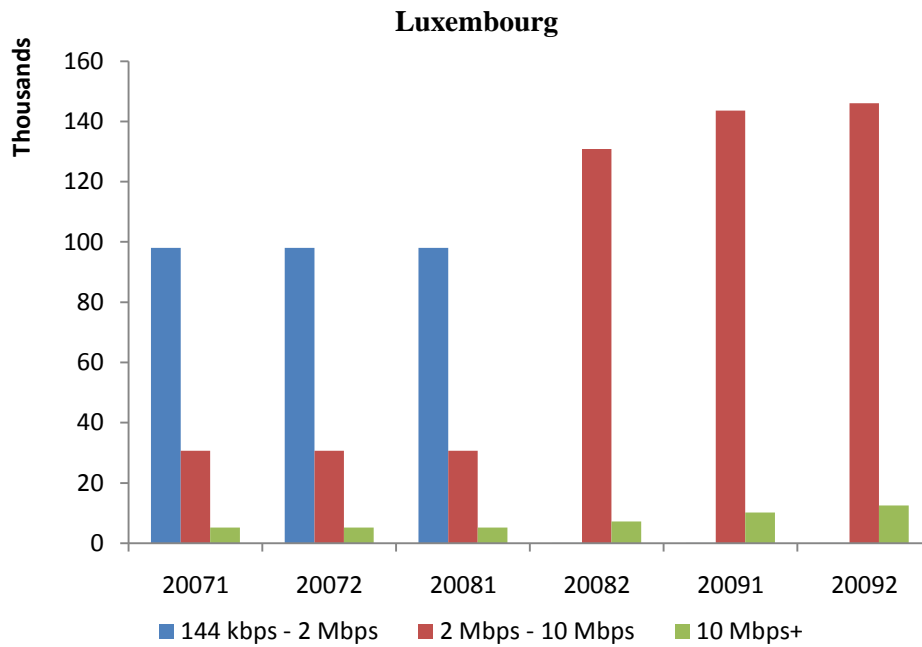
Source: NTT Corp (see notes)

*Counts refer to incumbent provider, not market totals.

Luxembourg

Connections by Speed Tier

	144 kbps - 2 Mbps	2 Mbps - 10 Mbps	10 Mbps+
20071			
20072		[20081]	
20081	98033	30676	5161
20082	34	130890	7232
20091	24	143619	10232
20092	20	146017	12515



Source: European Commission (see notes).

Mexico

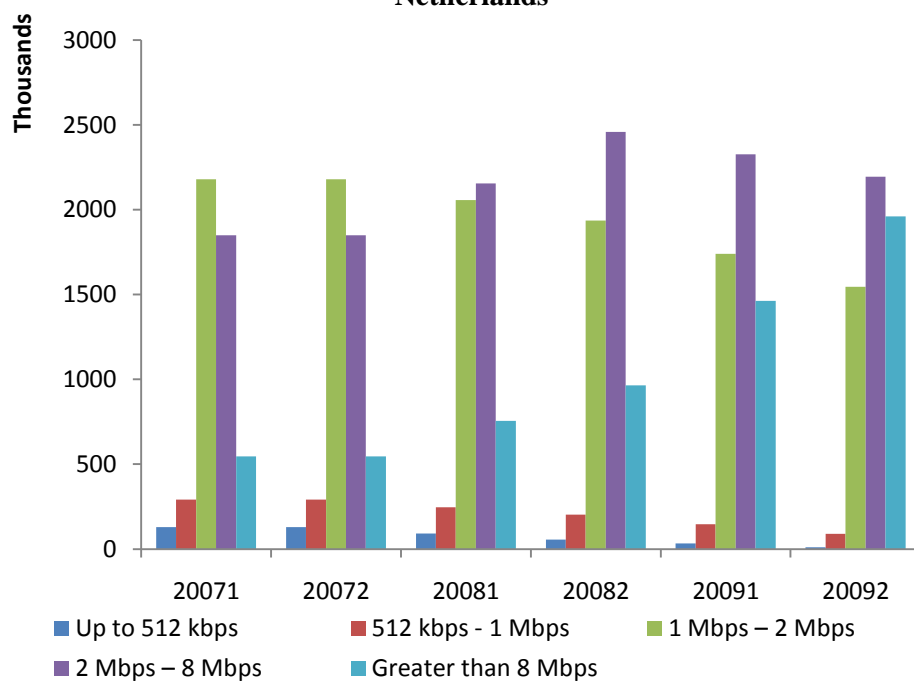
Note: Suitable count of connections by tier unavailable.

Netherlands

Connections by Speed Tier

	Up to 512 kbps	512 kbps - 1 Mbps	1 Mbps – 2 Mbps	2 Mbps – 8 Mbps	Greater than 8 Mbps
20071			[20072]		
20072	130000	291000	2180000	1850000	547000
20081	92500	246500	2057800	2154700	756000
20082	55000	202000	1935600	2459400	965000
20091	32500	146000	1740300	2327200	1462500
20092	10000	90000	1545000	2195000	1960000

Netherlands



Source: IDATE (see notes).

New Zealand

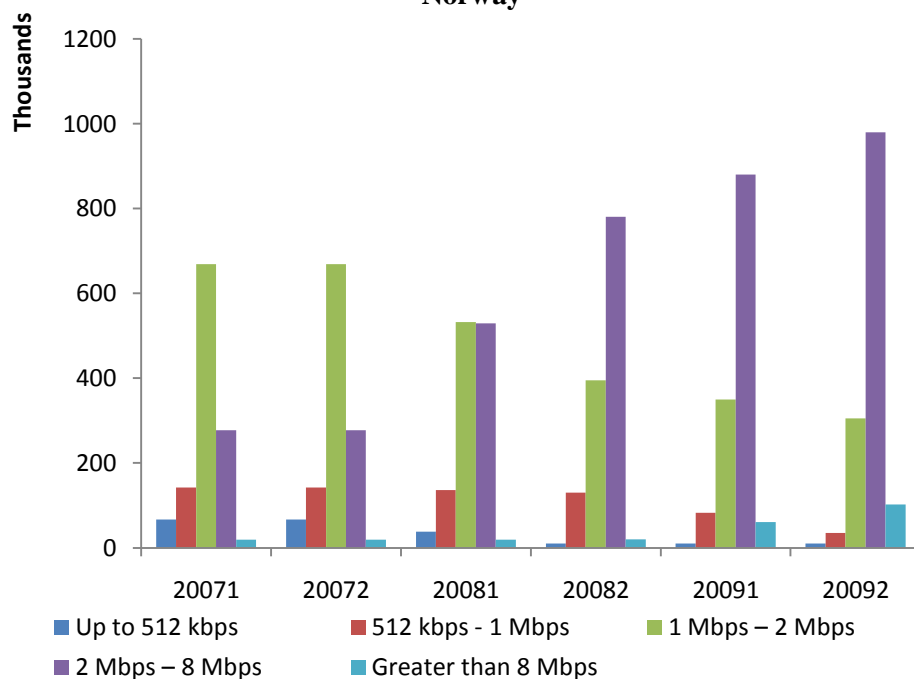
Note: Suitable count of connections by tier unavailable.

Norway

Connections by Speed Tier

	Up to 512 kbps	512 kbps - 1 Mbps	1 Mbps – 2 Mbps	2 Mbps – 8 Mbps	Greater than 8 Mbps
20071			[20072]		
20072	67000	142140	669104	277000	19000
20081	38500	136070	532052	528957	19500
20082	10000	130000	395000	780914	20000
20091	9995	82500	350000	880177	61000
20092	9989	35000	305000	979439	102000

Norway

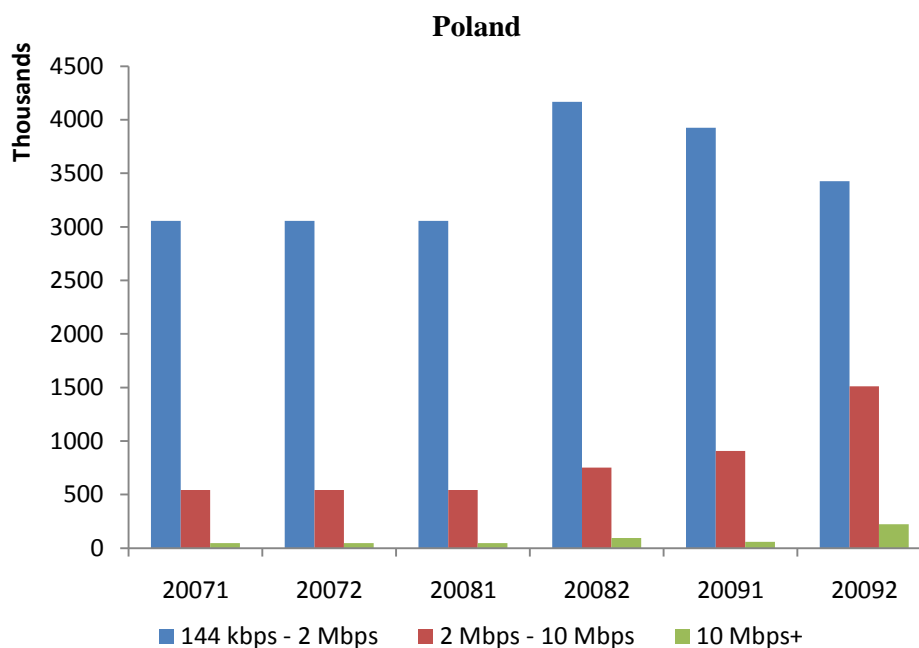


Source: IDATE (see notes).

Poland

Connections by Speed Tier

	144 kbps - 2 Mbps	2 Mbps - 10 Mbps	10 Mbps+
20071			
20072		[20081]	
20081	3054478	544490	46649
20082	4166937	751202	96285
20091	3926094	907084	59316
20092	3424993	1512668	222879

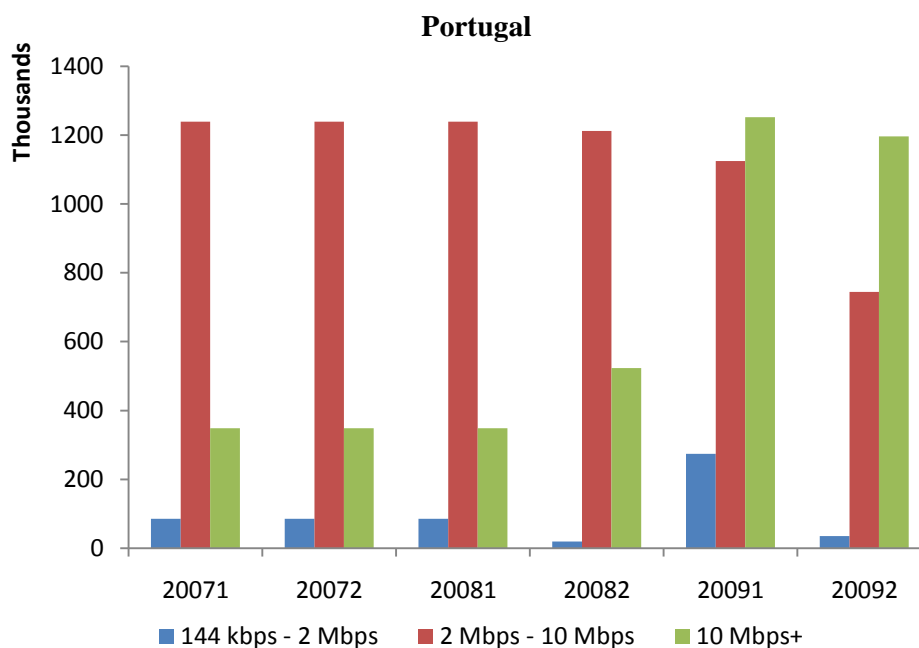


Source: European Commission (see notes).

Portugal

Connections by Speed Tier

	144 kbps - 2 Mbps	2 Mbps - 10 Mbps	10 Mbps+
20071			
20072		[20081]	
20081	85310	1238756	348246
20082	19498	1211951	523194
20091	273986	1124753	1251668
20092	35027	744386	1195820



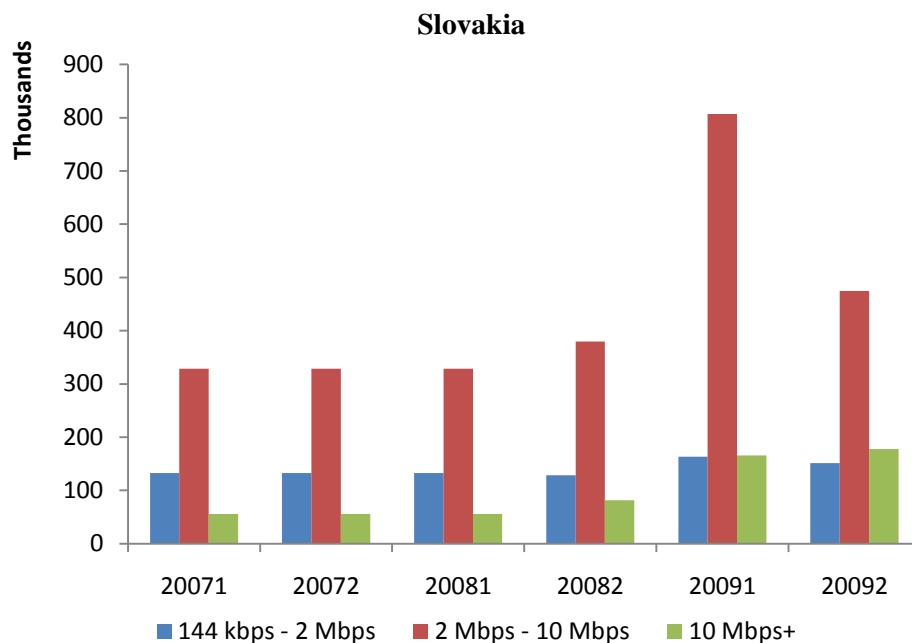
Source: European Commission (see notes).

Slovakia

Note: We omit Slovakia from the price indices as the data are not sufficient for those analyses.

Connections by Speed Tier

	144 kbps - 2 Mbps	2 Mbps - 10 Mbps	10 Mbps+
20071			
20072		[20081]	
20081	132789	328294	55852
20082	128633	379570	81714
20091	163500	806868	165725
20092	151108	474482	177598

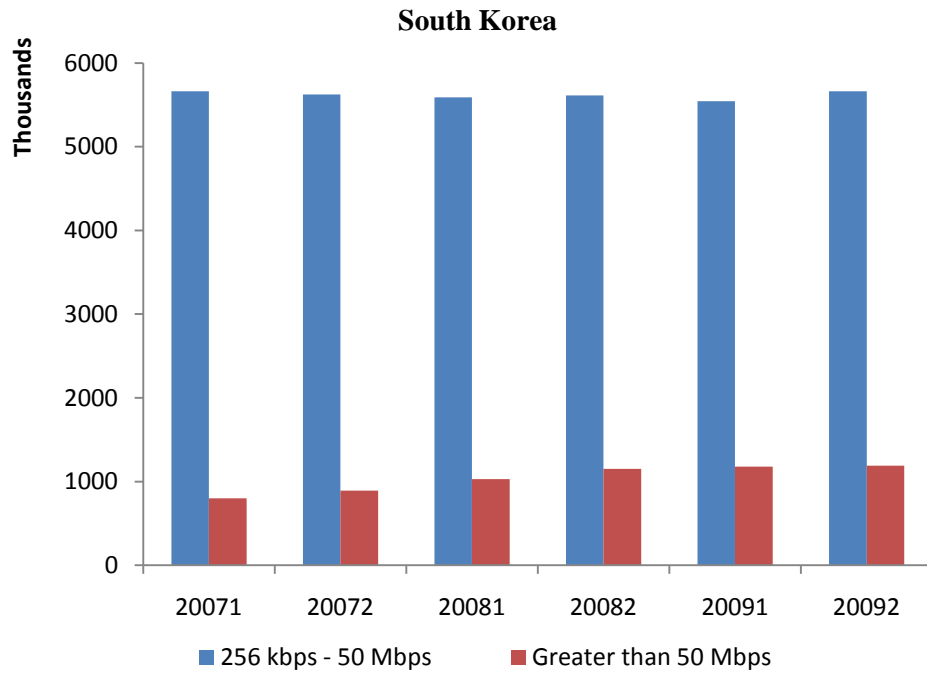


Source: European Commission (see notes).

South Korea

Connections by Speed Tier*

	256 kbps - 50 Mbps	Greater than 50 Mbps
20071	5663053	799536
20072	5624632	891295
20081	5588554	1031543
20082	5613304	1150554
20091	5543186	1177668
20092	5661353	1188301



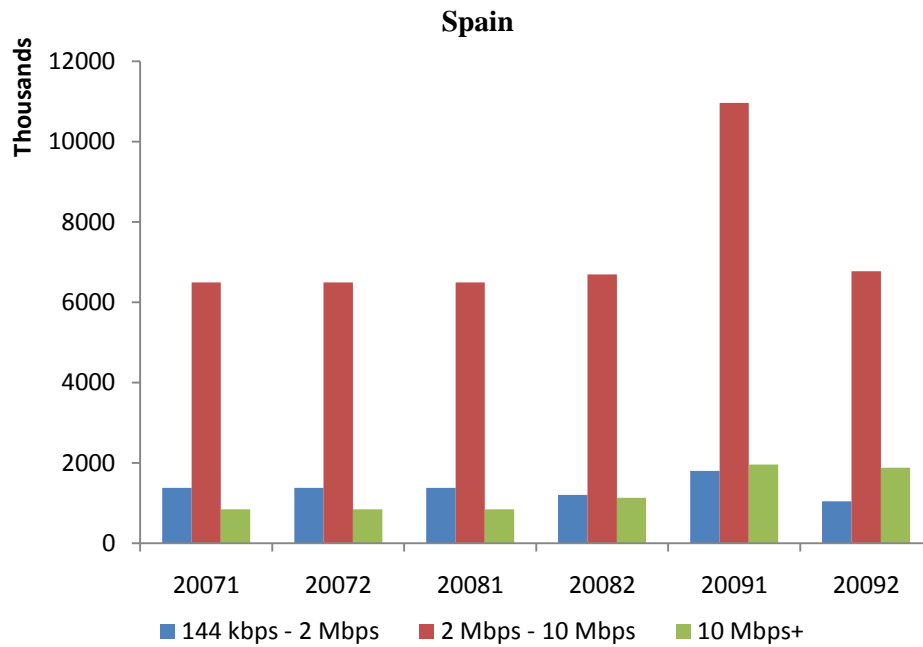
Source: KT Corp. (See notes)

*Counts refer to incumbent provider, not market totals.

Spain

Connections by Speed Tier

	144 kbps - 2 Mbps	2 Mbps - 10 Mbps	10 Mbps+
20071			
20072		[20081]	
20081	1379320	6488191	841320
20082	1202430	6687633	1132119
20091	1798232	10963234	1962573
20092	1040561	6773976	1879950

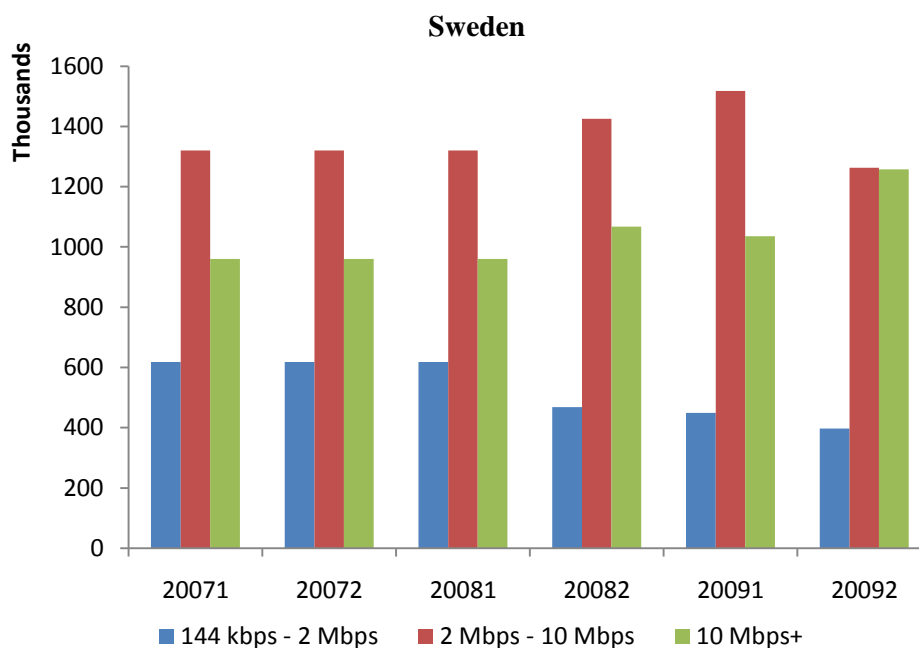


Source: European Commission (see notes).

Sweden

Connections by Speed Tier

	144 kbps - 2 Mbps	2 Mbps - 10 Mbps	10 Mbps+
20071			
20072		[20081]	
20081	618500	1320000	960000
20082	468311	1425800	1067595
20091	449000	1518000	1035010
20092	397619	1262835	1257571



Source: European Commission (see notes).

Switzerland

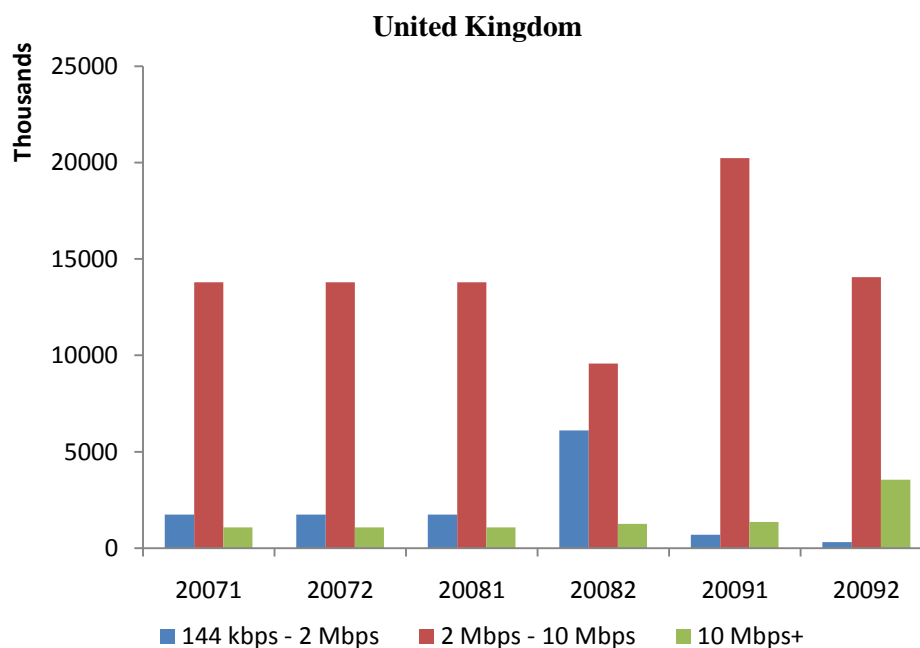
Note: Suitable count of connections by tier unavailable.

Turkey

Note: Suitable count of connections by tier unavailable.

United Kingdom

Connections by Speed Tier			
	144 kbps - 2 Mbps	2 Mbps - 10 Mbps	10 Mbps+
20071			
20072		[20081]	
20081	1740000	13790000	1070000
20082	6100417	9568783	1258061
20091	702945	20226218	1357415
20092	319452	14048355	3548410



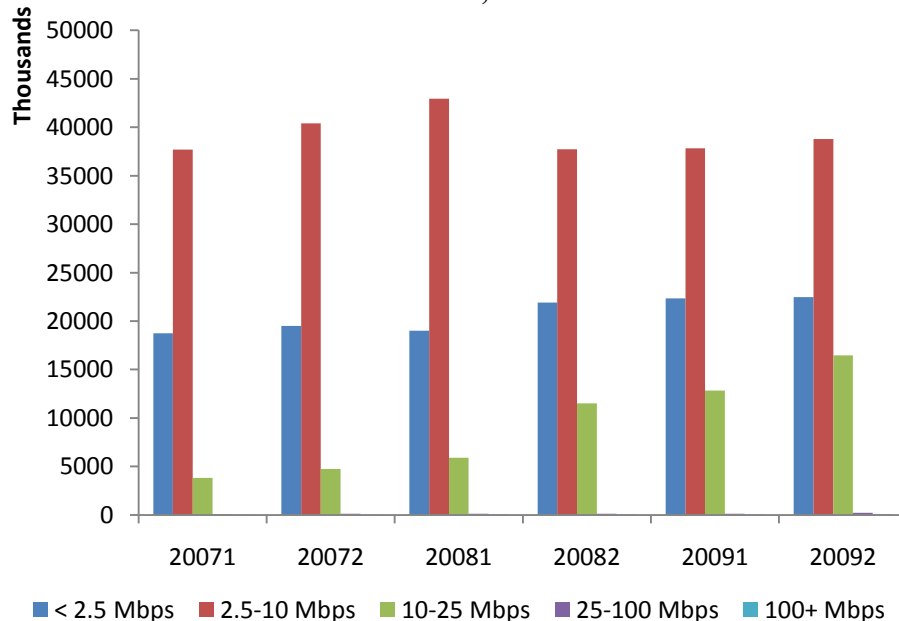
Source: European Commission (see notes).

United States

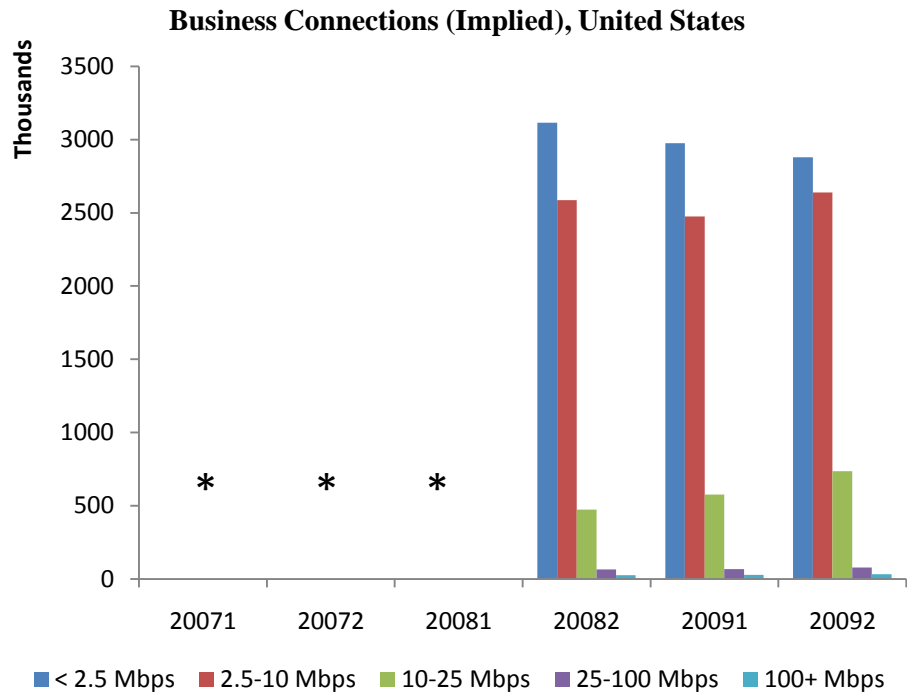
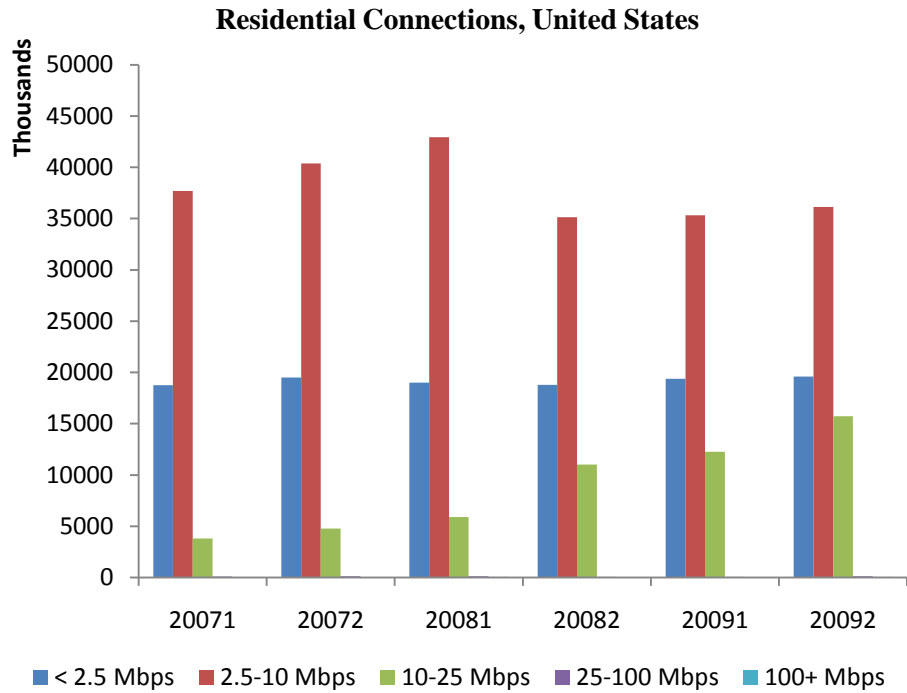
Connections by Speed Tier

		200 kbps- 2.5 Mbps	2.5-10 Mbps	10-25 Mbps	25-100 Mbps	100+ Mbps
Total	20071	18750129	37682542	3814471	91983	21708
	20072	19507648	40394418	4765239	121870	21412
	20081	18994624	42949226	5902037	129569	52796
	20082	21912000	37726000	11503000	126468	51532
	20091	22360000	37812000	12835000	132862	54138
	20092	22491000	38773000	16472000	218832	89168
Residential	20071					
	20072			[see Total]		
	20081					
	20082	18796000	35140000	11028000	61102	24898
	20091	19385000	35338000	12258000	64655	26345
	20092	19611000	36135000	15735000	139257	56743
Business (implied)	20071					
	20072			[20082]		
	20081					
	20082	3116000	2586000	475000	65365	26635
	20091	2975000	2474000	577000	68207	27793
	20092	2880000	2638000	737000	79575	32425

Total Connections, United States



United States, cont.



Source: FCC (2008-2010, 2010c)

Residential and business cannot be separated within speed tiers until 2H 2008 (see notes below). We use the total mix as a proxy for residential for those periods. We apply 20082 implied business counts to prior periods.

Notes on Sources

ARCEP (2010a, 2010b)

No data available for earlier than Q3 2008 as ARCEP published only high speed connections in total before that point. We ignore Q308 data when estimating 2H08 (and earlier), opting to use only the Q408 count rather than a Q3 and Q4 average. This is because Q4 2008 data which was released concurrently with Q3 2008 was revised significantly in a later publication, but no revision is found for Q3. When classifying plans into tiers in Point Topic data, we assume a plan met the upload requirement if it had over 50 Mbps downstream, even if it lacked a record of upload speed. From ARCEP (2010a) we take counts for Q4 2008 and Q1 2009; ARCEP (2010b) gives us Q2, Q3, and Q4 2009.

CRTC (2010)

We were unable to locate line counts by speed tier for Canada. These data instead detail broadband subscribers in each speed tier as estimated by official survey. We multiply the proportion of respondents in each speed category by the count of total lines (from Tables 5.3.2 and 5.3.3 of source) for each period to create tier counts. Data are annual. In the case of 2007 we use the annual count for both half years. Otherwise, we calculate averages across adjacent years to approximate midpoints (1H2008 and 1H2009). Proportions were for residential only but we have applied to both residential and business.

European Commission (2008, 2009a, 2009b, 2010)

Figures for earlier than July 2008 were not readily available. We apply July 2008 numbers to 2007. The sources claim to count “about three quarters,” “about 72%,” “about 90%”, and “only 75%” of total retail broadband lines, respectively. This may explain why in some countries (e.g. the United Kingdom) the total number of subscribers appears to decrease between the second to last and the last period, which runs counter to reliable indications of increasing wireline broadband penetration. Specific sources as follows: EC (2008) Table 5; EC (2009a) Figure 105; EC (2009b) Table 5; EC (2010) Table 3 (p. 93).

FCC (2008-2010, 2010c)

See discussion in Section III of *Part 2: International Comparisons*. We isolate fixed connections by subtracting the mobile category from the FCC connection count total, ignoring tiers with upload slower than 200 kbps. The FCC’s new tier scheme (discussed in the text of Part 2) no longer reports connections above 100 Mbps in their own tier; as such, we apply the proportion of 100 Mbps+ connections in relation to the sum of that tier and the 25-100 Mbps tier in the first half of 2008 (the last time the distinction appeared) in order to estimate a split for the new 25 Mbps+ classification in later periods. We calculate implied business counts by subtracting residential connection counts from the total counts; however, since the FCC began reporting residential counts in the second half 2008 data we can only reach business estimates for this and later periods. We assume the 2H 2008 business distribution for periods prior, whereas

for residential we use the total count in each period, as the vast majority of lines counted are to residences. FCC business counts do not include connections over dedicated access lines.

IDATE (2007,2008, 2009)

We were unable to locate exact overall subscriber counts by tier for Austria, Iceland, the Netherlands, and Norway, which are missing from the European Commission data; in addition, European Commission sources record data for Hungary for only a single period. To obtain approximations of the speed distribution within each of these countries we examined bar graphs depicting the number of subscribers by speed tier for DSL and cable modem in each country from the annual “Broadband Coverage in Europe” report from IDATE, a consulting firm. From these exhibits we recorded numerical estimates of the distribution of connections among tiers and checked those carefully “eye-balled” counts against the published totals for each market as a whole to ensure they summed correctly. We applied these annual data to the second half of each year (which unfortunately pushes them virtually a year forward from the true dates to which they correspond) and took averages of adjacent years to estimate subscribers for the 1H2008 and 1H2009. For 2007, we applied the annual figure to both half-years. As the sources altered several tier boundaries in 2009, the tiers represent a hybrid scheme we designed in order to allow for constant speed divisions across this reporting change.

NTT Corp. (2008, 2009, 2010)

We were unable to locate overall subscriber counts by tier for Japan, thus we approximate the mix of speeds with data from NTT, the incumbent Japanese provider. We define tiers based on the downstream capacity of FLET’S ADSL (NTT’s DSL services, which in our dataset do not exceed 47 Mbps down), and FLET’s Hikari/B FLET’s (its fiber network), and apply the company’s quarterly subscribership data accordingly to create a crude model of the distribution between these two speed levels in the country as a whole.

KT Corp. (2010)

We were unable to locate overall subscriber counts by tier for Korea, thus we approximate the mix of speeds with data from KT, the incumbent Korean provider.¹⁰ We define tiers around KT’s two present broadband offerings: Qook Internet Lite and Qook Internet Special. Company statements claim Lite has a maximum speed of 50 Mbps and Special has a maximum of 100 Mbps.¹¹ We generate tiers around a 50 Mbps cut-off, and average KT’s monthly data on subscribers to attain half-year subscriber counts for each tier. Note that we construct the lower tier to exclude “Megapass Checkline” plans present in the Point Topic data set which operate at 256 kbps (far lower than the next slowest plans in the country) and which an online search revealed may be related to merchant point-of-sale connections (although Point Topic classifies them as residential).

¹⁰ KT had a monthly average market share of just over half (55%) from 2007-2009.

¹¹ See excerpts of KT 20-F filings with the SEC, available at http://www.wikinvest.com/stock/Korea_Telecom_%28KTC%29/Internet%20Services