Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
International Comparison Requirements Pursuant	)	
to the Broadband Data Improvement Act	)	IB Docket No. 10-171
	)	
International Broadband Data Report	)	
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SECOND REPORT

Adopted: May 20, 2011 **Released: May 20, 2011**

By the Chief, International Bureau:

I. INTRODUCTION

1. This second *International Broadband Data Report* (*IBDR* or Report) presents comparative data on the extent of international broadband service capability, based on the best data sources available to the Commission at this time.[1] Our analysis of this data suggests a positive correlation between broadband adoption and income, population size, and population density. These factors help explain the United States' rates of broadband adoption compared to other Organization for Economic Co-operation and Development (OECD) member countries. Based on OECD data, the United States ranks ninth for mobile broadband adoption on a per capita basis,[2] and 12th for fixed (*e.g.*, DSL or cable) broadband on a per household basis.[3] U.S. fixed broadband adoption lags behind such countries as South Korea, the United Kingdom, Canada, and Germany, but exceeds adoption rates in Japan and the EU average.[4] This Report also compares data on average actual download speeds reported by a sample of consumers in a number of U.S. and foreign cities and finds that some large European and Asian cities exhibit a significant edge over comparable U.S. cities in reported download speeds, though reported speeds for some other international cities are roughly comparable to speeds in many U.S. cities. We note that

[1] *See* 47 U.S.C. § 1303(b). In this report we use the term "broadband" synonymously with "advanced telecommunications capability." *See generally Inquiry Concerning the Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion, and Possible Steps to Accelerate Such Deployment Pursuant to Section 706 of the Telecommunications of 1996, as Amended by the Broadband Data Improvement Act; A National Broadband Plan for Our Future,* GN Docket Nos. 09-137 and 09-51, Seventh Broadband Deployment Report, FCC 11-78 (2011) (*Seventh 706 Report*).

[2] OECD Broadband Portal, Table 1d (2) (June 2010) (accessed Feb. 11, 2011), *available at* http://www.oecd.org/dataoecd/21/35/39574709.xls.

[3] OECD Broadband Portal, Figure 2a. Households with broadband access, 2009 or latest available year (accessed Feb. 11, 2011), *available at* http://www.oecd.org/dataoecd/20/59/39574039.xls. A fixed broadband connection is likely to be shared within a household whereas multiple people within a single household may each have their own mobile broadband connection, thus accounting for differing standards of measurement (per capita for mobile broadband versus household for fixed broadband access).

[4] OECD Broadband Portal, Table 2a (July 2010) (accessed Feb. 11, 2011), *available at* http://www.oecd.org/dataoecd/20/59/39574039.xls.

available data sources on international broadband are incomplete and generally challenging to compare because of significant gaps and variations in data collection methodologies across countries. As a result, we are limited in the conclusions we can draw from the data. In this Report we outline steps the Commission is taking to obtain better, more globally standardized broadband data in order to help the Commission better meet its statutory responsibilities.

II. BACKGROUND

A. Requirements of the BDIA

2. The Broadband Data Improvement Act (BDIA) requires the Commission to include in its annual broadband progress report "information comparing the extent of broadband service capability (including data transmission speeds and price for broadband service capability) in a total of 75 communities in at least 25 countries abroad for each of the data rate benchmarks for broadband service utilized by the Commission to reflect different speed tiers."[5] The BDIA directs the Commission to assess broadband capability in international communities comparable to U.S. communities with respect to population size, population density, topography, and demographic profile.[6] The Commission is also directed to include "a geographically diverse selection of countries" and "communities including the capital cities of such countries."[7] The Commission must "identify relevant similarities and differences in each community, including their market structures, the number of competitors, the number of facilities-based providers, the types of technologies deployed by such providers, the applications and services those technologies enable, the regulatory model under which broadband service capability is provided, the types of applications and services used, business and residential use of such services, and other media available to consumers."[8]

B. Data Presented in the *2010 IBDR*

3. The Commission published its first report under the BDIA last year. In that report we presented broadband data gathered from public sources,[9] and reviewed the record developed for the Commission's 2010 broadband progress report[10] and the National Broadband Plan, including the report prepared by the Berkman Center for Internet and Society at Harvard University.[11] Recognizing that no single existing public data source would satisfy all of the requirements of the BDIA, Commission staff compiled advertised broadband prices from the websites of broadband providers in 34 countries; OECD

[5] 47 U.S.C. § 1303(b)(1).

[6] *Id. at* § 1303(b)(2).

[7] *Id.*

[8] 47 U.S.C. § 1303(b)(3).

[9] *International Comparison Requirements Pursuant to the Broadband Data Improvement Act International Broadband Data Report*, GN Docket No. 09-47, First Report, 25 FCC Rcd 11963, Appendices B-E (2010) (*2010 IBDR*).

[10] *See Inquiry Concerning the Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion, and Possible Steps to Accelerate Such Deployment Pursuant to Section 706 of the Telecommunications of 1996, as Amended by the Broadband Data Improvement Act; A National Broadband Plan for Our Future,* GN Docket Nos. 09-137 and 09-51, Sixth Broadband Deployment Report, 25 FCC Rcd 9556 (2010) (*Sixth Broadband Deployment Report*).

[11] The Commission conducted two National Broadband Plan public workshops focused specifically on international issues. *See* http://broadband.gov/ws_int_lessons.html and http://broadband.gov/ws_global_bb.html; *see also* Berkman Center for Internet and Society, Harvard University, Next Generation Connectivity: A Review of Broadband Internet Transitions and Policy from Around the World (2010), *available at* http://cyber.law.harvard.edu/publications/2010/Next_Generation_Connectivity. (Berkman Report).

community-level demographic data for 36 countries; broadband adoption data from the European Commission's regional database; and other data from national statistical agencies and communications regulators.[12] Staff also compiled information about broadband policies and the extent of competition in the broadband market in 37 countries.

C. Efforts To Improve Data Collection

4. We learned in preparation of the *2010 IBDR* that many nations do not collect the data required to achieve fully the international comparisons required by the BDIA. Even when data is available, often it is not available in standardized formats that can be easily compared, making it challenging to present the data in a way that is manageable or useful. Therefore, soon after the release of the first *IBDR*, the International Bureau sought comment on how to improve its data collection and analysis in order to illuminate similarities and differences between U.S. broadband technologies, markets, and policies and those in comparable foreign communities.[13] We received comments from broadband providers, consumer advocacy groups, and other interested members of the public.[14] Many commenters identified shortcomings in the data collected for the *2010 IBDR*, and many offered high-level proposals for improving the data collection.[15]

5. Since the first *IBDR* we have obtained better data, including more detailed and recent national-level price data, actual speed data, mobile and fixed broadband adoption data, and community-level demographic data. To improve and harmonize broadband data collection globally, the Commission, together with the State Department and the Department of Commerce, has also initiated through the OECD an effort to collect more reliable and granular international data on broadband deployment and adoption. We discuss this effort in more detail in Section III.D below.

D. Data and Analysis for the *2011 IBDR*

6. In order to obtain global broadband price data, Commission staff again gathered advertised prices from the websites of broadband providers in dozens of countries.[16] Staff also gathered community-level broadband adoption, demographic, income, and education data from OECD collections, the European Commission's regional database,[17] and from national government agencies.[18] Finally, staff gathered information about the extent of competition in broadband markets, government policies, and mobile broadband adoption in various countries around the world.[19] We discuss the data that we collected in more detail below.

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[12] *2010 IBDR*, 25 FCC Rcd 11963, at Appendices C and D.

[13] *Comment Sought on Improving International Comparisons Required by the Broadband Data Improvement Act*, IB Docket No. 10-171, Public Notice, 25 FCC Rcd 12426 (2010) (*BDIA Public Notice*).

[14] *See* Appendix A *infra*.

[15] Suggestions included directly coordinating with foreign regulatory counterparts to obtain data and contracting with third parties to purchase or otherwise acquire data. *See* Free Press Comments at 2-4; The New America Foundation and the Donald McGannon Communication Research Center, Fordham University (NAF) Comments at 5-6.

[16] *See* Appendix C *infra*. With a few exceptions (*e.g.*, New Zealand's TelstraClear, on whose website regional availability of some services was clearly indicated), service plans are presumed to be available throughout the country where offered.

[17] Eurostat is the Statistical Office of the European Communities, located in Luxembourg. Its task is to provide the European Union with statistics that enable comparisons between countries and regions. *See* http://epp.eurostat.ec.europa.eu/portal/page/portal/region_cities/introduction.

[18] *See* Appendix D *infra*.

[19] *See* Appendix E *infra*.

7. For the first time, in this report we present econometric analyses of how population size, population density, income, and education affect broadband adoption at a sub-national or "community" level.[20] The raw data we gathered on broadband service plans and pricing in 38 countries (including the United States) are presented in Appendix C. While preparing the *IBDR*, the International Bureau staff researched and gathered information regarding foreign government programs to promote broadband supply. An International Bureau Background Research Paper presents some of the qualitative data gathered on government initiatives in Canada and Australia.[21]

III. DISCUSSION

8. In preparing the *IBDR,* Commission staff have reviewed a number of data sources and analyzed various rankings that compare broadband service capability in the United States and other countries.[22] The best currently available data set comparing the United States to other countries appears to be from the OECD, which collects data on various broadband deployment, adoption, and usage metrics and publishes rankings of its member countries.[23] The OECD's deployment data ranks countries based on particular technologies, rather than overall coverage. The U.S. ranking in these surveys ranges from 27th out of 30 in DSL coverage[24] to 1st out of 28 in cable modem coverage.[25] The U.S. ranks 6th out of 16 in fiber-to-the-home (FTTH) coverage[26] and 8th out of 29 in 3G mobile wireless coverage.[27] As the OECD notes, however, its coverage rankings are compiled using metrics that may not be fully comparable across countries, thus limiting their utility.[28] For example, deployment is measured using different indicators and different reference dates across various countries.[29]

9. As for broadband adoption, the OECD's data ranks member countries on the basis of both fixed and mobile broadband adoption. For fixed broadband, the U.S. ranks 12th out of 33 countries when measured on a percentage-of-households basis,[30] and 14th out of 31 countries when measured using the number of broadband subscriptions per capita.[31] For mobile broadband, the OECD's data ranks the U.S. 9th out of 29 countries on a per capita basis.[32] As with the deployment rankings, the OECD's adoption

[20] *See* Sections III.B *infra*.

[21] *See* International Bureau Background Research Paper, Broadband Supply Case Studies: Canada and Australia (forthcoming). This paper will be available at http://www.fcc.gov/encyclopedia/international-bureau-background-research-papers.

[22] Differences between which countries are included for each dataset in this *IBDR* are primarily due to data availability. *See* Appendix B *infra*.

[23] OECD Broadband Portal, *available at* http://www.oecd.org/document/36/0,3746,en_2649_33703_38690102_1_1_1_1,00.html.

[24] OECD Broadband Portal, Table 3d (2009 or latest year).

[25] OECD Broadband Portal, Table 3e (2008 or latest year).

[26] OECD Broadband Portal, Table 3f (2009 or latest year).

[27] OECD Broadband Portal, Table 3g (2009 or latest year).

[28] OECD Broadband Portal, http://www.oecd.org/document/46/0,3746,en_2649_37441_39575598_1_1_1_37441,00.html.

[29] *See id*. and OECD Broadband Portal, 2a. Households with broadband access (1), 2000-09, *available at* http://www.oecd.org/dataoecd/20/59/39574039.xls.

[30] OECD Broadband Portal, Table 2a (2009 or latest year).

[31] OECD Broadband Portal, Table 1d(3) (June 2010).

[32] OECD Broadband Portal, Table 1d(2) (June 2010).

rankings are compiled using metrics that vary across member states and may not be fully comparable.[33] Further, where a particular country falls in these rankings may be influenced by population density and dispersion, income, and other factors. As discussed throughout this *IBDR,* and particularly in Section D below, we recognize the need for better data on these issues and have initiated efforts to improve available data, both domestically and internationally. In the meantime, we have continued to compile and analyze the international data that is available.

A. Elements of "Broadband Service Capability"

10. The BDIA requires that the Commission gather information concerning the "the extent of broadband service capability (including data transmission speeds and price for broadband service capability)" in foreign communities.[34] The term "broadband service capability" is not explicitly defined in the BDIA or its legislative history. But based on the surrounding language in the statute—including the specific mandate to consider both transmission speeds and pricing[35]—we understand the responsibility of collecting information on "the extent of broadband service capability" to require an inquiry into the availability of broadband service, which in turn includes factors such as available advertised and/or actual speeds, service quality, and price and affordability to broadband customers.[36] We consider these characteristics here to the extent currently available data allow.[37]

1. Advertised and Actual Speed

11. The BDIA requires the Commission to collect information on "data transmission speeds" for broadband services. Speed is a quantitative description of the information transfer rate of a broadband Internet access service, and Commission staff have defined speed as "data signaling rate," as expressed in bits per second.[38] One commenter argues that we should obtain data on actual broadband speeds, and asserts that reliance on advertised speeds "significantly overstates broadband performance in a large number of foreign countries relative to the United States."[39] Another commenter proposes that we assess "[p]oint to point transmission speed," because such a measurement takes into account "congestion on the provider's backbone."[40] For this IBDR, we have collected both advertised and actual speed data.

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[33] *See* OECD Broadband Portal, http://www.oecd.org/document/46/0,3746,en_2649_37441_39575598_1_1_1_37441,00.html (noting that statistical broadband country comparisons "should be undertaken with caution" due to variations in "market, regulatory, and geographic factors"); OECD Broadband Portal, Table 2a Households with broadband access (1), 2000-09, *available at* http://www.oecd.org/dataoecd/20/59/39574039.xls (noting that, for example, the household fixed broadband data for South Korea includes mobile broadband data).

[34] 47 U.S.C. § 1303(b)(1).

[35] *Id.*

[36] *Cf. Seventh 706 Report*, FCC 11-78, at paras. 18-20.

[37] *2010 IBDR*, 25 FCC Rcd at 11965. We note that one commenter suggests that we examine "[m]easures of service quality" such as jitter or latency. Mark Kennet Comments at 1. Though this could be valuable data for international comparisons, our research shows that such data is not available for most countries.

[38] *See Consumer and Governmental Affairs Bureau Seeks Comment on "Need for Speed" Information for Consumers of Broadband Services*, Public Notice, DA 11-661, n. 1 (April 11, 2011).

[39] AT&T Comments at 4. *See also* Prof. Rob Frieden Comments at 3 (the IBDR should "[u]se a credible average of delivered broadband speeds rather than advertised speeds" as broadband performance is affected by a number of factors, and advertised speeds "typically contain a disclaimer stating that actual performance may vary"); and AT&T Comments at 5 (analysis of speed measurement data should account for whether speed is measured during peak or off-peak times, the quality of internal wiring, the quality of hardware and software of the consumer, and the distance of the consumer from the service provider's facilities).

[40] Mark Kennet Comments at 2.

12. We agree that it could prove valuable to collect more granular speed data, such as on speed variations during peak and non-peak times, and on the effect of quality of wiring, hardware, and software on transmission speed. The Commission's Broadband Speed Test is one example of how more granular speed data can be collected directly and voluntarily from users.[41] Other countries are developing their own speed data collections, and there are some commercial data sources as well.[42] These data collections, however, do not capture all of the data identified by commenters (*i.e*, speed variations during peak and non-peak times, and the effect of in-home networks, hardware, and software on speed). Currently, that data does not appear to be readily available.

13. We have continued to collect information on advertised speeds offered in foreign communities.[43] These advertised speeds do not always align with Form 477 speed categories, making apples-to-apples comparisons of advertised speeds in other countries to the speed benchmarks for U.S. broadband used by the Commission challenging.[44] Advertised speeds typically feature "up to" download and upload speeds.[45]

14. As noted, the Commission is presently using a consumer-driven Broadband Speed Test to evaluate broadband speeds. One of the entities providing this service is Ookla, which offers its free speed test tools around the world and makes its data on actual speeds available on its website.[46] In an effort to give some sense of the actual speeds foreign consumers experience, we provide in Appendix F the average actual download speeds determined by Ookla in 15 foreign capital cities, and compare those speeds to Ookla-determined speeds in 15 U.S. cities with comparable populations.

15. The data suggest that mean actual download speeds in some European and Asian cities are substantially higher than in comparably sized U.S. cities (*e.g*., 24.8 megabits per second (Mbps) in Paris and 35.8 Mbps in Seoul versus 6.9 Mbps in San Francisco, 9.4 Mbps in Chicago, and 9.9 Mbps in Phoenix). Some of the U.S. cities in our sample have higher speeds than some foreign cities (*e.g*., Chicago with 9.39 Mbps versus Rome with 5.6 Mbps). Though Ookla's speed test gives an indication of individual consumers' actual broadband speeds, a number of factors may explain the different average speeds reported for different cities.[47] For example, the number of tests performed by users of different

[41] *See* FCC Launches Broadband Consumer Tools: Agency Introduces First Mobile App, Consumer Broadband Test, and Broadband Dead Zone Report, *News Release* (March 11, 2010). *See also* Consumer Broadband Test website, *available at* http://www.broadband.gov/qualitytest/about/#qualitytest.

[42] In the U.K. for example, the regulator Ofcom has partnered with speed test website SamKnows to report on U.K. broadband speeds. *See* http://stakeholders.ofcom.org.uk/market-data-research/telecoms-research/broadband-speeds/speeds-nov-dec-2010/. Other entities that make their speed test data publicly available include Ookla (www.netindex.com) and M-Lab (http://www.measurementlab.net/data).

[43] *See* Appendix C.

[44] The Commission uses its Form 477 to collect subscribership data on the offered speeds of broadband Internet access service in the United States. Form 477 requires providers to report broadband service offerings using specified speed tiers. *See Development of Nationwide Broadband Data to Evaluate Reasonable and Timely Deployment of Advanced Services to All Americans, Improvement of Wireless Broadband Subscribership Data, and Development of Data on Interconnected Voice over Internet Protocol (VoIP) Subscribership*, WC Docket No. 07-38, Report and Order and Further Notice of Proposed Rulemaking, 23 FCC Rcd 9691 (2008); Order on Reconsideration, 23 FCC Rcd 9800 (2008) (*Form 477 Order*). In the *Sixth Broadband Deployment Report*, the Commission concluded that a "broadband" service is one that offers actual download speeds of at least 4 Mbps and actual upload speeds of at least 1 Mbps. *Sixth Broadband Deployment Report*, 25 FCC Rcd at 9559-60, para. 5.

[45] Different broadband providers in different parts of the world may not use the same methodology for determining their advertised speeds.

[46] *See* http://www.netindex.com.

[47] We note that different speed test platforms are likely to indicate different speeds for the same individual, just as repeated speed tests from the same platform may vary over time as network conditions fluctuate. For additional

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kinds of broadband Internet access technologies (*e.g.*, DSL, cable, wireless) may skew the mean speed that Ookla reports for a given region.

2. Price

16. The BDIA directs the Commission to collect information regarding the price of broadband service capability.[48] A number of international organizations routinely collect and compare broadband prices across countries.[49] OECD's most recent broadband price data ranks the United States in the middle of the pack among OECD countries in terms of median monthly broadband prices.[50] A recently published ranking of broadband prices for 2009 by the International Telecommunication Union places the United States among the least expensive countries for fixed broadband services.[51]

17. Few attempts have been made to rigorously and systematically compare broadband pricing data across countries. One recent study used a hedonic regression technique to estimate the average broadband price difference between broadband plans offered in OECD countries.[52] Results from this hedonic model suggest that U.S. stand-alone residential broadband prices are generally "in the middle of prices in OECD countries," after accounting for speed, terms of service, data caps, and service delivery technology.[53] Similarly, prices in the United States for business stand-alone broadband services were fourteenth out of 30 among the OECD countries.[54] A paper by the Berkman Center for Internet and Society at Harvard University found prices for U.S. broadband with download speeds of around 768 kbps to be "very good" by international standards.[55] However, as download speeds increase, the paper found that U.S. prices become more expensive than most other OECD countries.[56]

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information, s*ee* Federal Communications Commission Consumer Broadband Test website, *available at* http://www.broadband.gov/qualitytest/about/#qualitytest.

[48] *See* 47 U.S.C. § 1303(b)(1).

[49] *See, e.g.*, OECD Broadband Portal, *available at* http://www.oecd.org/document/36/0,3746,en_2649_33703_38690102_1_1_1_1,00.html.

[50] See, OECD Broadband Portal, Tables 4c through 4h, *available at* http://www.oecd.org/dataoecd/22/42/39574970.xls.

[51] International Telecommunication Union, Measuring the Information Society, Table 4.9, page, 72, Geneva, 2010.

[52] A hedonic regression model estimates values for individual characteristics of a product or service. Hedonic models are based on the idea that products or services can be viewed as a bundle of characteristics that are valued by both buyers and sellers. Price represents the value of characteristics of the products or services. *See, e.g.*, Jack E. Triplett, *Economic Interpretation of Hedonic Methods,* Survey of Current Business, Bureau of Economic Analysis, Department of Commerce, January 1986, 36-40; *see also* OECD Glossary of Statistical Terms, *available at* http://stats.oecd.org/glossary/detail.asp?ID=1225.

[53] Scott Wallsten and James L. Riso, Residential and Business Broadband Prices Part 2: International Comparisons, Technology Policy Institute, December 2010, *available at* http://techpolicyinstitute.org/files/residential%20and%20business%20broadband%20prices%20pt2.pdf.

[54] *Id*. at 6.

[55] Berkman Center for Internet and Society, Memorandum Describing Intended Updates to the Final Report, Harvard University, *available at* http://cyber.law.harvard.edu/sites/cyber.law.harvard.edu/files/Next_Generation_Connectivity_Update-Memo_Lit-Review_Dec21.pdf at 2. (Berkman Report Update).

[56] Berkman Center for Internet and Society, Memorandum Describing Intended Updates to the Final Report, Harvard University, *available at* http://cyber.law.harvard.edu/sites/cyber.law.harvard.edu/files/Next_Generation_Connectivity_Update-Memo_Lit-Review_Dec21.pdf at 2 ("U.S. prices are very good by international standards at the very low speeds, around 768kbps, but become more expensive at contemporary broadband speeds above 1.5Mbps. By the time we reach
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18. We recognize that the complexity in the pricing of residential broadband services complicates any empirical analysis. The features and quality of broadband service vary across countries and providers, service is often offered under a multi-part pricing scheme,[57] and broadband is frequently purchased as part of a bundle of services.[58] Price comparisons are also difficult because different providers frequently adopt different price structures for broadband Internet access service. For example, it is not simple to compare an offering of unlimited broadband service with a maximum download speed of 5 Mbps for an up-front fee, a flat monthly recurring fee, and a two-year contract with an early termination fee, to a 5 Mbps offering from another provider that charges a different up-front fee, monthly recurring fees that vary with usage, and the ability to cancel service at any point with no penalty or termination fee. When broadband is bundled with other services, such as telephone or video service, it becomes even more complicated to identify the price of the broadband service. Promotional offers further complicate comparisons. We observe that broadband offerings around the world vary with respect to download and upload speeds; type of technology used to deliver broadband services; limitations on use, including limits on upload and download volumes; determinations of use limits (download traffic vs. a combination of upload and download traffic vs. download traffic at peak/non-peak usage times); and consequences of exceeding use limits (*e.g.*, access speed reductions, surcharges, service cut-off).

19. In pursuit of a more comprehensive dataset to enable price comparisons, Commission staff have compiled a dataset of publicly available advertised pricing information for residential broadband services in 38 countries (including the United States), most of which are members of the OECD. Our research this year generated a much richer dataset than the one included in the first *IBDR*. In Appendix C we list 1554 plans for 38 countries, including 162 U.S. plans, whereas in the *2010 IBDR* we provided data on 711 plans for 34 countries, and no plans for the United States. Staff collected this pricing information between October 2010 and April 2011.[59] The dataset includes a range of residential broadband offers by all major Internet service providers for these 38 countries.[60] The countries in the dataset represent a broad

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offers for speeds that are high or very high (above 10Mbps), U.S. broadband prices are substantially higher than elsewhere . . . .").

[57] For example, broadband service price often includes an installation charge, a monthly service fee, and possibly equipment rental charges.

[58] *See, e.g.,* Scott Wallsten, Understanding International Broadband Comparisons: 2009 Update (Technology Policy Institute Paper, June 2009), *available at* http://ssrn.com/abstract=1434570 (discussing difficulties in comparing broadband prices due to differing characteristics of broadband services and the tendency of consumers to purchase services in bundles).

[59] *See* Appendix C *infra*. We assembled the data by visiting the websites of broadband providers serving the countries and communities in our sample. In order to mitigate the effects of variations in a particular broadband provider's prices over time, we visited the websites of providers and downloaded the relevant information at one specific point in time. Thus, some provider data was collected in October 2010 while other provider data might have been collected in April 2011, but our sample does not reflect pricing changes that any individual provider may have implemented over the October-to-April period. Our price data reflects only what a given provider was offering at the specific point in time we accessed its website. In certain cases (*e.g.*, South Korea), we supplemented the information obtained from providers with information obtained from the country's diplomatic mission. For some countries in the dataset, we were able to determine whether the offerings were on a national or community level. Many advertised offerings were national in scope, though some were listed for particular cities or on an "as available" basis. Because we obtained the information for the dataset at specific points in time, we were not able to determine which offers are regularly available and which are significant departures from regularly available offers. Therefore, while ideally we would include only widely and regularly available offerings, it is possible we captured information on some non-standard offers such as special, promotional, or other limited offers.

[60] For each of the European countries in the dataset, we obtained a list of incumbent operators and their competitors from the European Commission's 2010 report on broadband Internet access prices. *See Broadband Internet Access Cost (BIAC)*, Final Report, prepared for the European Commission, Information Society and Media Directorate-General, by Van Dijk Management Consultants, January 2010, Brussels, Belgium, *available at*

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range of broadband markets, including countries of various sizes and population densities from every continent except Africa and Antarctica. The economies of the countries we examined range from emerging economies such as former Soviet republics and Mexico, to mature economies such as Germany and Japan. In Appendix C, we have converted all prices to U.S. dollars based on both purchasing power parity (PPP)[61] and current exchange rates.[62] Converting prices through both methods enables more meaningful comparisons.[63]

20. The dataset includes information on advertised monthly recurring charges and nonrecurring charges such as connection and modem fees, to allow for a more complete pricing analysis of each broadband Internet service offering.[64] The dataset includes not only advertised price but also promotional discounts such as those associated with online sign-up and longer service contracts. Data on advertised

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http://ec.europa.eu/information_society/eeurope/i2010/docs/benchmarking/eda/biac_2009.pdf. For non-European countries in the dataset, we developed our list of incumbent operators and their competitors through staff research.

[61] PPPs are currency conversion rates that convert to a common currency and equalize the purchasing power of different currencies. In other words, they eliminate the differences in price levels between countries in the process of conversion. PPPs show the ratio of the prices in national currencies of the same good or service in different countries. For example, if the price of a hamburger in France is €2.84 and the price of an equivalent hamburger in the United States is $2.20, then the PPP for a hamburger between France and the United States is €2.84 to $2.20, or €1.29 to the dollar. This means that for every dollar spent on hamburgers in the United States, €1.29 would have to be spent in France to obtain the same quantity and quality of hamburgers. *See* OECD, Statistics Directorate webpage, *available at* http://oecd.org/department/0,3355,en_2649_34357_1_1_1_1_1,00.html and FAQ webpage, *available at* http://oecd.org/faq/0,3433,en_2649_34357_1799281_1_1_1_1,00.html#1799063. AT&T contends that since PPP does not measure the actual cost of broadband service but rather its cost relative to the cost of living, the use of PPP gives EU countries a 21-28 percent discount compared to the United States. AT&T Comments at 8. The PPP conversion is an accepted method of equalizing purchasing power in different countries, thereby enhancing comparative studies. Tim Callen, *PPP Versus the Market: Which Weight Matters?*, Finance and Development, Vol. 44, no. 1, March 2007, International Monetary Fund, *available at* http://www.imf.org/external/pubs/ft/fandd/2007/03/basics.htm. It accurately reflects the cost of a product or service relative to other items in a particular country and can allow a more valuable international comparison than merely comparing prices based on exchange rates in certain circumstances. International exchange rates, unadjusted for purchasing power, are most relevant when goods and services are traded across international borders. Generally, non-traded services or products are cheaper in less affluent countries than in more affluent countries because of lower wages and income to afford these services. This can vary, though, depending on how much the service makes use of goods that are traded across international borders. Failure to account for such differences may understate the cost of those services, relative to the economy, in less affluent countries. Nonetheless, we have also included in Appendix C the data using current exchange rates to provide an additional perspective. We believe that use of the exchange rates, unadjusted for purchasing power, provides a nominal measure of broadband service prices across countries, while the use of the PPP conversion factor not only converts the local currencies to a common currency but also measures value of broadband services at a uniform price level. *Id*.

[62] Exchange rates fluctuate on a daily basis. The exchange rates and PPP conversion factors we used for each country are annual rates and factors for 2010 derived by the World Bank, http://data.worldbank.org/indicator/PA.NUS.FCRF.

[63] Meaningful international PPP price comparisons are easier to achieve when the prices paid are for the same or similar service in each country. Since broadband service varies in terms of upload and download speeds, non-recurring charges, and promotional discounts, we have assembled data on various service attributes and associated those attributes with the price data for our international price comparisons. We believe this approach enables more useful international price comparisons.

[64] One commenter proposed that we collect data on "any two-part tariff arrangements," such as monthly fixed charges paired with charges for *each* megabyte downloaded. Mark Kennet Comments at 1. Our data collection does include monthly fixed charges for broadband plus any recurring or nonrecurring charges (such as line rental or traffic overages).

and promotional prices may be helpful for analyzing competition because advertised prices are focused on winning new customers or keeping customers who may be considering switching providers. The dataset also contains a number of offers that include services such as voice or video that are bundled with a broadband service. Service bundles can have a wide assortment of components, and variations in mobile broadband plans bundled with home broadband service present additional layers of complexity.

21. For each broadband service offering, the dataset includes upload and download[65] speeds, limitations on data usage, and information on the types of technology offered, including DSL, cable, fiber to the home, fixed wireless, satellite, and public WiFi.

22. A comparison of prices does not portray the entire story though, as a number of service characteristics may vary between foreign and U.S. broadband offerings, such as upload speeds, length of contract term, incidental and recurring costs (such as installation and equipment rental fees), differences in bundle components,[66] and data caps, as noted in the paragraphs above.

B. Community-Level Comparisons

23. In addition to requiring the Commission to gather data on broadband service capability, the BDIA directs the Commission to compare broadband development in communities that are similar to U.S. communities in terms of population size and density, topography, and demographic profile.[67]

24. "Community" is not defined in the BDIA or its legislative history. Community is commonly defined as (1) a unified body of individuals such as a state, or commonwealth; (2) people with common interests living in a particular area; or (3) a group of people with a common characteristic or interest living together within a larger society.[68] In view of the use of the phrase in the BDIA, and consistent with our approach in the *2010 IBDR*, for purposes of this Report we interpret "community" as a geographical unit smaller than a nation-state.[69]

25. One commenter proposes that the Commission consider comparing non-geographic communities (*e.g.*, minority, low income, elderly, or disabled communities) as well as geographic communities for purposes of the international comparison.[70] Though we see value in such an approach, we focus primarily on geographically defined communities, as we did in the *2010 IBDR*. We believe that the primary intent of Congress in adopting this section of the BDIA was to create a more geographically granular set of broadband-related data than used in previous comparisons of countries, and this guides our analysis. A focus on geographic communities helps us fulfill the mandate to "choose communities for the comparison" with "population density" and "topography" that are comparable to communities within the United States.[71] This seems the most natural reading of the provision, especially given that the Commission is also obligated, in the related section 706 inquiry, to "compile a list of geographical areas

[65] In some cases, providers did not indicate upload speeds on their websites. *See* Appendix C.

[66] Differences in non-broadband aspects of bundles could be responsible for price differences in bundle prices. For example, a TV/broadband bundle in one country may include a DVR, video-on-demand, and premium channels, whereas a TV/broadband bundle in another country may include premium channels and no DVR.

[67] Specifically, the statute requires that "[t]he Commission shall choose communities for the comparison under this subsection in a manner that will offer, to the extent possible, communities of a population size, population density, topography, and demographic profile that are comparable to the population size, population density, topography, and demographic profile of the various communities within the United States." BDIA § 103(b)(3); 47 U.S.C. § 1303(b)(3).

[68] *See, e.g.*, Merriam-Webster Dictionary *available at* http://www.merriam-webster.com/dictionary/community; Black's Law Dictionary, 8th Ed. (2004).

[69] *See 2010 IBDR*, 25 FCC Rcd at 11967-68 (para. 16).

[70] NAF Comments at 4.

[71] 47 U.S.C. § 1303(b)(2).

that are not served by any provider."[72]

26. Another commenter criticizes the Commission's choice of communities and service offerings in the *2010 IBDR*, and asserts the Commission did "not appear to use a well-defined or consistent methodology for choosing the 'communities' or offers."[73] The commenter notes that using data availability as a criterion for selection makes the sample likely to be statistically unrepresentative because "there is likely a strong correlation between data availability and other factors driving broadband deployment, such as income and education levels, and the quality of governance in the area."[74] As a result, the commenter argues, our sample was biased towards areas with the best broadband service.[75]

27. As detailed below, we believe that the criteria that we have used for choosing communities and offers for comparison are squarely in line with what the BDIA requires. In instructing us to include a "geographically diverse selection of countries,"[76] we do not believe that Congress intended for us to use a random sample of countries. The BDIA requires the Commission to choose communities that are similar to U.S. communities, which suggests communities with higher income and education levels, and better broadband service, than communities in poorer, less developed countries.

28. Based on commenters' suggestions, and the BDIA's goal of developing a geographically diverse and detailed set of data on international broadband, we adopt two criteria to guide the selection of countries and communities. The first is *inclusivity*: We attempt to capture as full an international profile as possible, embracing communities from all parts of the world, while also focusing on those countries that have more developed broadband markets.[77] The second is *data availability*: We include only communities for which a substantial set of relevant information is available. These two criteria result in a dataset that meets the statutory minimum requirements of 25 countries and 75 communities comparable to U.S. communities, and includes communities from almost all nations with the most broadband deployment.[78]

29. For each community in the dataset, we examine population size and density, topography, and a number of additional criteria useful for building a "demographic profile." To determine what additional demographic or other factors to include in each community profile, we reviewed major public databases of economic, social, and demographic data, including the World Bank's Development Indicators,[79] the International Telecommunication Union's (ITU) World Telecommunication Indicators,[80] the OECD's regional statistics database,[81] and Eurostat's regional statistics database.[82] We also looked at studies and national broadband plans from other countries to determine which indicators would reflect the factors

[72] 47 U.S.C. § 1302(c).

[73] AT&T Comments at 3.

[74] *Id*. at 3-4.

[75] *Id*. at 4 (emphasis in the original).

[76] 47 U.S.C. § 1303(b)(2)(A).

[77] We determined that a broadband comparison study featuring countries with similar markets is more instructive than a comparison of developed and undeveloped countries, and also better serves the goals of the BDIA. *See* para. 27 *supra*.

[78] There are some differences in the countries included for each dataset contained in this Report. Those differences are primarily due to data availability. *See* Appendix B *infra*. We also recognize that much room for improvement remains with regard to international data availability and collection. *See* Section III.D, *infra*.

[79] *See* http://go.worldbank.org/U0FSM7AQ40.

[80] *See* http://www.itu.int/ITU-D/ict/publications/world/world.html.

[81] *See* http://oecd.org/gov/regional/statisticsindicators/explorer/.

[82] *See* http://epp.eurostat.ec.europa.eu/portal/page/portal/region_cities/introduction.

typically expected to influence broadband deployment and adoption. Based on our review of these sources, we identified three variables that are particularly likely to be of importance in understanding international broadband service capability and selected them for inclusion in our report and for further study:[83] (1) education level within a community (percentage of labor force with tertiary—*i.e.*, college or graduate school—education); (2) total income of a community (GDP, in current U.S. dollars, adjusted for purchasing power parity); and (3) income per capita within a community (GDP per capita, in current U.S. dollars adjusted for purchasing power parity).[84]

30. The data for the variables listed in paragraph 29,[85] are drawn mainly from the OECD's regional statistics[86] and the European Commission's Eurostat regional data.[87] We note that data at the national level for the variables listed above are generally available annually. Community-level information, however, is collected less frequently. Accordingly, we provided the most recent publicly-available data (ranging from 2005-2010) for each variable in the community dataset.[88] Data for communities not covered by the OECD and Eurostat datasets are drawn from national statistical agencies, communications ministries, and communications regulators.[89]

31. We have conducted an econometric analysis of our regional data on broadband adoption, population, income, and education level for a number of countries. The regression results, which are best interpreted as correlations, not causal relationships, suggest a correlation between broadband adoption and (1) communities with larger populations, (2) communities with higher population density, and (3) communities with higher income. The same model, however, does *not* detect a statistically significant relationship between education and broadband adoption.[90] These results illustrate that this kind of quantitative data is a potentially rich vein for future investigation and analysis. We present this analysis in Appendix G.

C. Other Relevant Similarities and Differences

32. The BDIA also directs the Commission, for the foreign communities selected, to identify "relevant similarities and differences" across several criteria including, among others: market structure, types of technologies offered, regulatory model, and other media available to consumers (which we take to mean other electronic video and audio news, information, and entertainment options, particularly

[83] *See* Appendix G.

[84] One commenter points out that "disparities between countries of similar income levels may be explained by differing income distributions," and for this reason he recommends that we measure a country's income distribution. Mark Kennet Comments at 1. We agree that analysis of a community's income distribution would be valuable. Unfortunately this data is not widely available internationally on a community-level basis, but it is worthy of consideration in our efforts to collect better data.

[85] *See* Appendix D, *infra*. Appendix D contains the most recent data available for the countries surveyed. A more complete version containing historical data going back several years is available at http://www.fcc.gov/reports/international-broadband-data-report-second. Information on topography is included in Appendix E of this *IBDR*. *See infra* para. 32 and Appendix E.

[86] *See* http://stats.oecd.org.

[87] *See* http://epp.eurostat.ec.europa.eu/portal/page/portal/region_cities/introduction.

[88] Communities that include the capital city of a country are indicated in boldface in Appendix D. Communities that are the same as the capital city are indicated in boldface and italics. For example, Ontario, the Canadian province where Ottawa is located, is in bold, while the District of Columbia is in bold and italics.

[89] *See* "Notes" in Appendix D *infra*.

[90] Our model's education data, however, was limited and the metric used may not be defined consistently across countries. The model could benefit from greater refinement and more data on additional variables.

television and radio).[91] For each foreign country included in this *IBDR*, Commission staff has collected, in Appendix E, information on topography; the regulatory environment, including national broadband plans; the market structure, including the number of competitors, broadband penetration, and the types of network technologies deployed; types of applications and services used; and other media, specifically television and radio outlets, available to consumers. In most cases, we have only been able to obtain relevant information at the national level for these factors.

33. Some commenters emphasize the need for the *IBDR* to consider mobile broadband data.[92] For our price survey, we gathered mobile broadband data when it was available.[93] Typically, the wireless data we found pertained to mobile and/or fixed wireless broadband services (*e.g.*, WiMAX access via a USB stick) offered by a cable or DSL provider.[94] Consistent data on mobile broadband adoption is just beginning to become available for this rapidly growing segment of the broadband market. At this point, we have included information on the availability of mobile broadband and adoption data for each country in Appendix E. In future reports we hope to collect and incorporate more data about the mobile segment of the broadband market.

D. Goals for Future Reports

34. As discussed above, the BDIA requires that we obtain a wealth of international data, much of which does not exist or is not readily available without significant expense.[95] Though this *IBDR* improves upon the *2010 IBDR* in terms of the amount, quality, and analysis of data collected and presented, we aspire to further improve our collection of international broadband data. Obtaining more data (and more granular data) on foreign broadband capability would help us understand broadband deployment and adoption patterns in the United States and globally.

35. Several commenters offer suggestions on how to obtain additional data from foreign countries.[96] We agree with commenters that the need exists for better and more disaggregated international data. Understanding what data are necessary to produce a robust analysis requires a review

[91] The statute provides that "[t]he Commission shall identify relevant similarities and differences in each community, including their market structures, the number of competitors, the number of facilities-based providers, the types of technologies deployed by such providers, the applications and services those technologies enable, the regulatory model under which broadband service capability is provided, the types of applications and services used, business and residential use of such services, and other media available to consumers." BDIA § 103(b); 47 U.S.C. § 1303(b). Section 103(b)(2) of the BDIA (47 U.S.C. § 1303(b)(2)) also directs the Commission to identify topography for selected foreign communities.

[92] *See* AT&T Comments at 9 (noting that wireless technology "now offer[s] speeds that equal or surpass many wireline broadband speeds"); NAF Comments at 2-3 (arguing that various wireless platforms (*e.g.*, smartphones, WiFi) often substitute for residential broadband).

[93] *See* Appendix C, *infra*.

[94] For example, we collected data on wireless broadband plans offered by cable and DSL companies. Such wireless service typically consisted of 3G or WiMAX access provided via a USB stick modem or a tablet computer. Foreign broadband providers might offer wireless access as a stand-alone product or as an add-on to a home broadband subscription.

[95] *See* Section II *supra*.

[96] *See, e.g.*, Free Press Comments at 2-4 (proposing four methods: (1) select communities from countries "with which [the Commission has] existing relationships and [that] maintain detailed data" while guarding against a biased sampling; (2) share data with local regulatory agencies in selected communities; (3) identify information that is not available through the foreign regulator, then work with the regulatory agency to find ways to obtain it; and (4) maintain ongoing relationships with foreign regulators to foster production of more comprehensive data for comparison purposes); NAF Comments at 5-6 (asserting that the Commission's collection of data can be improved only by achieving international cooperation on data collection, and failing that, suggesting that the Commission contract with a third party researcher to conduct a multi-country in-depth analysis); Mark Kennet Comments at 2.

of the factors that affect broadband supply and demand, which we discuss below. We then describe a Commission proposal, developed in collaboration with other U.S. government agencies, for the OECD to expand and standardize metrics for broadband data and collection.

1. Factors Affecting Broadband Demand and Supply

36. Identifying and examining the factors that influence broadband deployment and adoption is complicated. As a general matter, the number of broadband connections is determined by the interaction of supply and demand. The supply and demand curves for broadband in turn are likely to be influenced by a number of exogenous demographic, economic, and regulatory factors.[97] Below we explore one critical factor that affects the supply of broadband: the cost of deploying broadband infrastructure (which in turn is influenced predominantly by population density).[98] We also examine the effects that government policies may have on supply and demand for broadband, and other possible factors affecting supply and demand, such as the deployment of both wireline and wireless broadband platforms in a single market, and the impact of wireless broadband offerings that are both mobile and fixed.

a. Measuring Broadband Penetration and Adoption

37. Although broadband penetration is often defined as the number of broadband connections in a given area divided by population, it is not clear that this is the best measure, at least for fixed residential broadband services.[99] For example, most households will purchase a single fixed broadband connection to serve the entire household; it may make more sense to measure broadband penetration as the number of residential broadband connections divided by the number of households, to account for variation in household size. In an effort to make this report as complete as possible, we have collected and published data using both methods where available.[100] For mobile wireless broadband, however, it may make more sense to measure the number of mobile wireless subscriptions divided by the population, since consumers may be less likely to share mobile wireless devices with other household members.

b. Environmental, Demographic, and Competitive Effects on Supply and Demand

38. Previous studies suggest a number of demographic factors that may affect the demand for broadband. These include such exogenous variables as the level and distribution of income, the level of education and variations in education levels, computer ownership by consumers, computer literacy, and the age distribution of the population.[101] As discussed below, analysis of how these factors affect demand

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[97] *See, e.g.,* George S. Ford, Thomas M. Koutsky & Lawrence J. Spiwak*, The Demographic and Economic Drivers of Broadband Adoption in the United States* (Phoenix Center Policy Paper No. 31, Nov. 2007), *available at* http://www.phoenix-center.org/pcpp.html (identifying and analyzing various economic and demographic factors that affect broadband adoption).

[98] *See, e.g.,* John B. Horrigan, *Broadband Adoption and Use in America* (FCC Omnibus Broadband Initiative (OBI) Working Paper Series No. 1 (2010) at 6, Exhibit C-1, *available at* http://www.broadband.gov/plan/broadband-working-reports-technical-papers.html.

[99] *See, e.g.,* Scott Wallsten, *Understanding International Broadband Comparisons: 2009 Update* (Technology Policy Institute, June 2009) at 1 (noting that estimates of broadband penetration based on wired connections per capita will be misleading, because household sizes differ across countries); George S. Ford, Thomas M. Koutsky, & Lawrence J. Spiwak, *The Broadband Performance Index: A Policy-Relevant Method of Comparing Broadband Adoption Among Countries* (Phoenix Center Policy Paper No. 29, Jul. 2007) (same).

[100] *See* Appendix E.

[101] *See, e.g.,* John B. Horrigan, *Broadband Adoption and Use in America* (FCC Omnibus Broadband Initiative (OBI) Working Paper Series No. 1 2010), *available at* http://www.broadband.gov/plan/broadband-working-reports-technical-papers.html, and Gregory L. Rosston, Scott J. Savage, and Donald M. Waldman*, Household Demand for Broadband Internet in 2010*, *The B.E. Journal of Economic Analysis & Policy*: Vol. 10: Iss. 1 (Advances), Article
(continued....)

is complicated by the fact that broadband is a relatively new service; consequently, it is likely that subscribership will continue to rise over time as more consumers become aware of and then decide to adopt this service.

39. The cost of deploying broadband infrastructure is a critical factor affecting supply of broadband,[102] and population dispersion or density is generally viewed as a major factor affecting the cost of deployment.[103] In rural areas, where population is likely to be widely dispersed, it likely will cost more to construct wireline broadband networks because loops are likely to be longer and because there are fewer subscribers to share the cost of common equipment. Similarly, the cost per subscriber of building wireless broadband networks is likely to be higher in rural areas because there are fewer customers over which to spread the cost of building wireless towers and deploying backhaul capacity. But how best to measure population dispersion in a way that reflects underlying cost differences is not clear,[104] Differences in geographical terrain can also affect cost. For example, it typically is more expensive to build networks in mountainous areas than in level areas.

40. The level of competition among broadband providers is also likely to affect supply. As a general matter, one would expect that an increase in the number of competitors would reduce prices toward efficient levels. On the other hand, given economies of scale and scope, there may not be a business case to construct multiple networks in certain rural markets.

41. The factors affecting demand and supply discussed above are likely to vary within a country. For example, some areas of a country may have higher incomes or higher educational levels than others. Similarly, population dispersion and the number of competitors is likely to vary, depending on geographic and demographic characteristics. For example, in the United States, consumers in urban and suburban areas may have a choice of multiple broadband providers, while in rural areas they may have a choice of one broadband provider or no terrestrial broadband providers.

c. Government Policies' Effect on Supply and Demand

42. Government policies may also affect the demand for, and supply of, broadband. For example, governments may seek to spur demand by providing subsidies to low-income households for subscriptions to broadband services or for the purchase of computers, or they may support digital literacy or skills training for consumers. Alternatively, governments may make broadband services more valuable by providing convenient access to government services or information online.[105]

(...continued from previous page)
79 (2010). *See also* International Bureau Background Research Paper, Broadband Supply Case Studies: Canada and Australia (forthcoming).

[102] *See, e.g.*, R. Preston McAfee, *Introduction to Economic Analysis* at 2-18 (2006) (noting that increases in marginal cost will reduce supply).

[103] *See, e.g.*, Federal Communications Commission, The Broadband Availability Gap (OBI Technical Paper No. 1) (2010) at 8, *available at* http://download.broadband.gov/plan/the-broadband-availability-gap-obi-technical-paper-no-1.pdf.

[104] Although some economists have used average population density in a country as a measure of population dispersion and a proxy for cost, there may be problems with this measure. To use an extreme example, if one had two countries with equal population density, but the citizens in one country all lived in apartment buildings in a single city, while citizens in the other country were spread uniformly over farms, the loop lengths and hence the cost of broadband deployment are likely to be much lower in the first country.

[105] *See* International Bureau Background Research Paper, Broadband Supply Case Studies: Canada and Australia (forthcoming). Canada experienced success in promoting broadband deployment in rural areas with funding from its Broadband for Rural and Northern Development (BRAND) pilot program. *See Id.*

43. Governments have also adopted, or are considering adopting, policies to affect the supply of broadband service, including building government-owned broadband networks, funding the private construction of networks, or providing financial support (either one-time or recurring) for providers that seek to construct broadband networks in areas where there is no private business case for deployment.[106] Alternatively, governments may try to reduce the cost of deploying broadband by offering tax incentives, such as investment tax credits or accelerated depreciation, or by making it easier for providers to gain access to poles, ducts, conduits, and rights of way. Finally, governments may try to increase competition among broadband providers by reducing regulatory barriers to entry or requiring incumbent providers to share facilities with competitors.[107]

d. Other Factors

44. Several other characteristics of broadband service complicate any empirical analysis of the broadband marketplace. We highlight just a few of the most difficult issues below.

45. The first is that the United States and many other countries are still in a "diffusion" or "adoption" phase. When new and innovative technologies are introduced, they typically are not adopted immediately by all potential consumers. Rather consumers vary in their awareness of any new technologies and when they choose to adopt that technology. As a result, we have generally seen gradual adoption or diffusion of new technologies, which tends to follow an S-shaped adoption curve.[108] Given differences in the timing of the introduction of broadband in various areas and possible differences in the parameters that affect the adoption rate, some have argued that analyses of broadband adoption should take into account how far along particular countries are in this adoption process.[109]

46. Second, as discussed in Section III.A.2, identifying causes of international price differences are complicated by the existence of regulated wholesale rates in some countries, bundling with other services, combining recurring charges with non-recurring charges, unlimited usage plans, plans with usage caps, and promotional offerings.

47. As noted, broadband is a heterogeneous product. It can be offered over telephone networks,

[106] For example, the government of Canada, as part of its 2009 Economic Action Plan, provided CAN$225 million over three years, beginning in 2009-10, for Industry Canada to develop and implement a strategy to extend broadband coverage. A significant component of this plan is Broadband Canada: Connecting Rural Canadians, which is intended "to extend broadband service to as many unserved and underserved Canadian households as possible." *See* http://www.ic.gc.ca/eic/site/ic1.nsf/eng/06045.html (site visited March 10, 2011). In another example, the Australian government announced in 2009 that it would build and operate a new high-speed National Broadband Network, investing up to AU$43 billion over eight years to do so. *See* http://www.dbcde.gov.au/broadband/national_broadband_network (visited March 10, 2011). *See also* International Bureau Background Research Paper, Broadband Supply Case Studies: Canada and Australia (forthcoming).

[107] A disadvantage of unbundling requirements is that they may reduce carriers' incentives to invest in network upgrades to provide next generation broadband services. *See* Thomas M. Jorde, J. Gregory Sidak, & David J. Teece, *Innovation, Investment, and Unbundling*, 17 YALE JOURNAL ON REGULATION 1 (2000).

[108] *See, e.g.,* Lawrence K. Vanston & John H. Vanston, Introduction to Technology Market Forecasting (1996); *see generally* Everett M. Rogers, Diffusion of Innovations (4th ed. 1995). Note that estimating adoption curves is complex. *See, e.g.*, Luis Andres, David Cuberes, Mame A. Diouf and Tomas Serebrisky, *The Diffusion of Internet: a Cross-country Analysis*, Ivie Working Paper, WP-AD 2010-07, February 2010.

[109] *See, e.g.,* Wei-Min Hu & James Prieger, *The Empirics of the Digital Divide,* in HANDBOOK OF RESEARCH ON OVERCOMING DIGITAL DIVIDES: CONSTRUCTING AN EQUITABLE AND COMPETITIVE INFORMATION SOCIETY (E. Ferro *et al.* eds. 2009); Mario Denni & Harald Gruber, *The Diffusion of Broadband Telecommunications in the U.S.: The Role of Different Forms of Competition*, 68 COMMUNICATIONS & STRATEGIES 139 (2007). *See also The Broadband Availability Gap* (Federal Communications Commission, Omnibus Broadband Initiative Technical Paper No. 1, 2010), *available at* http://www.broadband.gov/plan/broadband-working-reports-technical-papers.html.

cable networks, fiber networks, mobile or fixed wireless networks, and via satellite. These platforms offer broadband services that differ in important characteristics, such as maximum speed, contention,[110] latency,[111] and mobility. In addition, a single broadband provider may offer broadband service packages that may vary in terms of maximum speed, data limits, or bundled services. These differing service characteristics affect how much consumers are willing to pay for a particular broadband service as well as how many consumers will choose to purchase the service.

48. A final complicating factor arises from the fact that it is not clear whether consumers view fixed and mobile broadband offerings as substitutes or whether they view mobile broadband as a supplemental technology; furthermore, consumers in one country may view mobile and fixed broadband as substitutes while consumers elsewhere may view the two more as complements. Analysis of broadband adoption is complicated because many consumers subscribe to both technologies. For example, if a sufficient number of customers purchased both fixed and mobile broadband services, then, depending on the broadband adoption measure used, broadband adoption estimates may exceed 100 percent, even though many residential consumers do not subscribe to any broadband service.

2. The Need for Detailed Disaggregated Data

49. The above discussion suggests that, in order to conduct a rigorous, empirical analysis of the factors that affect global broadband supply and demand, it is helpful to have reasonably comparable, detailed, and geographically disaggregated data from many countries, including:

- Detailed demographic data broken down on a highly geographically disaggregated basis. These demographic data ideally would include data on income and variations in income), education (and variations in education), computer literacy, residential computer ownership, and household size.[112]

- Data to estimate the relative costs of deploying alternative broadband technologies. At a minimum, one should have data on population density at a geographically disaggregated level. It would also be useful to have data on the actual costs of deploying alternative broadband technologies (including both initial construction costs and recurring costs).

- Data and maps indicating where alternative broadband technologies are deployed within countries. These data should identify different broadband technologies, the number of providers that offers each form of broadband, and the advertised and actual speeds that providers offer in communities. To the extent that countries adopt standardized mapping methods, this would facilitate availability comparisons.

[110] A contention protocol is a multiple access technique that permits users to transmit on a random or near-random basis with transmissions from one or more users that occasionally overlap, causing "collision." In contention protocols, transmissions from different terminals compete, or "contend," for the same resource. *See* Amendment of Parts 2 and 25 of the Commission's Rules to Allocate Spectrum and Adopt Service Rules and Procedures to Govern the Use of Vehicle-Mounted Earth Stations in Certain Frequency Bands Allocated to The Fixed-Satellite Service, IB Docket No. 07-101, *Notice of Proposed Rulemaking*, 22 FCC Rcd 9649, 9676 (2007), and *Report and Order*, 24 FCC Rcd 10414, 10452 (2009).

[111] Latency refers to the time taken (frequently measured in milliseconds) for a single data packet to travel from one computer to another over a network. *See*, *e.g.*, http://www.broadband.gov/qualitytest/about/.

[112] We recognize that some of these data, such as data on computer ownership, may not be available on a geographically disaggregated basis. We currently lack any definition or means to measure digital literacy, a concept that could mean different things to different people in different circumstances (*e.g.*, one could know how to send email, but not how to set up a videoconference).

- The number of subscribers to different broadband technologies. And, where providers offer multiple service packages, it would be useful to know the speeds and other service characteristics of the packages that consumers purchase. Information on actual data usage would also be useful, as well as data on the applications used by residential consumers, such as VoIP services.

- Data on broadband prices in a form that can be compared across countries. Ideally these data should be available with, or susceptible to, an analysis of bundle prices and promotional prices.

- Data on government policies intended to encourage broadband deployment, such as the level and scope of government subsidies.

3. Reforming Data Collection Domestically and Internationally

50. The *National Broadband Plan* recommended that the Commission reevaluate and improve its broadband data collection,[113] and the Commission has initiated a proceeding to consider modifications to its broadband data gathering.[114]

51. Other countries have also indicated their intention to review their broadband data, and the OECD is considering a proposal to develop meaningful cross-sectional and longitudinal data that can be used to gauge key broadband-related metrics within and across countries. The proposal addresses many of the data needs identified above, including broadband deployment and adoption data at a disaggregated, statistical, geographic area level, with special attention to residential and business use, speed tiers, the number of competitors, and technology type (*e.g.*, wireline, fixed and mobile wireless). The proposal also calls for collection of demographic metrics at a disaggregated, statistical, geographic area level, *e.g.*, education, income, age, and household type. Also part of the proposal is a request for urbanicity metrics,[115] particularly urban versus rural, which could be used as a proxy for loop length. The proposal addresses metrics for household dispersion to allow comparison and normalization of availability figures. Detailed subscriber price data for OECD countries is also part of the proposal. These and other coordinated improvements in broadband data gathering would facilitate more rigorous empirical analyses.

IV. CONCLUSION

52. In conjunction with the Commission's adoption of the *Seventh 706 Report*, the release of this *IBDR* fulfills the obligation imposed by Section 103(b) of the Broadband Data Improvement Act.[116]

[113] *See, e.g.,* National Broadband Plan*,* Recommendations 4.2- 4.4. (2010), *available at* http://download.broadband.gov/plan/national-broadband-plan.pdf.

[114] *See Modernizing the FCC Form 477 Data Program*, WC Docket No. 11-10, Notice of Proposed Rulemaking, FCC 11-14 (rel. Feb. 8, 2011).

[115] The concept of urbanicity refers to the degree to which a geographical unit is urban. *See* http://www.urbanicity.us/Urbanicity.html.

[116] 47 U.S.C. § 1303(b).

V. ORDERING CLAUSE

53. IT IS ORDERED that, pursuant to Section 103(b) of the Broadband Data Improvement Act, 47 U.S.C. § 1303(b), and pursuant to authority delegated to the International Bureau in Section 0.261 of the Commission's rules, 47 C.F.R. § 0.261, this *IBDR*, with its associated Appendices A-G, is ADOPTED.

FEDERAL COMMUNICATIONS COMMISSION

Mindel De La Torre
Chief, International Bureau

APPENDIX A: PUBLIC RECORD

Docket GN 09-47 (Broadband Data Improvement Act)

Comments (September 27, 2010)
AT&T, Inc.
Free Press
The New America Foundation and the Donald McGannon Communication Research Center, Fordham University (NAF)

Reply Comments (October 12, 2010)
None filed

Late-filed Comments
Professor Rob Frieden, Pioneers Chair and Professor of Telecommunications and Law, The Pennsylvania State University
Miguel Gil Tertre
Professor Shane Greenstein
D. Mark Kennet, Ph.D.

APPENDIX B: Countries Included in the *IBDR*

COUNTRIES	Appendix C: Broadband Price Dataset	Appendix D: Demographics Dataset	Appendix E: Market and Regulatory Background	Appendix F: Actual Broadband Speeds	Appendix G: Econometric Analysis
Australia	X	X	X	X	X
Austria	X	X	X		X
Belgium	X	X	X		
Bulgaria	X	X	X		
Canada	X	X	X	X	
Chile	X	X	X		
Cyprus		X	X		
Czech Republic	X	X	X		X
Denmark	X	X	X	X	
Estonia	X	X	X		
Finland	X	X	X	X	X
France	X	X	X	X	
Germany	X	X	X	X	X
Greece	X	X	X		
Hong Kong	X		X		
Hungary	X	X	X		
Iceland	X	X	X	X	
Ireland	X	X	X		
Italy	X	X	X	X	X
Japan	X	X	X	X	
Korea	X	X	X	X	
Latvia	X	X	X		
Lithuania	X	X	X		
Luxembourg	X	X	X		X
Malta	X	X	X		
Mexico	X		X		
Netherlands	X	X	X	X	X
New Zealand	X		X		
Norway	X	X	X	X	X
Poland	X	X	X		
Portugal	X	X	X		X
Romania		X	X		
Singapore			X		
Slovakia	X	X	X		X
Slovenia	X	X	X		
Spain	X	X	X	X	X
Sweden	X	X	X		
Switzerland	X		X	X	
Turkey	X		X		
U.K.	X	X	X	X	X
USA	X	X			X

APPENDIX C: Broadband Price Dataset

This dataset can be found on the FCC website at http://www.fcc.gov/reports/international-broadband-data-report-second.

APPENDIX D: Demographics Dataset

Below is a concise version of the demographics dataset, containing only the most recent data available for the countries surveyed. A complete version containing historical data going back several years is available at http://www.fcc.gov/reports/international-broadband-data-report-second.

Community	% Households with broadband	Population Total	Population density (avg population per square meter)	GDP total (US$m), PPP (purchasing power parity)	GDP per cap, PPP (purchasing power parity)	Education (% of labor force with tertiary education)
ALA0 Australia	**62**	**21429366**	**3**	**855409**	**37197**	**23**
ALA1 New South Wales	61	6984172	9	274642	36865	34
ALA2 Victoria	62	5313823	23	199078	35733	33
ALA3 Queensland	64	4293915	2	166492	35100	28
ALA4 South Australia	54	1603361	2	53918	32353	27
ALA5 Western Australia	64	2171197	1	116012	48292	31
ALA6 Tasmania	49	497529	7	15820	30180	25
ALA7 Northern Territory	64	219818	0	11719	48724	31
ALA8 Australian Capital Territory	74	345551	147	17727	47983	47
AT0 Austria	**58**	**8355260**	**99**	**308599**	**37112**	**20**
AT11 Burgenland (A)	55	283118	71	6903	24594	16
AT12 Niederösterreich	57	1605122	83	48211	30256	16
AT13 Wien	65	1687271	4046	82384	49302	24
AT21 Kärnten	52	560605	59	17735	31624	17
AT22 Steiermark	49	1207479	74	38647	32075	16
AT31 Oberösterreich	58	1410403	118	50998	36249	16
AT32 Salzburg	60	529217	74	22358	42176	18
AT33 Tirol	57	704472	56	27200	38747	17
AT34 Vorarlberg	59	367573	141	14163	38730	16
BE0 Belgium	**63**	**10666866**	**349**	**368213**	**34653**	**38**
BE1 Région de Bruxelles-Capitale/Brussels Hoofdstedelijk Gewest	57	1048491	6512	68794	66154	45
BE21 Prov. Antwerpen	69	6161600	456	213730	34812	36
BE3 Région Wallonne	56	3456775	205	85690	24864	34

BG0 Bulgaria	**26**	**7606551**	**69**	**52438**	**6956**	
BG3 Severna I iztochna Bulgaria	21	3953967	58	20776	5180	No Data
BG4 Yugozapadna I yuzhna tsentralna Bulgaria	31	2115042	86	31660	8732	No Data
Canada	**62**	**33739859**	**4**	**1299895**	**39004**	**59**
CA1 Newfoundland And Labrador	59	508925	1	25416	50186	59
CA2 Prince Edward Island	61	140985	25	3758	26945	53
CA3 Nova Scotia	66	938183	18	27782	29663	58
CA4 New Brunswick	58	749468	11	22243	29770	55
CA5 Quebec	53	7828879	6	245591	31675	62
CA6 Ontario	64	13069182	14	477675	36925	60
CA7 Manitoba	57	1221964	2	41308	34249	50
CA8 Saskatchewan	62	1030129	2	51608	50915	50
CA9 Alberta	67	3687662	6	236678	65819	56
CA10 British Columbia	72	4455207	5	160841	36689	56
Yukon, Northwest Territories, and Nunavut	54	No data	No data	No Data	No Data	No Data
Chile	**35**	**16928873**	**8**			
CL01 Tarapaca	41	307426	7	No Data	No Data	No Data
CII Antofagasta	57	538432	4	No Data	No Data	No Data
CIII Atacama	31	278515	4	No Data	No Data	No Data
CIV Coquimbo	25	708369	17	No Data	No Data	No Data
CV Valparaiso	36	1739876	106	No Data	No Data	No Data
CVI O'Higgins	18	874806	53	No Data	No Data	No Data
CVII Maule	15	999685	33	No Data	No Data	No Data
CVIII Bio-Bio	26	2022995	55	No Data	No Data	No Data
CIX Araucania	18	962120	30	No Data	No Data	No Data
CX Los Lagos	23	825830	17	No Data	No Data	No Data
CXI Aisen	21	103738	1	No Data	No Data	No Data
CXII Magallanes y Anta(a)rtica	30	158111	0.1	No Data	No Data	No Data
CRMS Santiago	47	6814630	442	No Data	No Data	No Data
CL14 Los Rios	23	378193	21	No Data	No Data	No Data
CL15 Arica Y Parinacota	45	186147	11	No Data	No Data	No Data
Cyprus	**51**	**796875**	**86**	**25585**	**32264**	
CZ0 Czech Republic	**36**	**10467542**	**132**	**247689**	**23968**	**16**
CZ01 Praha	53	1233211	2498	61712	51422	32
CZ02 Strední Cechy	37	1230691	111	26748	22505	13
CZ03 Jihozápad	34	1205955	70	25299	21270	14
CZ04 Severozápad	26	1144294	134	20938	18477	7

CZ05 Severovýchod	37	1507030	122	29424	19709	12
CZ06 Jihovýchod	36	1662557	121	35405	21468	16
CZ07 Střední Morava	33	1233549	135	22941	18633	14
CZ08 Moravskoslezsko	33	1250255	235	25224	20185	12
DK0 Denmark	76	**5511451**	**127**	**198338**	**36316**	**38**
DK01 Hovedstaden	80	1662285	643	73860	45001	40
DK02 Sjælland	71	821252	113	22397	27387	28
DK03 Syddanmark	74	1199667	98	40460	33937	26
DK04 Midtjylland	76	1247732	94	42590	34564	30
DK05 Nordjylland	74	580515	73	19031	32931	26
Estonia	**64**	**1340415**	**31**	**23838**	**17760**	
FI0 Finland	**74**	**5326314**	**16**	**186936**	**35346**	**40**
FI13 Itä-Suomi	65	654344	9	17528	26594	30
FI18 Etelä-Suomi	78	2653778	64	106560	40621	39
FI19 Länsi-Suomi	69	1349600	23	42150	31413	32
FI1A Pohjois-Suomi	76	641136	5	19539	30650	32
FI20 Åland	64	27456	17	1158	42888	28
France	**57**	**64367000**	**118**	**2071782**	**32460**	**31**
FR1 Île de France	64	11746000	978	587699	50508	41
FR2 Bassin Parisien	52	10712000	74	299545	280504	n/a
FR3 Nord - Pas-de-Calais	49	4022000	324	106203	26407	27
FR4 Est	52	5357000	112	149568	280836	n/a
FR5 Ouest	51	8460000	99	238376	361019	n/a
FR6 Sud-Ouest	52	6806000	66	194667	290615	n/a
FR7 Centre-Est	55	7503000	108	236337	319150	n/a
FR8 Méditerranée	58	7863000	117	223111	288851	n/a
DE0 Germany	**65**	**82002356**	**230**	**2853157**	**34748**	**28**
DE1 Baden-Württemberg	63	10749506	301	421073	39190	27
DE2 Bayern	66	12519728	177	509940	40892	26
DE3 Berlin	67	3431675	3834	99809	29269	34
DE4 Brandenburg	40	2522493	86	62615	24634	28
DE5 Bremen		661866	1640	31518	47503	24
DE6 Hamburg	67	1772100	2345	101345	57504	28
DE7 Hessen	67	6064953	288	253403	41719	26
DE8 Mecklenburg-Vorpommern	56	1664356	72	40958	24283	24
DE9 Niedersachsen	67	7947244	167	244081	30597	21
DEA Nordrhein-Westfalen	72	17933064	528	617900	34304	22
DEB Rheinland-Pfalz	62	4028351	204	123150	30413	23
DEC Saarland	47	1030324	404	35677	34308	19

DED Sachsen	47	4192801	229	109217	25789	31
DEE Sachsen-Anhalt	57	2381872	118	60783	25043	22
DEF Schleswig-Holstein	71	2834260	180	84510	29801	22
DEG Thüringen	59	2267763	142	57178	26216	27
GR0 Greece	**33**	**11260402**	**85**	**311084**	**27793**	**27**
GR1 Voreia Ellada	27	3580472	64	74938	20998	25
GR2 Kentriki Ellada	20	2475170	46	52848	21437	19
GR3 Attiki	46	4088447	1067	155305	38376	32
GR4 Nisia Aigaiou, Kriti	29	1116313	64	27992	25182	20
HU0 Hungary	**51**	**10030975**	**108**	**188682**	**18763**	**23**
HU10 Közép-Magyarország	60	2925500	419	88978	30842	31
HU21 Kosep-Dunantul	56	1103132	99	19285	17435	18
HU22 Nyugat-Dunantul	51	998187	88	18389	18413	16
HU23 Del-Dunantul	42	952982	68	12340	12803	17
HU31 Eszak-Magyarország	44	1223238	92	14960	12025	16
HU32 Eszak-Alfold	43	1502409	85	17957	11816	18
HU33 Del-Alfold	48	1325527	73	16772	12531	19
Iceland	**87**	**319368**	**3**	**11311**	**36301**	**31**
Ireland	**54**	**4450030**	**63**	**193371**	**44383**	
IE01 Border - Midlands and Western	44	1199297	37	34655	29709	30
IE02 Southern and Eastern	57	3250733	89	158716	49748	36
IT0 Italy	**39**	**60045068**	**198**	**1840070**	**30990**	**18**
ITC1 Piemonte	38	4432571	173	148964	34033	16
ITC2 Valle d"Aosta/Vallée d"Aoste	34	127065	39	4454	35519	13
ITC3 Liguria	39	1615064	297	51473	31993	20
ITC4 Lombardia	43	9742676	404	387481	40388	17
ITD1 Provincia Autonoma Bolzano-Bozen	39	498857	67	19782	40307	11
ITD2 Provincia Autonoma Trento	44	519800	83	18641	36537	17
ITD3 Veneto	39	4885548	263	175031	36443	14
ITD4 Friuli-Venezia Giulia	43	1230936	156	42534	34941	15
ITD5 Emilia-Romagna	41	4337979	193	162900	38334	17

ITE1 Toscana	43	3707818	160	123606	33794	17
ITE2 Umbria	41	894222	105	25514	29036	16
ITE3 Marche	43	1569578	160	48818	31606	15
ITE4 Lazio	45	5626710	323	202508	36638	22
ITF1 Abruzzo	37	1334675	123	33638	25543	18
ITF2 Molise	26	320795	72	7479	23335	17
ITF3 Campania	37	5812962	428	114457	19731	16
ITF4 Puglia	29	4079702	211	81561	20024	15
ITF5 Basilicata	26	590601	59	13292	22483	15
ITF6 Calabria	26	2008709	133	39494	19718	17
ITG1 Sicilia	34	5037799	196	99377	19783	15
ITG2 Sardegna	36	1671001	69	39067	23499	13
JP0 Japan	**62**	**127771000**	**338**	**4972265**	**38916**	**24**
JP Hokkaido/Tohoko	48	15074000	107	585630	33504	No Data
JP Kanto	71	44882000	890	1933603	43081	No Data
JP Chubu	64	20638000	434	805144	44161	No Data
JP Kinki	67	20861000	763	770311	36926	No Data
JP Chugoku	52	7631000	239	284731	37315	No Data
JP Shikoku	46	4040000	215	129282	32007	No Data
JP Kyushu	48	14645000	329	463637	31657	No Data
KR0: Korea	**84**	**48606787**	**489**	**1204692**	**24861**	**34**
KR01: Capital region	90	23908871	2043	574047	24244	40
KR02: Gyeongnam region	78	7713817	626	212281	27462	37
KR03: Gyeonbuk region	73	5077459	255	117070	22933	34
KR04: Jeolla region	76	4977495	242	120418	23976	25
KR05: Chungcheong region	88	4922359	297	136860	27895	23
KR06: Gangwon region	74	1461318	88	33360	22687	29
KR07: Jeju	72	545468	295	10657	19571	34
Latvia	**53**	**2261294**	**36**	**34095**	**15096**	
Lithuania	**54**	**3349872**	**54**	**47786**	**14208**	
Luxembourg (Grand-Duché)	**71**	**493500**	**187**	**39577**	**82453**	**32**
Malta	**69**	**413609**	**1304**	**8530**	**20868**	
NL0 Netherlands	**77**	**16485787**	**395**	**648467**	**39585**	**36**
NL1 Noord-Nederland	74	1708821	205	64128	37647	26
NL2 Oost-Nederland	75	3499946	358	117885	33912	28
NL3 West-Nederland	80	7719856	886	328732	42947	34
NL4 Zuid-Nederland	73	3557164	502	137722	38820	29
NO0 Norway	**78**	**4799252**	**15**	**252580**	**53635**	**39**

NO01 Oslo og Akershus	83	1103100	216	79415	74331	46
NO02 Hedmark og Oppland	71	374359	7	15311	41127	25
NO03 Sør-Østlandet	78	919900	27	38985	43078	29
NO04 Agder og Rogaland	75	696166	29	35841	52793	30
NO05 Vestlandet	72	824865	18	42636	52507	32
NO06 Trøndelag	87	417437	11	19458	47413	34
NO07 Nord-Norge	75	463425	4	20933	45299	31
PL0 Poland	**57**	**38135876**	**122**	**537468**	**14060**	
PL1 Centralny	56	7753356	144	149006	19240	No Data
PL2 Poludniowy	56	7932801	288	110719	13912	No Data
PL3 Wschodni	52	6725581	90	68222	10212	No Data
PL4 Pólnocno-Zachodni	61	6099536	91	83775	13764	No Data
PL5 Poludniowo-Zachodni	58	3910099	133	56003	14356	No Data
PL6 Pólnocny	59	5714503	94	69744	12284	No Data
PT0 Portugal	**46**	**10627250**	**115**	**240155**	**22638**	**16**
PT11 Norte	45	3745439	176	67660	18068	13
PT15 Algarve	50	430084	85	10116	23858	12
PT16 Centro (PT)	39	2383284	85	46066	19308	11
PT17 Lisboa	54	2819433	957	87849	31360	22
PT18 Alentejo	37	757069	24	16432	21548	14
PT30 Região Autónoma da Madeira (PT)	45	244780	105	4929	20242	8
PT20 Região Autónoma dos Açores (PT)	48	247161	308	7103	28850	13
RO0 Romania	**23**	**21610213**	**94**	**206852**	**9620**	
RO1 Macroregiunea unu	26	5263559	78	46465	8880	No Data
RO2 Macroregiunea doi	20	6578570	97	444579	6808	No Data
RO3 Macroregiunea trei	27	5537093	157	78816	14208	No Data
RO4 Macroregiunea patru	18	4230991	70	36993	8880	No Data
SK0 Slovakia	**42**	**5412254**	**110**	**109387**	**20267**	**17**
SK01 Bratislavský kraj	39	616578	298	29226	48006	30

SK02 Západné Slovensko	44	1866168	124	36899	19806	13
SK03 Stredné Slovensko	40	1350044	83	21569	15969	14
SK04 Východné Slovensko	41	1579464	100	21693	13775	14
Slovenia	**62**	**2032362**	**100**	**55211**	**27232**	
ES0 Spain	**51**	**45828172**	**89**	**1412140**	**31466**	**34**
ES11 Galicia	38	2738930	92	72583	26592	33
ES12 Principado de Asturias	51	1058923	100	30747	29045	37
ES13 Cantabria	55	576418	107	17902	31568	38
ES21 Pais Vasco	55	2136061	296	87335	40974	47
ES22 Comunidad Foral de Navarra	52	614526	58	23789	39570	39
ES23 La Rioja	48	315718	62	10378	33585	32
ES24 Aragón	51	1313735	27	44070	34250	34
ES30 Comunidad de Madrid	63	6295011	771	250575	40938	40
ES41 Castilla y León	41	2510545	27	75698	30352	34
ES42 Castilla-la Mancha	44	2022647	25	47640	24383	24
ES43 Extremadura	39	1080439	26	23345	21682	25
ES51 Cataluña	60	7290292	225	264598	36946	32
ES52 Comunidad Valenciana	47	4991789	210	137687	28531	28
ES53 Illes Balears	58	1070066	209	35076	34064	21
ES61 Andalucia	46	8150467	92	194335	24347	27
ES62 Región de Murcia	44	1443383	125	36237	26047	26
ES63 Ciudad Autónoma de Ceuta (ES)	46	72561	3789	2092	29135	25
ES64 Ciudad Autónoma de Melilla (ES)	51	70076	5361	1936	28216	25
ES70 Canarias (ES)	53	2076585	274	56117	27792	25
SE0 Sweden	**79**	**9256347**	**21**	**336512**	**36785**	**34**
SE11 Stockholm	84	1981263	299	95338	49301	38
SE12 Östra Mellansverige	79	1545587	40	48683	31829	28
SE21 Småland med öarna	75	807871	24	26484	32948	24
SE22 Sydsverige	80	1367017	97	44319	32985	32

SE23 Vastsverige	79	1851702	63	65401	35682	30
SE31 Norra Mellansverige	78	825149	13	26711	32381	23
SE32 Mellersta Norrland	73	370269	5	12024	32437	27
SE33 Övre Norrland	76	507489	3	17552	34496	29
UK0 United Kingdom	**69**	**61179300**	**250**	**2131507**	**34954**	**36**
UKC North East	65	2570000	299	69468	27083	26
UKD North West	66	6869900	487	204064	29728	30
UKE Yorkshire and The Humber	64	5195200	336	151221	29207	29
UKF East Midlands	64	4416300	282	135785	30867	28
UKG West Midlands	69	5396500	414	160718	29843	28
UKH Eastern	73	5694900	296	189280	33416	28
UKI London	76	7588400	4810	446129	59000	44
UKJ South East	75	8344300	436	309323	37228	34
UKK South West	73	5193600	217	165438	31985	30
UKL Wales	67	2986700	144	77554	26027	30
UKM Scotland	63	5156500	66	173660	33763	37
UKN Northern Ireland	42	1767100	124	48867	27786	32
US0 United States	**63**	**309280117**	**33**	**14165565**	**46588**	
US01 Alabama	48	4661900	35	170014	36469	20
US02 Alaska	73	1366454	0.5	47912	69813	24
US04 Arizona	67	6500180	22	248888	38289	23
US05 Arkansas	51	2855390	21	98331	34437	17
US06 California	67	36756666	91	1846760	50243	27
US08 Colorado	68	4939456	18	248603	50330	32
US09 Connecticut	70	3501252	279	216174	61742	33
US10 Delaware	66	873092	173	61828	70815	25
US11 Dist. of Columbia	66	591833	3722	97235	164295	45
US12 Florida	66	18328340	131	744120	40599	24
US13 Georgia	63	9685744	65	397756	41066	25
US15 Hawaii	70	1288198	77	63847	49563	26
US16 Idaho	67	1523816	7	52747	34615	22
US17 Illinois	62	12901563	90	633697	49118	27
US18 Indiana	56	6376792	69	254861	39967	21
US 19 Iowa	62	3002555	21	135702	45196	22
US 20 Kansas	66	2802134	13	122731	43799	27
US 21 Kentucky	53	4269245	41	156436	36643	18
US 22 Louisiana	57	4410796	39	222218	50380	18
US 23 Maine	61	1316456	16	49709	37760	23
US 24 Maryland	69	5633597	223	273333	48518	32

US 25 Massachusetts	72	6497967	320	364988	56170	35
US 26 Michigan	62	10003422	68	382544	38241	23
US 27 Minnesota	66	5220393	25	262847	50350	29
US 28 Mississippi	41	2938618	24	91782	31233	17
US 29 Missouri	57	5911605	33	237797	40225	23
US 30 Montana	58	967440	3	35891	37099	24
US 31 Nebraska	63	1783432	9	83273	46693	25
US 32 Nevada	67	2600167	9	131233	50471	20
US 33 New Hampshire	73	1315809	57	60005	45603	31
US 34 New Jersey	72	8682661	452	474936	54699	32
US 35 New Mexico	54	1984356	6	79901	40265	22
US 36 New York	65	19490297	159	1144480	58721	29
US 37 North Carolina	59	9222414	73	400192	43393	24
US 38 North Dakota	62	641481	4	31208	48650	24
US 39 Ohio	61	11485910	108	471508	41051	22
US 40 Oklahoma	55	3642361	20	146448	40207	20
US 41 Oregon	70	3790060	15	161573	42631	26
US 42 Pennsylvania	61	12448279	107	553301	44448	24
US 44 Rhode Island	69	1050788	388	47364	45075	28
US 45 South Carolina	53	4479800	57	156384	34909	21
US 46 South Dakota	59	804194	4	36959	45958	23
US 47 Tennessee	55	6214888	58	252127	40568	21
US 48 Texas	59	24326974	36	1223510	50294	23
US 49 Utah	73	2736424	13	109777	40117	25
US 50 Vermont	60	621270	26	25442	40952	29
US 51 Virginia	65	7769089	76	397025	51103	31
US 53 Washington	72	6549224	38	322778	49285	28
US 54 West Virginia	52	1814468	29	61652	33978	16
US 55 Wisconsin	66	5627967	40	240429	42720	24
US 56 Wyoming	65	532668	2	35310	66289	21

Sources

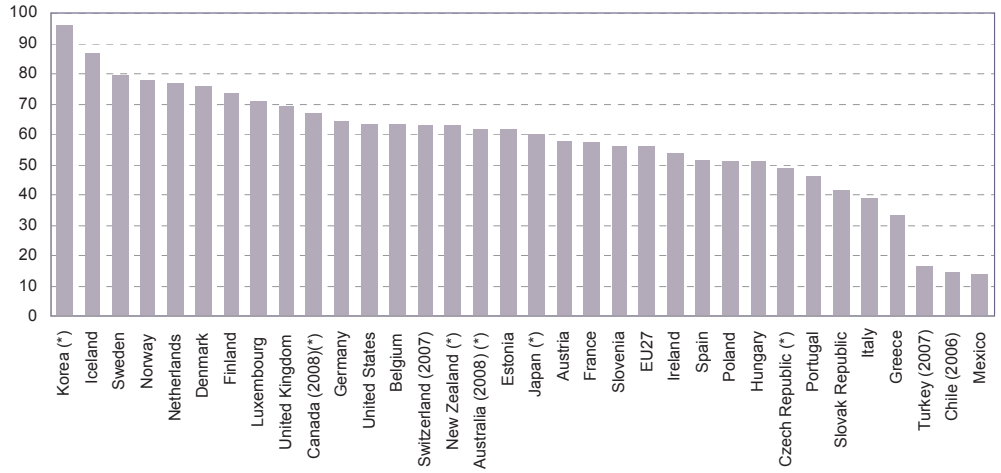
	% households with broadband	Population Total	Population density	GDP total	GDP per cap, PPP	Education
Australia	2009, OECD	2008, OECD	2008, OECD	2009, OECD	2008, OECD	2005, OECD
Austria	2009, OECD	2009, OECD	2008, OECD	2007, OECD	2007, OECD	2008, OECD
Belgium	2009, OECD	2008, OECD	2008, OECD	2007, OECD	2007, OECD	2008, OECD
Bulgaria	2010, Eurostat	2009, Eurostat	2008, Eurostat	2008, Eurostat	2008, Eurostat	
Canada	2009, CRTC	2009, OECD	2009, OECD	2008, OECD	2008, OECD	2010, Statistics Canada
Chile	2009, Subtel	2009, INE	2009, INE			
Cyprus	2010, Eurostat	2009, Eurostat	2009, Eurostat	2008, Eurostat	2008, Eurostat	
Czech Republic	2008, OECD	2009, OECD	2008, OECD	2007, OECD	2007, OECD	2008, OECD
Denmark	2009, OECD	2009, OECD	2008, OECD	2007, OECD	2007, OECD	2008, OECD
Estonia	2010, Eurostat	2009, Eurostat	2009, Eurostat	2008, Eurostat	2008, Eurostat	
Finland	2009, OECD; for Aland, 2007, OECD	2009, OECD	2008, OECD	2007, OECD	2007, OECD	2008, OECD
France	2009, Eurostat	2009, OECD	2009, OECD	2007, OECD	2007, OECD	2008, Eurostat
Germany	2009, OECD; for Saarland 2006 OECD	2009, OECD	2008, OECD	2007, OECD	2007, OECD	2008, OECD
Greece	2009, OECD	2009, OECD	2008, OECD	2007, OECD	2007, OECD	2008, OECD
Hungary	2009, OECD	2009, OECD	2008, OECD	2007, OECD	2007, OECD	2008, OECD
Iceland	2009, OECD	2008, OECD	2008, OECD	2007, OECD	2007, OECD	2006, OECD
Ireland	2009, OECD	2009, OECD	2008, OECD	2007, OECD	2007, OECD	2008, OECD
Italy	2009, OECD	2009, OECD	2008, OECD	2007, OECD	2007, OECD	2008, OECD
Japan	2009, Government of Japan	2007, Govt. of Japan	2007, Govt. of Japan	2007, Govt. of Japan	2007, Govt. of Japan	
Korea	2009, KCC	2008, OECD	2008, OECD	2007, OECD	2007, OECD	2006, OECD
Latvia	2010, Eurostat	2009, Eurostat	2008, Eurostat	2008, Eurostat	2008, Eurostat	
Lithuania	2010, Eurostat	2009, Eurostat	2008, Eurostat	2008, Eurostat	2008, Eurostat	
Luxembourg	2009, OECD	2009, OECD	2008, OECD	2007, OECD	2007, OECD	2008, OECD
Malta	2010, Eurostat	2009, Eurostat	2008, Eurostat	2008, Eurostat	2008, Eurostat	
Netherlands	2009, OECD	2009, OECD	2008, OECD	2007, OECD	2007, OECD	2008, OECD

Norway	2009, OECD	2009, OECD	2008, OECD	2007, OECD	2007, OECD	2008, OECD
Poland	2010, Eurostat	2009, OECD	2008, OECD	2008, Eurostat	2008, Eurostat	
Portugal	2009, OECD	2009, OECD	2008, OECD	2007, OECD	2007, OECD	2008, OECD
Romania	2010, Eurostat	2009, Eurostat	2008, Eurostat	2008, Eurostat	2005, Eurostat	
Slovakia	2009, OECD	2009, OECD	2008, OECD	2007, OECD	2007, OECD	2008, OECD
Slovenia	2010, Eurostat	2009, Eurostat	2008, Eurostat	2007, OECD	2007, OECD	
Spain	2009, OECD	2009, OECD	2008, OECD	2007, OECD	2007, OECD	2008, OECD
Sweden	2009, OECD	2009, OECD	2008, OECD	2007, OECD	2007, OECD	2008, OECD
United Kingdom	2009, OECD; for Northern Ireland 2008 OECD	2008, OECD	2007, OECD	2007, OECD	2007, OECD	2008, OECD
United States	2009, OECD	2008, OECD	2008, OECD	2008, OECD	2008, OECD	2008, OECD

APPENDIX E: Market and Regulatory Background

This Appendix contains regulatory, market, and other information for the 40 foreign countries for which we obtained either pricing data in Appendix C or community-level demographic and broadband adoption data in Appendix D. The information in this Appendix is drawn from a variety of sources. Descriptions of regulatory structures and states of the market and competition are from the websites of national regulators or ministries and from subscription-based services, such as IHS Global Insight and TeleGeography,[1] unless otherwise noted. Topography and information on radio and television broadcast stations come from the CIA Factbook, unless otherwise noted.[2] Data contained in the tables in this Appendix are drawn from the sources indicated.

OECD Rankings, Households with Broadband Access, 2009 or latest available year
Percentage of all households
OECD Broadband Portal Table 2a

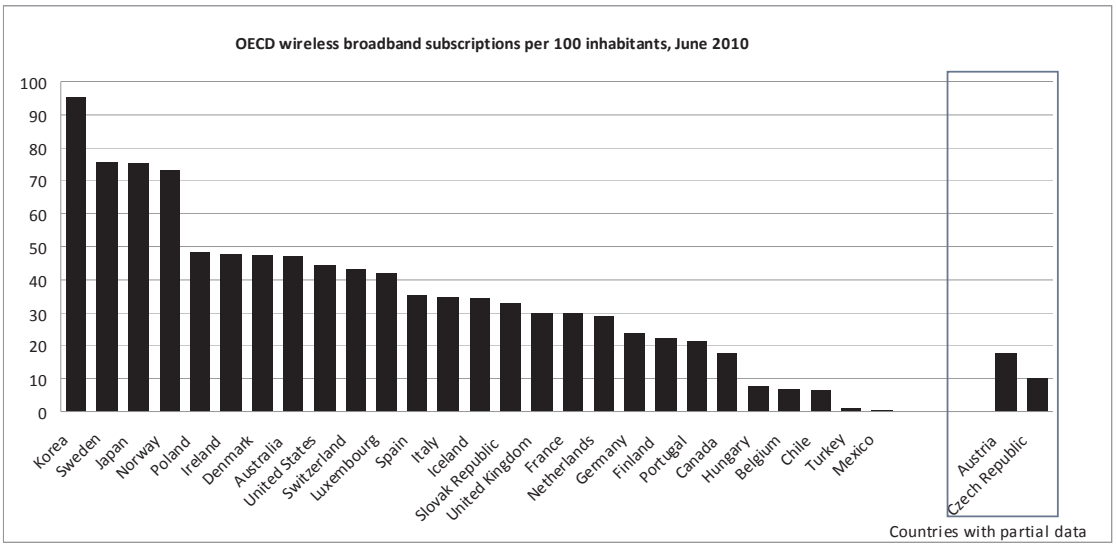


Source: OECD, ICT database and Eurostat, Community Survey on ICT usage in households and by individuals, July 2010.
Generally, data from the EU Community Survey on household use of ICT, which covers EU countries plus Iceland, Norway and Turkey, relate to the first quarter of the reference year.
For Australia: data is based on a financial year, data provided relate to the second half of the reference year and the first half of the following year; data was based on a multi-staged area sample of private and non-private dwellings, and covers the civilian population only; data includes persons aged 15 years and over except members of the permanent defence forces, certain diplomatic personnel of overseas governments customarily excluded from census and estimated population counts, overseas residents in Australia, and members of non-Australian defence forces (and their dependants) stationed in Australia.
For Canada: Statistics for 2007 include the territories (Northwest Territories, Yukon Territory and Nunavut). For 2008, statistics include the 10 provinces only.
For the Czech Republic, data relate to the fourth quarter of the reference year.
For Japan: Households with Internet access via FTTx, ADSL, cable and fixed wireless broadband.
For Korea: Data also include mobile [broadband] phone access.
For New Zealand: The information is based on households in private occupied dwellings. Visitor-only dwellings, such as hotels, are excluded.

[1] *See* http://www.ihsglobalinsight.com; http://www.telegeography.com.

[2] *See generally*, CIA Factbook, https://www.cia.gov/library/publications/the-world-factbook.

OECD Rankings, Wireless Broadband Subscriptions per 100 inhabitants, June 2010
Source: OECD Broadband Portal Table 1d(2)



1. Australia

Regulation: Australia's Department of Broadband, Communications and the Digital Economy (DBCDE) formulates telecommunications policy.[3] Its four broad areas of focus are: (1) transforming the structure of telecommunications and enhancing access to digital economy platforms by promoting the delivery of fast, affordable and reliable broadband and communications infrastructure across Australia, (2) facilitating the digital television transition and enhancing the broadcasting sector, (3) helping all Australians realize the benefits of the digital economy, and (4) supporting effective consumer information and research and working with industry to encourage industry-driven solutions to specific consumer issues, including cybersafety and cybersecurity.[4]

The Australian Communications and Media Authority (ACMA) is the agency responsible for regulating broadcasting, the Internet, radiocommunications and telecommunications. Among other things, it promotes self-regulation and competition in the communications industry, manages access to the radiofrequency spectrum and represents Australia's communications interests internationally.[5]

The Australian Competition and Consumer Commission (ACCC) promotes competition and fair trade in the marketplace, and it regulates national infrastructure services. Its primary responsibility is to ensure that individuals and businesses comply with the government's competition, fair trading and consumer protection laws.[6]

The ACCC has mandated loop unbundling for Telstra, the incumbent telecommunications company, since 1999. Operators can make their own access agreements with Telstra, though the ACCC may intervene if there are disputes over pricing arrangements. Approximately 10 percent of Telstra's central offices are capable of supporting loop unbundling for competitors.[7] Over 2,220 of Telstra's 5,000 exchanges had at least one facilities-based competitor, and 245 exchanges had five or more facilities-based competitors.

In April 2009, Australia announced that it would create a new company (majority owned by the government) to build a national, wholesale only, open-access, fiber-to-the-premises (FTTP) broadband network with a goal of providing, by 2021—when the rollout is complete—broadband services to 93 percent of all Australians at speeds of 100 Mbps.[8] The government plans to invest AU$27.5 billion (US$27.2 billion) in equity.[9] The seven percent of the population not reached by the extensive fiber network will be served by other platforms such as terrestrial wireless or satellite, with speeds of at least 12 Mbps. The government conditionally plans to reduce its ownership in the network after the network is built.

In June 2010, Telstra signed an agreement with the National Broadband Network (NBN) to manage the deployment and transition to the FTTP infrastructure to be built with public funds. The agreement also gives NBN access to Telstra's facilities, backhaul services and space in Telstra exchanges.[10]

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[3] *See* DBCDE, http://www.dbcde.gov.au.

[4] *See* DBCDE, *Corporate Plan 2011-13*, *at* http://www.dbcde.gov.au/about_us/corporate_plan_2011-13.

[5] *See* ACMA, http://www.acma.gov.au/WEB/STANDARD/pc=ACMA_ROLE_OVIEW.

[6] *See* ACCC, http://www.accc.gov.au/content/index.phtml/itemId/142.

[7] *See* OECD Communications Outlook 2009, at 34 (2009), *available at* http://www.oecd.org/document/44/0,3746,en_2649_34225_43435308_1_1_1_1,00.html.

[8] DBCDE, *National Broadband Network*, http://www.dbcde.gov.au/broadband/national_broadband_network.

[9] *Id.*

[10] http://www.minister.dbcde.gov.au/media/media_releases/2010/060.

In November 2010, the ACCC issued a statement on the Implementation of the Universal Service Policy (USP) for the transition to the NBN environment.[11] The policies established under the USP are broader than the issues addressed in the earlier Universal Service Obligation (USO), which was limited to standard telephone services. The USP is an important component in the development and implementation of universal services in telecommunications. While the ACCC will not have a direct role in administering the USP, it will have responsibility for the regulation of competition and communications infrastructure under the Trade Practices Act 1974 (TPA).[12]

Market and Competition: The four largest ISPs in Australia are Telstra, SingTel Optus, iiNet, and Primus Telecommunications followed by Internode and AAPT.[13] At the end of June 2010, Australia had 9.5 million active Internet subscribers with non-dial up accounting for approximately 92 percent of all Internet connections and 71 percent of all subscribers receiving download speeds of 1.5 Mbps or greater. Digital subscriber line (DSL) technology accounted for 44 percent of Internet connections.[14] This share has decreased since December 2008 when DSL represented 63 percent of broadband connections. Mobile wireless connections, the fastest growing Internet access technology, increased to 3.5 million in June 2010, an increase of 21.7 percent since December 2009.[15]

Other Media: The Australian Broadcasting Corporation (ABC) runs multiple national and local radio networks and TV stations as well as the Australia Network, the main public broadcaster for the Asia-Pacific region. A second large public broadcaster, Special Broadcasting Service (SBS), operates radio and TV networks broadcasting in multiple languages. There are several national commercial TV networks, a large number of local commercial TV stations, and hundreds of commercial radio stations. Cable and satellite systems also are available.

[11] http://www.acma.gov.au/WEB/STANDARD/pc=PC_2451#2.2.

[12] ACCC, *Implementation of Universal Service Policy for the Transition to the National Broadband Network Environment - Discussion Paper* (Nov. 2010), *available at* http://www.accc.gov.au/content/index.phtml/itemId/957780.

[13] Senator Stephen Conroy, Minister for Broadband, Communications and the Digital Economy, Measures to Improve Safety of the Internet for Families, http://www.minister.dbcde.gov.au/media/speeches/2009/075.

[14] http://www.abs.gov.au/ausstats/abs@.nsf/mf/8153.0.

[15] *Id.*

Topography: Australia occupies an area slightly smaller than the contiguous 48 states of the United States. Australia's population is concentrated along the eastern and southeastern coasts. The terrain is mostly low plateau with deserts and fertile plain in the southeast.

Fixed	**Total**	**Fiber**	**Cable**	**DSL**	**Other[16]**
Fixed broadband subs per 100 inhabitants[17]	24.1	0.1	4.1	19.3	0.7
Fixed broadband subs (June 2010)[18]	5,313,000				
% of households with fixed broadband access (2008) [19]	62.0				
Mobile					
Mobile wireless broadband subs per 100 inhabitants[20]	47.1				
Mobile wireless broadband subs (June 2010) [21]	10,381,000				

[16] "Other" can include broadband over power lines, satellite, which could be fixed or mobile, and terrestrial fixed wireless.

[17] OECD Broadband Portal, Table 1d (3) (June 2010) (accessed Feb. 11, 2011).

[18] *Id*.

[19] OECD Broadband Portal, Table 2a (July 2010) (accessed Feb. 11, 2011).

[20] OECD Broadband Portal, Table 1d (2) (June 2010) (accessed Feb. 11, 2011). Includes satellite, which could be fixed or mobile, and terrestrial fixed wireless, which is generally not a mobile service but is included by the OECD in its mobile broadband statistics; does not include mobile-broadband equipped handsets that do not subscribe to a data package for a separate fee and did not make an Internet data connection via IP in the previous three months.

[21] *Id.*

2. Austria

Regulation: The Austrian Regulatory Authority for Broadcasting and Telecommunications (RTR) (Rundfunk und Telekom Regulierungs-RTR) and the Telecom Control Commission (TKK) share regulatory oversight of the telecommunications market in Austria.[22] The TKK makes determinations of significant market power and imposes *ex ante* remedies as appropriate. The RTR, which is divided into broadcasting and telecommunications sections, provides technical expertise to and handles all administrative matters on behalf of the TKK. As required under European Union (EU) law, Austria incorporated the 2002 European regulatory framework for communications into its national 2003 Telecommunications Act.[23]

The use of unbundled local loops was mandated under the previous Austrian Telecommunications Act, passed in January 1998. The incumbent, Telekom Austria, is subject to loop unbundling.[24] As of December 2009, Telekom Austria had well over 280,000 unbundled lines in service.[25]

The Austrian Broadband Initiative issued in 2003 sets out various recommendations to, among other things, promote Austria's transition to an information and knowledge-based society, develop telecommunications infrastructure, and bridge the social and geographical digital divide.[26] Recommendations of the initiative include creating a task-force to help with implementation, promoting universal coverage in regions where broadband rollout is not supported by a viable business case, and encouraging e-government initiatives and government-supplied content.[27] More recently, Austria set a goal of having broadband speeds of up to 25 Mbps available to all Austrians by 2013.[28]

In February 2010, Austria partially deregulated its broadband market after determining that mobile broadband should be considered part of the residential broadband market.[29]

Market and Competition: There are three main broadband service providers in Austria. Telekom Austria (operating under the "eTel" brand) is the leading provider, followed by UPC Liberty Global Inc. (LGI) and Tele2 Austria. Other broadband providers are TS-Online, Chello (UPC Telekabel), UTA and PCCW (wireless). At the end of 2009, there were approximately 1.88 million fixed broadband lines in Austria. Austria has been one of the leaders in mobile broadband within Europe. The five major mobile broadband providers in Austria had launched 3G service by the end of 2003. Providers are expecting

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[22] *See* RTR, http://www.rtr.at/en/rtr/RTRGmbH; TKK, http://www.rtr.at/en/rtr/OrganeTKK.

[23] *See* RTR, *Legal Framework*, http://www.rtr.at/en/tk/Recht.

[24] CESInfo, *DICE Report*, *available at* http://www.cesifo-group.de/portal/page/portal/DICE_Content/INFRASTRUCTURE/COMMUNICATION_NETWORKS/Fixed-line%20Access%20Regulation/Impl-LLU-oecd.pdf.

[25] Telegeography GlobalComms Database: Austria (2010) (accessed Nov. 13, 2010), *available at* http://www.telegeography.com/research-services/globalcomms-database-service/.

[26] *See* http://www.oecd.org/countrylist/0,3349,en_2649_34223_38711225_1_1_1_1,00.html; *see also* http://www.cisco.com/global/EMEA/d__nl__ds/ettx/pdf/day1/2003_06_03_cisco_metro_ethernet.pdf (outlining details of the initiative).

[27] *Id.*

[28] EC Information Society, *Broadband Policy Measures: National Broadband Strategies*, *available at* http://ec.europa.eu/information_society/activities/broadband/policy/index_en.htm#National_broadband_strategies.

[29] http://www.analysysmason.com/About-Us/News/Newsletter/Mobile-broadband-has-led-to-deregulation-in-the-Austrian-broadband-market (accessed Mar. 2, 2011).

substantial growth in the country's mobile broadband market, and Austria's mobile operators are expected to be among the first in Europe to launch commercial 4G services.[30]

Other Media: Commercial radio and television broadcasters have been available since the 1990s in addition to Austria's public broadcaster, Österreichischer Rundfunk (ORF). Cable and satellite television are available, as well as German television stations.

Topography: Austria occupies an area slightly smaller than Maine. Austria's population is concentrated in eastern lowlands because of steep slopes, poor soils and low temperatures elsewhere in the country. The terrain in the west and south is mostly mountains (Alps) and mostly flat or gently sloping along the eastern and northern margins.

Fixed	**Total**	**Fiber**	**Cable**	**DSL**	**Other**
Fixed broadband subs per 100 inhabitants[31]	23.3	0.1	6.9	15.9	0.5
Fixed broadband subs (June 2010)[32]	1,951,518				
% of households with fixed broadband access (2009) [33]	57.8				
Mobile					
Mobile wireless broadband subs per 100 inhabitants[34]	17.6				
Mobile wireless broadband subs (June 2010) [35]	1,473,769				

[30] IHS Global Insight, *Austria: Telecoms Report* (2010) (accessed Mar. 2, 2011).

[31] OECD Broadband Portal, Table 1d (3) (June 2010) (accessed Feb. 11, 2011).

[32] *Id.*

[33] OECD Broadband Portal, Table 2a (July 2010) (accessed Feb. 11, 2011).

[34] OECD Broadband Portal, Table 1d (2) (June 2010) (accessed Feb. 11, 2011). Austria reported only partial data.

[35] *Id*.

3. Belgium

Regulation: National telecommunications goals and policy objectives are set by the Ministère des Communications et de l'Infrastructure. The independent regulator is the Institut Belge des Services Postaux et des Télécommunications (BIPT).[36] BIPT is the regulatory body responsible for the postal and the telecommunications sectors. With regard to the telecommunications markets, BIPT is responsible for promoting competition, ensuring compliance with the regulatory framework, and protecting consumer interests. BIPT is also responsible for managing certain resources, such as the electromagnetic spectrum and numbering resources.

Belgium first mandated local-loop unbundling in October 2000, but alternative operators have historically used bitstream access to provision DSL services. The guidelines for bitstream access are outlined in the Belgacom Reference Offer Bitstream Access decision, and those for local-loop unbundling are set forth under the Belgacom Reference Unbundled Offer decision.[37]

Belgium's broadband strategy, released in mid-2009, includes plans to improve broadband through mapping, access regulations, tax relief, relief from rights of way charges, sharing of inside wiring and public-private partnerships.[38] One of the primary goals of the strategy is to stimulate fiber and cable deployment. The strategy also highlights broadband applications such as intelligent transport systems, smart grids, and e-health. Other recent developments in Belgium include the auction of four 3G licenses and the sale of LTE-suitable spectrum.[39]

Market and Competition: The Belgian broadband market ranked in the top 10 EU markets for broadband adoption in 2009. The country's incumbent wireline operator is Belgacom. Its competitors include telecommunications companies Versatel (KPN) (unbundled loops) and Telenet (cable system). Local-loop unbundling is used primarily for the provision of differentiated DSL services. By the end of 2008, there were 47,137 fully unbundled lines in Belgium with another 46,680 shared access lines. Together, those lines accounted for about three percent of all DSL lines in Belgium and two percent of all broadband lines in the country.[40]

Other Media: Belgium's market is a segmented into three major communities (Flemish, French, and German-speaking), each of which is responsible for its own broadcast media. Multiple TV channels exist for each community. Over 90 percent of households are connected to cable and can access broadcasts of TV stations from neighboring countries. Each community has a public radio network that co-exists with private broadcasters.

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[36] *See* IBPT, http://www.ibpt.be.

[37] *See* BROBA, http://www.belgacomwholesale.be/wholesale/en/jsp/dynamic/product.jsp?dcrName=nws_broba; BRUO, http://www.belgacomwholesale.be/wholesale/en/jsp/dynamic/product.jsp?dcrName=nws_bruo.

[38] *See* Quickonomie.be, *economy and reform*, *available at* http://www.apritel.org/fotos/editor2/Minister_van_Quickenborne.pdf.

[39] *See* BIPT Auction, http://www.auction2011.be (accessed Apr. 1, 2011).

[40] BIPT, *A Comparative Study by Analysis of Retail Prices for Broadband Internet Connections in Belgium and six other European countries* (March 2007), *available at* http://bipt.be/en/406/ShowDoc/2265/Communications/A_comparative_study_by_Analysis_of_retail_prices_f.aspx.

Topography: Belgium occupies an area about the size of Maryland. Belgium's terrain consists of flat coastal plains in the northwest, central rolling hills, and the rugged mountains of Ardennes Forest in the southeast.

Fixed	**Total**	**Fiber**	**Cable**	**DSL**	**Other**
Fixed broadband subs per 100 inhabitants[41]	30.2	13.2	16.7	0.3	0.0
Fixed broadband subs (June 2010)[42]	3,254,811				
% of households with fixed broadband access (2009) [43]	63.4				
Mobile					
Mobile wireless broadband subs per 100 inhabitants[44]	6.9				
Mobile wireless broadband subs (June 2010) [45]	749,775				

[41] OECD Broadband Portal, Table 1d (3) (June 2010) (accessed Feb. 11, 2011).

[42] *Id*.

[43] OECD Broadband Portal, Table 2a (July 2010) (accessed Feb. 11, 2011).

[44] OECD Broadband Portal, Table 1d (2) (June 2010) (accessed Feb. 11, 2011).

[45] *Id*.

4. Bulgaria

Regulation: The Ministry of Transport, Information Technology and Communications (MTITC) is responsible for formulating state policy for telecommunications.[46] The Communications Regulation Commission (CRC), an independent agency established in 2002 in accordance with EU telecommunications requirements, is responsible for approving licenses, and frequency, technical, market, and legal regulation. The CRC promotes market competition, enforces license conditions, and promulgates appropriate consumer protection measures. Bulgaria adopted its Electronic Communications Act in 2007, following its accession to the EU.[47]

Bulgaria's National Broadband Strategy for 2010 was approved by its Cabinet in November 2009 and will fund high-speed Internet access projects in 26 smaller cities (with about 20,000 residents each). Half of the strategy's projects will be funded through the government's Operational Program for Regional Development; private-sector partners will fund the other half. Initially, priority will be given to business investment projects in smaller towns and villages.[48] The broadband strategy encourages the use of online medical, legal and educational services.

Market and Competition: The Bulgarian Telecommunications Company (BTC, operating as Vivacom) is the incumbent wireline carrier and the leading provider in the fixed broadband market. Competitors include CableTel/EuroCom (cable system) and Broadband Cable (via resale of DSL services, local-loop unbundling). In addition, alternative last mile infrastructure is provided by fixed wireless and satellite operators and Power-line technology (PLT). Nexcom has offered WiMAX-based broadband since January 2007, and currently provides coverage to nearly half of Bulgaria's population.[49] Vestitel, owned by national gas company Overgas, has deployed fiber-to-the-home (FTTH) infrastructure along its parent company's gas distribution network in the largest cities, and it plans to begin rolling out service in 2011.[50]

Other Media: Bulgaria's broadcast media consists of four national terrestrial television stations, one state-owned and three privately-owned stations. Many additional television stations are available via cable and satellite providers. National radio is broadcast over three networks with a host of private radio stations broadcasting in urban areas.

[46] *See* MTICT, http://www.mtitc.government.bg/index.php.

[47] *See* CRC, http://www.crc.bg/index.php?lang=en.

[48] *See* The Sofia Echo, http://sofiaecho.com/2009/11/25/820727_bulgarias-national-broadband-strategy-foresees-government-funded-Internet-in-smaller-cities; MTITC, http://mtitc.government.bg/page.php?category=92&id=3562&seek=broadband.

[49] *See* WiMAX by Nexcom, http://wimax.nexcom.bg/en/thetechnology/description/.

[50] *See* TMCnet Bloggers, http://blog.tmcnet.com/telecom-crm/2009/03/27/moveros-mobility-study-verimatrix-in-slovenia-vestitel-in-bulgaria-sun.asp.

Topography: Bulgaria occupies an area slightly larger than Tennessee. Bulgaria's terrain is mostly made up of mountains with lowlands in the north and southeast.

Fixed	**Total**	**Fiber**	**Cable**	**DSL**	**Other**
Fixed broadband subs per 100 inhabitants[51]	12.85	Data N/A	Data N/A	4.1	Data N/A
Fixed broadband subs (2009)[52]	969,700				
% of households with fixed broadband access (2009) [53]	26				
Mobile					
Mobile wireless broadband subs per 100 inhabitants[54]	9.0				
Mobile wireless broadband subs (Q4 2010) [55]	655,729				

[51] *See* ITU, *ICT Statistics Database* (2009), http://www.itu.int/ITU-D/icteye/Indicators/Indicators.aspx (ITU Statistics Database).

[52] *Id*.

[53] *See* eGovernment Factbook (2009), http://www.epractice.eu/en/document/288394.

[54] Wireless Intelligence, https://www.wirelessintelligence.com/Index.aspx (accessed Apr. 14, 2011) (available by subscription) (High Speed Packet Access (HSPA) connections only). HSPA, which uses the FDD transmission scheme, includes HSDPA (High Speed Downlink Packet Access), HSUPA (High Speed Uplink Packet Access) and HSPA Evolved.

[55] *Id.*

5. Canada

Regulation: Industry Canada, headed by the Minister of Industry, sets telecommunications and radio communications policy. Industry Canada is also responsible for international submarine cable licensing as well as spectrum policy and management.[56] The Canadian Radio-Television and Telecommunications Commission (CRTC) is an independent entity that regulates and supervises the Canadian broadcasting and telecommunications systems. The CRTC operates under the provisions of the Telecommunications Act (1991) and the Bell Canada Act (1987), and its mandate is to ensure that the telecommunications systems serve the Canadian public. The CRTC does not regulate cell phone company rates, quality of service, or business practices.[57] The Competition Bureau, an independent law enforcement agency, is responsible for promoting and maintaining fair competition to maintain competitive prices, product choice, and quality of service.[58]

Incumbent operators are required to obtain approval from the regulator for their wholesale and unbundled loop rates. Both the cable and DSL segments are open to third-party access. In 2006, the CRTC approved proposed rates for third-party access to leading cable TV systems networks.

The CRTC aims to eventually deregulate all of the telecommunications market in order to increase price competition in markets with sufficient competitors.[59] In 2008, the CRTC introduced a new framework for the deregulation of non-essential wholesale services. A number of wholesale services, which have been identified as non-essential and therefore not mandated, will gradually be deregulated over three to five years. One-third of the wholesale services have been identified to be deregulated by the end of 2012, and the remaining services are to be reviewed in 2013.[60]

Canada's 2009 budget "provide[d] CAN$225 million [US$199 million] over three years to Industry Canada to develop and implement a strategy on extending broadband coverage to as many unserved and underserved households in Canada as possible, beginning in 2009-10."[61] As a result, a program entitled "Broadband Canada: Connecting Rural Canadians" was launched. Industry Canada undertook an extensive mapping exercise in order to understand the extent to which Canadians remain unserved or underserved. Based on the mapping data, geographic service areas (GSAs) were defined, and on September 1, 2009, a competitive call for applications was launched to fund projects in the GSAs. Over 570 applications were received and over 90 projects totaling more than CAN$140 (US$127.4) million are being funded. Projects will be funded up to 50 percent of eligible project costs.[62]

On October 21, 2009 the CRTC issued a framework to be used in evaluating complaints about Internet traffic management practices.[63] The framework states that ISPs must be transparent about the use of such practices. In addition, economic approaches to traffic management, such as network investment or charging consumers based on usage, should be preferred to technical means such as traffic shaping.

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[56] *See* Industry Canada, http://www.ic.gc.ca.

[57] *See* CRTC, http://www.crtc.gc.ca/eng/home-accueil.htm.

[58] *See* Competition Bureau, http://competitionbureau.gc.ca/eic/site/cb-bc.nsf/eng/home.

[59] IHS Global Insight, *Canada: Telecoms Report* (2010).

[60] *Id.*

[61] Industry Canada, *Summary of Broadband Deployment Initiatives in Canada* (Nov. 2010) at 2.

[62] *Id.*; *see* http://www.ic.gc.ca.

[63] CRTC, *Telecom Regulatory Policy CRTC 2009-657: Review of the Internet traffic management practices of Internet service providers* (2009), *available at* http://www.crtc.gc.ca/eng/archive/2009/2009-657.pdf.

Traffic management practices must address a defined need and must not be unjustly discriminatory. The framework applies only to fixed broadband access and not to wireless access platforms.

In August 2010, the CRTC required incumbent telephone companies and cable carriers to make their Internet access services (aggregated ADSL service and third-party Internet access service) available to competitive ISPs at speeds that match their own retail offerings.[64] In recognition of the investments that telephone companies have made in their networks, the CRTC allows them to charge competitors an additional 10 percent mark-up over their costs.[65] Cable companies had already been required to provide access to alternate ISPs at speeds that match their own retail offerings.[66]

Market and Competition: Competition in broadband is predominantly facilities-based. The Internet access industry consists of approximately 500 companies. Of these, nine percent are incumbents that own the vast majority of the copper twisted pair access links to homes and businesses. Eighteen percent are cable companies; 19 percent are utilities, municipalities, and other providers that mainly provide service utilizing dial-up, DSL, fiber, satellite or fixed wireless facilities; and the remaining 54 percent are resellers that mainly provide dial-up Internet access service. The five largest Internet access service providers and their affiliates control 76 percent of the retail Internet market. The incumbent wireline operators (excluding their out-of-territory operations) and cable operators hold, respectively, 40 percent and 48 percent of the Internet access market. Providers include cable companies such as Rogers, Cogeco, Shaw, and Vidéotron; telecommunications carriers such as Bell Canada, Bell Alliant, Telus, MTS Allstream, and Sasktel; and resellers include AOL Canada, 3Web/CIA.com, 295.ca, and Inter.net Canada (Uniserve). Other providers, such as Inukshuk Wireless (joint venture of Bell Canada and Rogers), mainly serve the business segment.[67]

Rogers launched Canada's first mobile service that enables video calls in April 2007.[68] By May 2010, Bell Canada's 3G service was available to over 90 percent of the population. Canada's first 4G Long Term Evolution (LTE) mobile broadband network is expected to begin operations in late 2011.[69]

Other Media: Canada, with two public television broadcasting networks, has about 150 television stations. Each broadcasting network has a large number of network affiliates. Canadians have access to a wide range of stations, including U.S. stations, due to multi-channel satellite and cable systems. Canada has roughly 2,000 licensed radio stations. They are a mix of public and commercial radio broadcasters. The Canadian Broadcasting Corporation (CBC), the public radio broadcaster, operates four radio networks, including Radio Canada International and radio services to indigenous populations in the north.

[64] http://www.crtc.gc.ca/eng/com100/2010/r100830.htm.

[65] *Id*.

[66] *Id*.

[67] IHS Global Insight, *Canada: Telecoms Report* (2010) (accessed Mar. 2, 2011).

[68] Telegeography GlobalComms Database: Canada (2010) (accessed Nov. 13, 2010).

[69] *Id.*

Topography: Canada occupies an area somewhat larger than the contiguous 48 states of the United States. Approximately 90 percent of the population is concentrated within 100 miles of the U.S. border. The terrain is mostly plains with mountains in the west and lowlands in the southeast.

Fixed	**Total**	**Fiber**	**Cable**	**DSL**	**Other**
Fixed broadband subs per 100 inhabitants[70]	31.1	0.0	16.9	13.1	1.1
Fixed broadband subs (June 2010)[71]	10,495,741				
% of households with fixed broadband access (2008) [72]	66.9				
Mobile					
Mobile wireless broadband subs per 100 inhabitants[73]	14.25				
Mobile wireless broadband subs (Q4 2010) [74]	4,836,606				

[70] OECD Broadband Portal, Table 1d (3) (June 2010) (accessed Feb. 11, 2011).

[71] *Id*.

[72] OECD Broadband Portal, Table 2a (July 2010) (accessed Feb. 11, 2011). In even numbered years, Canada includes only its 10 provinces in its statistics and excludes its three territories.

[73] Wireless Intelligence, https://www.wirelessintelligence.com/Index.aspx (accessed Apr. 14, 2011) (HSPA connections only).

[74] *Id.*

6. Chile

Regulation: Chile does not have an independent telecommunications regulator. The Undersecretariat of Telecommunications, the Subsecretaria de Telecomunicaciones (SUBTEL), a subcabinet level arm of the Ministry of Transportation and Telecommunications (MTT), acts as both policymaker and telecommunications regulator.[75]

Chile was among the first countries in the world to liberalize its telecommunications market, beginning in the mid-1970s, under the Pinochet military government. Chile has an open telecommunications market, with competition in local, domestic long distance and international calling. Under SUBTEL regulations, all ISPs must interconnect domestically and provide consistent consumer information on service features such as latency rates and packet size for quality of service purposes. In June 2009, Chile launched an online portal that allows consumers to compare offerings of all Internet providers.[76]

The Chilean government plans to implement a series of reforms over the next few years to improve telecommunications in the country, with special emphasis on increasing access to broadband services, promoting net neutrality and facilitating service convergence. In July 2010, Congress approved a Net-Neutrality Law that guarantees that ISPs cannot interfere with content accessed by Internet users. SUBTEL's implementing regulations were published on March 18, 2011. In addition to ensuring users have access to content without discrimination, the regulations permit ISPs to offer tiered speed service levels and pricing. Previously, Chilean ISPs only offered unlimited access for a flat fee, which allowed a small number of heavy users to create network congestion.[77]

Market and Competition: Broadband providers in Chile include Telefónica Chile (incumbent), VTR (cable), Telefónica del Sur, GTD Manquehue, Entel and CMET Telecomunicaciones. Telefónica Chile holds 44.9 percent of the broadband market as of the end of October 2009, followed by VTR (39.4 percent), Telefónica del Sur (5.1 percent), and Telmex (5.4 percent), which launched its own WiMAX network in 2007.

Telmex Chile and VTR hold wireless local loop licenses that allow them to offer wireless broadband services to the public using WiMAX technology, particularly in remote, underserved areas. Telmex launched services in the capital city of Santiago and 14 other urban centers in March 2007. In 2008, VTR began deploying a WiMAX network.

Telefónica Chile, Entel, and Claro have been offering 3G/3.5G services for a number of years. 4G is expected to be deployed commercially in Chile in late 2011/2012.

Other Media: Chile has a mix of national and local terrestrial television channels, coupled with extensive cable television networks. Television Nacional de Chile (TVN), a state-owned network, is self-financed through commercial advertising revenues and is not under direct government control. Overall, Chile has a large number of privately-owned television stations and approximately 250 radio stations.

[75] *See* SUBTEL, http://www.subtel.cl/prontus_subtel/site/edic/base/port/inicio.html.

[76] *See* http://www.mibandaancha.cl/prontus_bpp/site/edic/base/port/inicio.html.

[77] *See* http://www.bnamericas.com/news/telecommunications/amended-net-neutrality-regulation-calms-critics.

Topography: Chile occupies an area slightly smaller than twice the size of Montana. Chile's terrain consists of low coastal mountains, a fertile central valley, and rugged Andes in the east.

Fixed	**Total**	**Fiber**	**Cable**	**DSL**	**Other**
Fixed broadband subs per 100 inhabitants[78]	10.3	0.0	4.8	5.4	0.1
Fixed broadband subs (June 2010)[79]	1,745,835				
% of households with fixed broadband access (2006) [80]	14.8				
Mobile					
Mobile wireless broadband subs per 100 inhabitants[81]	6.5				
Mobile wireless broadband subs (June 2010) [82]	1,092,267				

[78] OECD Broadband Portal, Table 1d (3) (June 2010) (accessed Feb. 11, 2011).

[79] *Id*.

[80] OECD Broadband Portal, Table 2a (July 2010) (accessed Feb. 11, 2011).

[81] OECD Broadband Portal, Table 1d (2) (June 2010) (accessed Feb. 11, 2011).

[82] *Id*.

7. Cyprus

Regulation: The Department of Electronic Communications of the Ministry of Communications and Works (MCW) oversees spectrum management.[83] The Office of the Commissioner of Electronic Communications & Postal Regulation, established in 2002, is responsible for the introduction of effective competition in the provision of networks and services, and the protection of consumers, especially in issues relevant to the price and the quality of the provided services.[84]

Cyprus requires both unbundled loops and wholesale broadband access.[85]

Market and Competition: DSL service is available in most urban and suburban areas and in some rural areas.[86] Cable service is limited to a few urban locations. Satellite Internet service is the only broadband option in areas not reached by DSL service.[87] Broadband competitors include the Cyprus Telecommunications Authority (CYTA), a quasi-governmental agency; PrimeTel, the largest private telecommunication company in Cyprus; and Cablenet, a cable operator.[88] Cytamobile-Vodafone and MTN provide 3G mobile broadband service in urban and suburban areas.[89]

Other Media: There is a mix of state- and privately-run television and radio services. The public broadcaster operates two television channels and four radio stations. Also available in Cyprus are six private TV broadcasters, satellite and cable television services including telecasts from Greece and Turkey, and a number of private radio stations. In areas administered by Turkish Cypriots, there are two public television stations, four public radio stations, and privately-owned TV and radio broadcast stations.

[83] *See* MCW, http://www.mcw.gov.cy/mcw/mcw.nsf/index_en/index_en?OpenDocument.

[84] *See* OCECPR, http://www.ocecpr.org.cy/nqcontent.cfm?a_id=767&tt=ocecpr&lang=gr; *see also* Cyprus Government, Office of the Commissioner of Electronic Communications and Postal Regulation, http://www.cyprus.gov.cy/portal/portal.nsf/All/6D2934F2A71AAF04C225702A0029F464.

[85] http://ec.europa.eu/information_society/policy/ecomm/doc/implementation_enforcement/annualreports/15threport/cy.pdf.

[86] http://www.cyprusbroadband.net/cyprus-adsl.html.

[87] http://www.cyprusbroadband.net/.

[88] See CYTA, http://www.cyta.com.cy/company_history_en.htm and http://www.cto-ict.org/index.php?dir=03&sd=50&cid=20011; PrimeTel, http://www.prime-tel.com/Main/main.aspx?id=242; Cablenet, http://www.cablenet.com.cy/en/.

[89] http://www.cyprusbroadband.net/3g-mobile-broadband.html.

Topography: Cyprus is a little over half the size of Connecticut. Cyprus' terrain consists of a central plain with mountains to the north and the south, and scattered but significant plains along the southern coast.

Fixed	**Total**	**Fiber**	**Cable**	**DSL**	**Other**
Fixed broadband subs per 100 inhabitants[90]	20.21	Data N/A	Data N/A	19.0	Data N/A
Fixed broadband subs (2009)[91]	176,000				
% of households with fixed broadband access	Data N/A				
Mobile					
Mobile wireless broadband subs per 100 inhabitants[92]	12.15				
Mobile wireless broadband subs (Q4 2010) [93]	101,778				

[90] ITU Statistics Database (accessed Dec. 9, 2010).

[91] *Id.*

[92] Wireless Intelligence, https://www.wirelessintelligence.com/Index.aspx (accessed Apr. 14, 2011) (HSPA connections only).

[93] *Id.*

8. Czech Republic

Regulation: The Czech Telecommunication Office (Český telekomunikační úřad or ČTÚ)[94] is the country's independent regulatory authority, though it is organizationally situated in the Ministry of Informatics (MICR).[95] The Telecoms Act of 2000 governs the telecommunications sector, and the Czech market was opened to competition in 2001.

Local-loop liberalization began in 2003; at that time the Czech Republic was required to harmonize its telecommunications regime with the 2002 EU telecommunications directives. Ceiling prices for unbundled local loops were modified in 2008. These ceiling prices are still in effect, and 95 percent of local exchanges may offer fully unbundled lines.[96] In 2009, Telefónica O2, the incumbent, introduced a new model for wholesale DSL, permitting alternative ISPs and their end users to opt out of Telefónica O2's fixed-line telephony offering while subscribing to broadband Internet.

The Czech Government adopted its "National Broadband Access Policy" in January 2005. The policy is based on the OECD Council's recommendations on promoting broadband development. The policy's main goal is to achieve a broadband adoption rate of approximately 50 percent by 2010. The government will also use some of the funds from its sale of the former government-owned operator to develop a subsidy scheme for the development of broadband services.[97]

Market and Competition: The incumbent operator in the Czech Republic is Telefónica O2.[98] Its competitors include UPC (cable system operator); Dial Telecom; T-Mobile (loop unbundling, resale and alternate facilities); Radiokomunikace (alternate facilities and fixed wireless); and fixed wireless operators, Broadnet, a subsidiary of Vodafone, and U:fon. Mobile broadband services are offered by four operators, T-Mobile, Telefónica, Vodafone and U:fon. There were an estimated 1.5 million 3G subscriptions as of the end of 2009. 4G networks are in the planning stages.[99]

Other Media: Roughly 130 television broadcasters operate 350 television channels, four of which are publicly operated and the remainder privately operated. Thirteen of the television stations, including the four publicly operated stations, have national coverage. There are also cable and satellite TV subscription services available. About 70 radio broadcasters operate roughly 85 radio stations, 15 of which are publicly operated; 16 radio stations provide national coverage with the remainder local or regional.

[94] *See* ČTÚ, http://www.ctupraha.cz/.

[95] *See* MICR, http://www.micr.cz/.

[96] https://cesifo-group.de/portal/page/portal/DICE_Content/INFRASTRUCTURE/COMMUNICATION_NETWORKS/Fixed-line percent20Access percent20Regulation/dev-loc-loop-unbund_0.pdf.

[97] Telegeography GlobalComms Database: Czech Republic (2010) (accessed Nov. 13, 2010).

[98] *See* Telecoms and Technology Forecast, *Czech Republic Telecoms: Sub-sector Update* (Economic Intelligence Unit) (Feb. 6, 2010).

[99] Telegeography GlobalComms Database: Czech Republic (2010) (accessed Nov. 13, 2010).

Topography: The Czech Republic occupies an area slightly smaller than South Carolina. The terrain in Bohemia in the west consists of rolling plains, hills, and plateaus surrounded by low mountains; Moravia in the east consists of very hilly country.

Fixed	**Total**	**Fiber**	**Cable**	**DSL**	**Other**
Fixed broadband subs per 100 inhabitants[100]	20.2	1.5	4.5	7.7	6.5
Fixed broadband subs (June 2010)[101]	2,131,900				
% of households with fixed broadband access (2009) [102]	48.9				
Mobile					
Mobile wireless broadband subs per 100 inhabitants[103]	12.48				
Mobile wireless broadband subs (Q4 2010) [104]	1,265,071				

[100] OECD Broadband Portal, Table 1d (3) (June 2010) (accessed Feb. 11, 2011).

[101] *Id*.

[102] OECD Broadband Portal, Table 2a (July 2010) (accessed Feb. 11, 2011).

[103] Wireless Intelligence, https://www.wirelessintelligence.com/Index.aspx (accessed Apr. 14, 2011) (HSPA connections only).

[104] *Id.*

9. Denmark

Regulation: The National IT and Telecoms Agency (NITA) is Denmark's independent regulator.[105] NITA operates under the auspices of the Ministry of Science, Technology and Innovation (MSRI).[106] Danish law ensures that the MSRI cannot intervene in the NITA's regulatory functions. A third body – the Danish Competition Authority (DCA) – is also involved in the regulation of the country's telecommunications sector. The DCA is an autonomous entity under the Ministry of Economic and Business Affairs, and promotes fair competition, primarily by administering the Consolidated Act on Competitive Conditions and Consumer Interests in the Telecoms Market.[107]

The incumbent, Telia Denmark, is obligated to offer unbundled loops, sub-loops, and bitstream access.[108] In 2009, the EC approved the Danish regulator's rules forcing TDC, a cable provider that controls large parts of the cable network, to open up its cable broadband network to competitors.[109]

The existing strategy for the rollout and use of broadband in Denmark is based on the 2001 broadband plan called "From Hardware to Content." According to the strategic goals outlined in the plan, all Danish citizens and business must have access to broadband of at least 512 kbps by the end of 2010.[110] This goal has been met.[111] In June 2010, Denmark announced a new broadband goal of 100 Mbps for all households and enterprises by 2020.[112] Denmark is pursuing a market-based approach, ensuring that regulations are technology-neutral and using e-government services as "drivers" to ensure high demand for broadband.

Market and Competition: The following companies compete in the Danish broadband market: TDC; Cybercity; cable TV provider, Telia Stofa; Fixnet Nordic; Telenor; Telia Denmark; and FTTH providers, Dansk Bredband and Energi Midt. Danske Telecom and ELRO provide WiMAX services. Alternative infrastructure operators include Danske Telecom and Sonofon. Cable providers include Dansk Kabel TV, TDC, and Telia Sofia. Experts estimate that Denmark's networks will be ready to support the projected demand for 50 Mbps downstream and 10 Mbps upstream speeds in 80 percent of Danish households by 2013.[113] The share of the market served by fiber grew from 4.8 to 6.7 percent in 2009.[114]

Other Media: DR (Danish Broadcasting Corporation) is Denmark's largest electronic media enterprise.[115] DR is an independent, license-financed public institution. DR TV operates four channels,

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[105] *See* NITA, http://en.itst.dk/.

[106] *See* MSTI, http://en.vtu.dk/.

[107] Telegeography GlobalComms Database: Denmark (2010) (accessed Nov. 13, 2010).

[108] *Id.*

[109] *See* NITA, http://en.itst.dk/news/tdcs-cable-tv-network-opened-up-to-competitors.

[110] *See* NITA, *Broadband Mapping 2010* (November 2010), *available at* http://en.itst.dk/statistics/telestatistik/broadband-mapping/broadband-mapping-2010/Bredbandskortlegning%202010%20english.docx.pdf.

[111] IHS Global Insight, *Denmark: Telecoms Report* (2010) (accessed Mar. 2, 2011).

[112] http://extranet.broadband-europe.eu/Lists/StrategiesData/Attachments/41/Danish%20broadband%20goal%20June%202010_EN.pdf.

[113] http://point-topic.com/content/operatorSource/profiles2/denmark-broadband-overview.htm.

[114] IHS Insight, *Denmark: Telecoms Report* (2010) (accessed Mar. 2, 2011).

[115] *See* http://www.dr.dk/NR/rdonlyres/B96D837A-CC87-4F49-B7A6-7B7FE89E1E22/1349984/2009FACTSONDR1.pdf.

and publicly-owned TV2 operates about six channels. Satellite and cable feed broadcast are available for privately-owned stations. DR Radio operates 4 nationwide FM radio stations, 15 digital audio broadcasting stations, and about 15 web-based radio stations; approximately 250 commercial and community radio stations are operational.

Topography: Denmark occupies an area that is slightly less than twice the size of Massachusetts. About one-quarter of Denmark's population lives in greater Copenhagen. The terrain consists of low and flat to gently rolling plains.

Fixed	**Total**	**Fiber**	**Cable**	**DSL**	**Other**
Fixed broadband subs per 100 inhabitants[116]	38.1	4.4	10.0	22.3	1.5
Fixed broadband subs (June 2010)[117]	2,105,000				
% of households with fixed broadband access (2009) [118]	76.0				
Mobile					
Mobile wireless broadband subs per 100 inhabitants[119]	47.4				
Mobile wireless broadband subs (June 2010) [120]	2,618,000				

[116] OECD Broadband Portal, Table 1d (3) (June 2010) (accessed Feb. 11, 2011).

[117] *Id*.

[118] OECD Broadband Portal, Table 2a (July 2010) (accessed Feb. 11, 2011).

[119] OECD Broadband Portal, Table 1d (2) (June 2010) (accessed Feb. 11, 2011).

[120] *Id*.

10. Estonia

Regulation: The Ministry of Economic Affairs and Communications (MEAC) sets communications policy.[121] The independent regulator is the Technical Surveillance Authority (TJA), a governmental organization established in 2008 through the merger of the Communications Board, the Railway Inspectorate and the Technical Surveillance Inspectorate.[122]

In April 2009, the Estonian government announced that it will provide broadband access to all homes and businesses in the country by 2015.[123] The "EstWin" initiative is projected to create a 4,125 mile fiber optic cable network offering speeds of up to 100 Mbps at a cost of 283 million Euros (US$374 million). The government, drawing on money from EU structural funds, will pay approximately 25 percent of the project, and the country's major telecommunications companies will pay the remainder.[124]

Market and Competition: Strong competition is present only in urban areas, where local cable operators compete with the incumbent telecommunications carrier, Elion, in the provision of Internet services. As of the end of 2008, 82 percent of broadband subscribers had service with Elion or cable operators Starman and STV.[125]

Other Media: Eesti Rahvusringhaaling (ERR) is the publicly-owned broadcaster, and it operates two television channels. National private television channels are expanding service, including a range of channels aimed at Russian-speaking viewers. More than half of Estonian households subscribe to cable television services. ERR operates four radio networks. The number of private commercial radio stations has been increasing locally, regionally and nationally.

[121] *See* MEAC, http://www.mkm.ee/en.

[122] *See* TJA, http://www.tja.ee/?lang=en.

[123] *See generally*, The Baltic Course, http://www.baltic-course.com/eng/Technology/?doc=20853.

[124] *See* TJA, http://www.tja.ee/?lang=en.

[125] *See* Konkurentsiamet (Estonian Competition Authority) 2008 Annual Report, *available at* http://www.konkurentsiamet.ee/public/AnnualReports_/Annual_Report_2008.pdf.

Topography: Estonia occupies an area that is slightly smaller than New Hampshire and Vermont combined. The mainland terrain is flat, boggy, and partly wooded, while the south is hilly and the north is flat.

Fixed	**Total**	**Fiber**	**Cable**	**DSL**	**Other**
Fixed broadband subs per 100 inhabitants[126]	22.47	Data N/A	Data N/A	10.1	Data N/A
Fixed broadband subs (2009)[127]	301,100				
% of households with fixed broadband access (2009) [128]	62.0				
Mobile					
Mobile wireless broadband subs per 100 inhabitants[129]	3.00				
Mobile wireless broadband subs (Q4 2010) [130]	39,262				

[126] ITU Statistics Database (accessed Dec. 9, 2010).

[127] *Id*.

[128] OECD Broadband Portal, Table 2a (July 2010) (accessed Feb. 11, 2011).

[129] Wireless Intelligence, https://www.wirelessintelligence.com/Index.aspx (accessed Apr. 14, 2011) (HSPA connections only).

[130] *Id.*

11. Finland

Regulation: The Ministry of Transport and Communications (MINTC)[131] sets communications policy, and Finland's independent communications regulator is the Finnish Communications Regulatory Authority (FICORA).[132] The Finnish telecommunications market was first opened to competition when data communication and business networks were liberalized under the Telecommunications Act of 1987. The laws governing telecommunications and digital broadcast networks in Finland were converged in mid-2002 by broadening the scope of the 1987 Act to include cable TV and digital wireless terrestrial broadcasting.[133]

FICORA has imposed an obligation on operators with significant market power to lease local loops to other operators.

The Finnish government passed legislation in 2009 to make broadband connectivity a fundamental right for every person in the country. And in July 2010, new universal service obligations for telecommunications operators took effect, *i.e.*, broadband access became included in basic communications services like telephone or postal services. Thus, a reasonably priced broadband connection became every Finnish citizen's basic right.[134] The legislation is part of a commitment from the Finnish government to provide universal broadband services, which includes a pledge to make 100 Mbps broadband access available to all Finnish residents by 2015.[135]

In 2009, the government allocated spectrum in the 1.8 and the 2.6 GHz bands to three mobile operators, which paved the way for the widespread rollout of 4G LTE mobile broadband services. Sonera became the first competitor to offer 4G service at the end of 2010 and DNA and Elisa are expected to offer 4G service this year.[136]

Market and Competition: Elisa, TeliaSonera, DNA and Finnet are the leading broadband providers in Finland.[137] Elisa is the market leader with 34 percent of the broadband market as of the end of 2009.[138] TeliaSonera follows closely behind with around 29 percent, while DNA holds 14 percent and Finnet holds 13 percent.[139] DSL services were introduced by Sonera (now TeliaSonera) in 1998, making Finland one of the first countries in the world to have broadband offerings.[140] There are 17 cable television

[131] *See* MINTC, http://www.mintc.fi/web/en/home.

[132] *See* FICORA, http://www.ficora.fi/en/index.html.

[133] *See* Goliath, http://goliath.ecnext.com/coms2/gi_0199-2883809/Finland-s-Broadcast-And-Telecommunications.html. The name of "Telecommunications Market Act" was also changed to "Communications Market Act" to reflect its new scope.

[134] *See* MINTC, http://www.lvm.fi/web/en/pressreleases/view/1169259.

[135] *Id*.

[136] IHS Global Insight, *Finland: Telecoms Report* (2010) (March 22, 2011).

[137] *See* FICORA, Market Review 3/2009: Price level of telecommunications services in Finland 2008 (Nov. 2009) (FICORA Market Review Report), *available at* http://www.ficora.fi/attachments/ruotsiav/5mnNXXdeL/DOHA_n580363_v3_Market_review_3_2009_-_Price_level_of_telecommunications_services_in_Finland_2008.pdf.

[138] IHS Global Insight, *Finland: Telecoms Report* (2010) (December 6, 2010).

[139] *Id.*

[140] *See* Point Topic, http://point-topic.com/content/operatorsource/profiles2/finland-broadband-overview.htm.

companies that offer broadband services in Finland.[141] The largest is Welho, which operates from the capital, Helsinki.[142]

Other Media: Finland has a mix of publicly-operated television stations, which recently expanded services, and privately-operated television stations, the largest of which has introduced several special-interest pay-TV channels. Since September 2007, all TV signals have been broadcast digitally, and analog broadcasts via cable networks were terminated in February 2008. With respect to radio, public broadcasting maintains a network of 13 national and 25 regional radio stations. There are also a large number of private radio broadcasters.

Topography: Finland occupies an area slightly smaller than Montana. Finland's population is concentrated on a small southwestern coastal plain. The terrain is mostly low, flat to rolling plains interspersed with lakes and low hills.

Fixed	**Total**	**Fiber**	**Cable**	**DSL**	**Other**
Fixed broadband subs per 100 inhabitants[143]	26.9	0.3	4.3	21.8	0.6
Fixed broadband subs (June 2010)[144]	1,437,600				
% of households with fixed broadband access (2009) [145]	73.7				
Mobile					
Mobile wireless broadband subs per 100 inhabitants[146]	22.1				
Mobile wireless broadband subs (June 2010) [147]	1,182,300				

[141] *See* FICORA, http://www.ficora.fi/attachments/englantiav/5m4R6KvqC/Broadband_Prices_in_the_Nordic_Countries_2006.pdf.

[142] *See* FICORA Market Review Report.

[143] OECD Broadband Portal, Table 1d (3) (June 2010) (accessed Feb. 11, 2011).

[144] *Id*.

[145] OECD Broadband Portal, Table 2a (July 2010) (accessed Feb. 11, 2011).

[146] OECD Broadband Portal, Table 1d (2) (June 2010) (accessed Feb. 11, 2011).

[147] *Id*.

12. France

Regulation: The General Directorate for the Information Technology and Postal Services (DiGITIP), a unit of the Ministry of Economy, Industry and Employment (MEIE), is responsible for France's national telecommunications policy.[148] Created in November 1998, the DiGITIP proposes and implements policies to promote an industrial and competitive environment favorable to France's communications industry, both domestically and internationally. France's Autorité de Régulation des Communications Electroniques et des Postes (ARCEP) is the independent regulator.[149] France's telecommunications sector is governed by the Telecommunications Law of July 9, 2004, relating to electronic communication and audiovisual communication services, which amended the 1996 Telecommunications Act and incorporated the EU's 2003 regulatory framework for electronic communications into French national law.

As of July 2009, unbundled loop facilities are available in exchanges covering more than 72 percent of the French population. ARCEP has emphasized that operators must resolve quality of service issues, including access to lines with technical problems.[150] The regulator has mandated access to rights of way, poles, ducts, and existing sheaths, and the sharing of the terminal part of fiber networks.[151] ARCEP has also developed a framework for fiber, which applies symmetric regulation to all operators – whoever is first to construct within a building is required to provide shared access to competitors. In September 2010, ARCEP published proposals to simplify mobile consumer contracts in an effort to improve transparency and competition in the domestic market.[152]

"Digital France 2012," adopted in October 2008, sets out France's proposals for infrastructure development and includes a plan to achieve universal broadband access in France by the end of 2012, *i.e.*, make available to 100 percent of the population affordable Internet access (less than 35 Euros (US$52) per month) at speeds greater than 512 kbps. This goal would be achieved through the designation of "universal broadband providers." These providers would be responsible for providing universal access and establishing public-private partnerships to increase the rollout of fiber networks.[153]

Market and Competition: Competitors in the broadband market include Orange (France Telecom), Iliad affiliates Free and Alice, Club Internet, Neuf Cegetel (SFR), and Numericable. Orange, Neuf Cegetel and Iliad hold the largest market shares. Orange holds 47 percent of the total broadband market, with Neuf Cegetel at 22 percent and Iliad at 19 percent. Cable has just over five percent of the broadband market. Cable still accounts for much of the alternative last-mile infrastructure although Iliad and Neuf Cegetel have begun the rollout of fiber.

The three leading broadband providers in France all offer IPTV and have committed to rolling out fixed-mobile convergence services. All three companies offer a "box" (Orange's Livebox, Iliad's Freebox and

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[148] *See* MEIE, http://www.telecom.gouv.fr/accueil.php3.

[149] *See* ARCEP, http://www.arcep.fr/index.php?id=1&L=1.

[150] *See* https://www.cesifo-group.de/portal/page/portal/DICE_Content/INFRASTRUCTURE/COMMUNICATION_NETWORKS/Fixed-line percent20Access percent20Regulation/dev-loc-loop-unbund_0.pdf.

[151] ARCEP, *ARCEP pleased by operators' publication of their FTTH technical and pricing reference offers. ARCEP has published a practical guide on the terms and conditions of fiber rollouts, for property owners, managers and joint owners* (Feb. 10, 2010), http://arcep.fr/index.php?id=8571&L=1&tx_gsactualite_pi1[uid]=1251&tx_gsactualite_pi1[annee]=&tx_gsactualite_pi1[theme]=&tx_gsactualite_pi1[motscle]=&tx_gsactualite_pi1[backID]=26&cHash=31099861b8.

[152] IHS Global Insight, *France: Telecoms Report* (2010) (November 12, 2010).

[153] *See* http://www.arcep.fr/fileadmin/reprise/communiques/communiques/2009/comnq-nkm-fibre-100709.pdf.

Neuf Cegetel's Neuf Box) that customers can use to access broadband, VoIP, and Wi-Fi. In addition, Bouygues Telecom offers a quadruple-play package called "Ideo."[154]

In February 2010, the government announced that mobile operators will have to pay a minimum of 120 million Euros for the last two remaining tranches of 3G spectrum in the 2.1 GHz band.

Other Media: France has a mix of publicly- and privately-operated television stations. State-owned France Televisions operates four networks, one of which is a network of regional stations. There are a large number of privately-owned regional and local television stations. The public broadcaster, Radio France, operates seven national networks and a series of regional networks. Radio France Internationale (RFI), under the Ministry of Foreign Affairs, is a leading international broadcaster.

Topography: France occupies an area slightly smaller than the size of Texas. The terrain consists of mostly flat plains or gently rolling hills in the north and west; the remainder is mountainous, especially with the Pyrenees in the south, and the Alps in the east.

Fixed	**Total**	**Fiber**	**Cable**	**DSL**	**Other**
Fixed broadband subs per 100 inhabitants[155]	31.4	0.1	1.6	29.7	0.0
Fixed broadband subs (June 2010)[156]	20,257,000				
% of households with fixed broadband access (2009) [157]	57.5				
Mobile					
Mobile wireless broadband subs per 100 inhabitants[158]	30.0				
Mobile wireless broadband subs (June 2010) [159]	19,358,000				

[154] Le monde, *Internet: les fournisseurs d'accès lancent des offers moins chères mais moins riches* (Feb. 13, 2010), http://www.lemonde.fr/technologies/article/2010/02/12/Internet-les-fournisseurs-d-acces-lancent-des-offres-moins-cheres-mais-moins-riches_1304840_651865.html; Le monde, *Numericable va lancer un forfeit social Internet à 9,99 euros* (Feb. 8, 2010), http://www.lemonde.fr/economie/article/2010/02/08/numericable-va-lancer-un-forfait-social-Internet-a-9-99-euros_1302930_3234.html.

[155] OECD Broadband Portal, Table 1d (3) (June 2010) (accessed Feb. 11, 2011).

[156] *Id*.

[157] OECD Broadband Portal, Table 2a (July 2010) (accessed Feb. 11, 2011).

[158] OECD Broadband Portal, Table 1d (2) (June 2010) (accessed Feb. 11, 2011).

[159] *Id*.

13. Germany

Regulation: Policy-related issues in the telecommunications sector are directed by the Federal Ministry of Economics and Technology (BMWi).[160] Its mission is to foster "successful economic activity" in Germany, and the Ministry plays a key legislative, administrative and coordination role in areas such as competition policy and trade issues that affect the German telecommunications sector. Germany's independent telecommunications regulator is the Federal Network Agency, Bundesnetzagentur (BnetzA).[161]

Agreements for Very high bitrate DSL (VDSL) wholesale access are mainly contractual, with the conditions decided between operators and approved by the regulator, rather than by direct guidance from the BnetzA. Commercial negotiations over wholesale access to fiber optic networks failed to achieve agreements, however, and the BnetzA set the terms of access in a December 2009 order. That order outlined the technical specifications for installing digital subscriber line access multiplexer (DSLAM) equipment in cabinets and fiber-optic cables in cable ducts, as well as the use of Deutsche Telekom's (DT) unlit fiber when lack of space prohibits the sharing of passive infrastructure. In early February 2010, Germany's highest administrative court ruled that DT did not have to give competitors access to dark fiber on its VDSL network. However, the court stated (affirming the regulator's December 2009 order) that DT did have to give competitors access to its street cabinets and empty pipes. In July 2010, BnetzA extended the regulation of local-loop unbundling activation and deactivation fees. The monthly fee competitors pay for access to unbundled loops from DT is currently US$14; the regulator is presently reviewing local-loop unbundling fees.[162]

Germany's Broadband Strategy was released in February 2009.[163] The strategy defines two overarching targets. First, gaps in broadband penetration are to be eliminated, and capable broadband, defined as at least 1 Mbps, is to be made available nationwide by the end of 2010. Second, a total of 75 percent of all German households are to have Internet access with speeds of at least 50 Mbps by 2014.[164] The government describes its approach as "incentive-oriented."[165] In the short-term it will focus mainly on financial support for local authorities and improving financial options available to companies. In the long-term, it will focus on incentives within the overall EU regulatory framework and provide stimulus where it can promote synergies from infrastructure projects. Specific measures include optimizing shared use of existing infrastructure and facilities and compiling a broadband map and a database of construction sites.[166] The German government has also taken steps to make more spectrum available for mobile broadband by freeing up the 900 MHz band for data and reallocating spectrum in the 800 MHz band made available as a result of Germany's digital television transition.[167]

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[160] *See* BMWi, http://www.bmwi.de/English/Navigation/root.html.

[161] *See* BnetzA, http://www.bundesnetzagentur.de/enid/98affacc9ef0ab056cda24ebc3920710,0/xn.html.

[162] IHS Global Insight, *Germany: Telecoms Report* (2010) (accessed Mar. 2, 2011).

[163] BMWi, *The Federal Government's Broadband Strategy* (Feb. 2009) (German Broadband Strategy), *available at* http://www.bmwi.de/English/Redaktion/Pdf/broadband-strategy,property=pdf,bereich=bmwi,sprache=en,rwb=true.pdf.

[164] German Broadband Strategy at 5.

[165] *Id.* at 10.

[166] *Id.* at 11-13.

[167] *Id.* at 13; *see also* Zukunft Breitband (Germany's Broadband Portal), *Flächendeckende Breitbandversorgung forcieren - Aufbau von Hochleistungsnetzen unterstützen*, http://www.zukunft-breitband.de/BBA/Navigation/breitbandstrategie.html.

In July 2008, the EC approved Germany's 141 million Euros (US$223 million) state-aid plan to bring broadband to rural areas currently without access. The plan has the potential to help rural areas in the former East Germany (GDR), which have lagged behind the rest of the country in terms of broadband access. This is because the GDR information infrastructure was less developed than the western parts of Germany. In November 2008, the EC approved another aid package worth 45 million Euros (US$61 million) and another 25 million Euros (US$34 million) in January 2009, bringing the total amount of subsidy to 211 million Euros (US$286 million). In 2010, the EC approved a framework proposed by the German government, which allows co-financing to support the establishment of high-speed networks in areas in which the market is unlikely to create them, as long such co-financing complies with state aid rules.[168]

Market and Competition: As of 2009, 70 percent of German households had access to broadband services with speeds of at least 2 Mbps and 20 percent had access to VDSL technology supporting broadband speeds of up to 50 Mbps.[169]

The broadband market is dominated by DSL providers, which have nearly 90 percent of the market. T-Home, incumbent DT's fixed line unit, is the market leader, but it faces significant competition from companies utilizing resale, bitstream access or unbundled loops from DT.[170] Its largest competitors in the fixed-line sector are Vodafone, United Internet, and Telefónica, which took over Hansenet. Cable companies, including Kabel Deutschland GmbH, Unitymedia and Kabel BW, have been increasing their market share but still serve just over 10 percent of the broadband market.[171] A number of regional carriers, such as M-Net (Munich) and NetCologne (Cologne) are rolling out fiber optic networks, including FTTH.[172] There are also a small number of subscribers to broadband satellite services.[173]

There are four wireless network operators in the German market: E-Plus, O2 Germany, T-Mobile Deutschland, and Vodafone Germany. Each offers 3G service. The digital dividend (*i.e.*, spectrum freed up following Germany's transition to digital television) allowed the BnetzA to auction off a set of new radio frequencies, raising 4.4 billion Euros (US$5.5 billion) in proceeds, in the second quarter of 2010. The auction was the first allocation of the 800 MHz digital dividend spectrum in the EU. Providers are currently starting to offer 4G services.[174]

Other Media: National and regional public broadcasters compete with nearly 400 privately-owned national and regional television stations. More than 90 percent of households have cable or satellite TV, while there are hundreds of radio stations broadcasting including multiple national radio networks, regional radio networks, and a large number of local radio stations.

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[168] *See* Federal Ministry of Economics and Technology - Press Release 2010-7-21, http://www.bmwi.de/English/Navigation/Press/press-releases,did=356040.html.

[169] German Broadband Strategy at 7.

[170] Dialog Consult for the Association of the Telecommunications and Value-Added Service Providers (VATM), 11th Joint Analysis of the Telecommunications Market 2009: Results of a survey of member companies of the in the third quarter of 2009 (Nov. 2009) at 14, *available at* http://www.vatm.de/uploads/media/10-02-2010.pdf.

[171] *Id.* at 12. OECD Broadband Portal, Table 1d (2) (June 2010) (accessed Feb. 11, 2011).

[172] At the end of 2009, the number of subscribers to fiber optic broadband access services was less than 100,000. *Id.* at 14.

[173] As of the end of 2008, there are approximately 30,000 subscribers to satellite-delivered broadband services in Germany. German Broadband Strategy at 7.

[174] IHS Global Insight, *Germany: Telecoms Report* (2010) (accessed Mar. 2, 2011).

Topography: Germany occupies an area that is slightly smaller than Montana. Germany's terrain consists of lowlands in the north, uplands in the center, and Bavarian Alps in the south.

Fixed	**Total**	**Fiber**	**Cable**	**DSL**	**Other**
Fixed broadband subs per 100 inhabitants[175]	31.3	0.2	3.2	27.9	0.2
Fixed broadband subs (June 2010)[176]	25,599,360				
% of households with fixed broadband access (2009) [177]	64.6				
Mobile					
Mobile wireless broadband subs per 100 inhabitants[178]	23.6				
Mobile wireless broadband subs (June 2010) [179]	19,342,600				

[175] OECD Broadband Portal, Table 1d (3) (June 2010) (accessed Feb. 11, 2011).

[176] *Id*.

[177] OECD Broadband Portal, Table 2a (July 2010) (accessed Feb. 11, 2011).

[178] OECD Broadband Portal, Table 1d (2) (June 2010) (accessed Feb. 11, 2011).

[179] *Id*.

14. Greece

Regulation: Both the Ministry of Transport and Communications (MTC)[180] and the independent regulator, Hellenic Telecommunications & Post Commission (EETT),[181] are responsible for oversight of Greece's regulatory framework. In 2006, EETT incorporated the EU's 2003 regulatory framework for electronic communications into Greek law, and imposed new regulations on local loop unbundling.

In 2005, Greece adopted a national broadband plan titled Digital Strategy 2006-2013.[182] The plan's objectives are to use broadband and information and communications technologies (ICT) to enhance business productivity and to improve the quality of life for the Greek population, in part through the development of e-government optic networks for 75 cities and wireless networks for 120 smaller cities.[183] In February 2009, the Greek government announced a public-private partnership to build a national fiber-optic network to Athens and 50 other cities (including the islands) with speeds of up to 100 Mbps for nearly 650,000 users by the end of 2010 and to be expanded to over two million households over the next seven years.[184]

Market and Competition: Competitors in the broadband market include OTEnet, Forthnet, and Tellas. As of March 2008, 34 percent of OTE's DSL lines were provided by third-party ISPs.[185] Greece has no cable broadband networks. Greece's Internet sector is less developed than that of its European peers. At the end of September 2008, OTE's total retail and wholesale ADSL customers (which excludes unbundled local loops) exceeded 924,000 (up from 892,500 three months previously).[186]

Greece's three mobile broadband operators – CosmOTE, Vodafone Greece and WIND Hellas – offer 3G services. Vodafone Greece launched its HSPA+ network in July 2009 in Athens.[187]

Other Media: The broadcast media is dominated by the private sector. There are roughly 150 private TV channels and about a dozen of these private channels broadcast at the national or regional level. Also available are three publicly-owned terrestrial TV channels with national coverage, one publicly-owned satellite channel, three stations designed for digital terrestrial transmissions, and multi-channel satellite and cable TV services. There are upwards of 1,500 radio stations broadcasting, nearly all of them privately-owned. The state-run broadcaster has seven national stations, two international stations, and 19 regional stations.

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[180] *See* MTC, http://www.yme.gr/index.php?getwhat=1&oid=531&id=&tid=531.

[181] *See* EETT, http://www.eett.gr/opencms/opencms/EETT_EN/index.html.

[182] *See* Ministry of Economy and Finance, *Digital Greece and the Greek Digital Strategy* (Jan. 2008), *available at* http://www.mnec.gr/export/sites/mnec/en/press_office/DeltiaTypou/Documents/2008-01-28_FactSheetOnDigitalGreece.pdf.

[183] *Id.* at 6.

[184] Nicolae Oaca, *Broadband for All Europeans' to Fight Economic Crisis, IEEE Global Communications Newsletter* (June 2009) at 2.

[185] *See* European Competitive Telecommunications Association (ECTA), http://www.ectaportal.com/en/.

[186] IHS Global Insight, *Greece: Telecoms Report* (2010) (accessed Mar. 2, 2011).

[187] *Id.*

Topography: Greece occupies an area slightly smaller than the size of Alabama. Greece's terrain is mostly mountainous with ranges extending into the sea as peninsulas or chains of islands.

Fixed	**Total**	**Fiber**	**Cable**	**DSL**	**Other**
Fixed broadband subs per 100 inhabitants[188]	18.7	0.0	0.0	18.7	0.0
Fixed broadband subs (June 2010)[189]	2,107,000				
% of households with fixed broadband access (2009) [190]	33.1				
Mobile					
Mobile wireless broadband subs per 100 inhabitants[191]	28.34				
Mobile wireless broadband subs (Q4 2010) [192]	3,030,010				

[188] OECD Broadband Portal, Table 1d (3) (June 2010) (accessed Feb. 11, 2011).

[189] *Id*.

[190] OECD Broadband Portal, Table 2a (July 2010) (accessed Feb. 11, 2011).

[191] Wireless Intelligence, https://www.wirelessintelligence.com/Index.aspx (accessed Apr. 14, 2011) (HSPA connections only).

[192] *Id.*

15. Hong Kong

Regulation: Established in July 1993, the Office of the Telecommunications Authority (OFTA) is Hong Kong's independent regulator for telecommunications.[193] OFTA issues telecommunications licenses, administers the numbering plan, oversees technical standards and international affairs, manages spectrum, and provides technical support in the regulation of broadcasting services. The Commerce and Economic Development Bureau (CEDB) is Hong Kong's policy-making body for the telecommunications, broadcasting, and film industries.[194] The CEDB sets information technology goals for Hong Kong, in cooperation with the Legislative Council of the government.

Although Hong Kong has been a part of the People's Republic of China since 1997, its communications market remains more competitive, more market-driven, and less regulated than in other parts of China. All sectors of Hong Kong's telecommunications market have been liberalized, and there are no foreign ownership restrictions.

In July 2004, OFTA decided that mandatory local-loop unbundling would end by June 2008. OFTA determined that this decision would promote investment and consumer choice in broadband networks. Unbundling is maintained in buildings where it is technically unfeasible or economically unviable for competitors to install infrastructure.

The "Digital 21 Strategy," the blueprint for ICT development in Hong Kong, sets out a vision of building on Hong Kong's position as a "world digital city." The strategy was first published in 1998 and is updated regularly. The 2008 edition identified the following five action areas for implementation between 2008 and 2010: (1) facilitating a digital economy, (2) promoting advanced technologies and innovation, (3) developing Hong Kong as a hub for technological cooperation and trade, (4) enabling the next generation of public services, and (5) building an inclusive, knowledge-based society.[195]

Market and Competition: Competitors in the broadband market include PCCW, HKNet, and City Telecom (HKBN). I-Cable provides broadband over its cable system. HKBN, SmarTone, HKNet and other fixed wireless licensees utilize alternative last-mile infrastructure.

By mid-2009, the mobile market in Hong Kong was one of the most competitive in the world and cellular penetration was the highest in all of Asia.[196] At the end of 2009, Hong Kong had over 3.8 million 3G users accounting for approximately 31 percent of the total mobile subscriber base.[197]

Other Media: Hong Kong has two commercial terrestrial television networks each with multiple stations, and multi-channel satellite and cable TV systems. There are also three radio networks, one of which is government-funded and operates about 15 radio stations.

[193] *See* OFTA, http://www.ofta.gov.hk/en/.

[194] *See* CEDB, http://www.cedb.gov.hk/about/index.htm.

[195] http://info.gov.hk/digital21/eng/index.htm.

[196] Telegeography GlobalComms Database: Hong Kong (2010) (accessed Nov. 13, 2010).

[197] IHS Global Insight, *Hong Kong: Telecoms Report* (2010) (accessed Mar. 2, 2011).

Topography: Hong Kong occupies an area six times the size of Washington, DC. The terrain is hilly to mountainous with steep slopes, and lowlands in the north.

Fixed	Total	Fiber	Cable	DSL	Other
Fixed broadband subs per 100 inhabitants[198]	29.18	Data N/A	Data N/A	15.1	Data N/A
Fixed broadband subs (2009)[199]	2,049,300				
% of households with fixed broadband access (2011) [200]	82.9				
Mobile					
Mobile wireless broadband subs per 100 inhabitants[201]	38.22				
Mobile wireless broadband subs (Q4 2010) [202]	2,861,787				

[198] ITU Statistics Database, accessed Dec. 9, 2010.

[199] *Id*.

[200] http://www.ofta.gov.hk/en/datastat/key_stat.html (accessed Apr. 13, 2011).

[201] Wireless Intelligence, https://www.wirelessintelligence.com/Index.aspx (accessed Apr. 14, 2011) (HSPA connections only).

[202] *Id.*

16. Hungary

Regulation: The NCAH (National Communications Regulatory Authority) was established in 2004 as Hungary's independent regulatory authority.[203] The Act LXXXII of 2010 outlines fundamental changes in the regulation of the media and mass communication and also in the management and supervision of the public service media. This law merged the two pre-existing broadcasting regulatory bodies, the National Communications Authority (NHH) and the National Radio and Television Commission (ORTT), into a new converged authority, the National Media and Communications Authority (NMHH).[204]

The incumbent, Magyar Telekom, has been required to offer unbundling to allow competitors access to its network since 2001.

Hungary adopted a "National Broadband Strategy" in 2005. Its aim is to facilitate content development and the spread of broadband communications in the private and public sectors.[205] The government recently announced plans to make broadband Internet available to everyone as part of its digital renewal action plan. The plan has four key components: (1) ensuring equal opportunities to citizens, (2) increasing the competitiveness of businesses, (3) creating a modern IT system in public administration, and (4) developing the IT infrastructure.[206]

Market and Competition: Competitors in the broadband market include Magyar Telekom (T-Mobile), HTCC/Invitel, UPC, Fibernet, and DIGI. The four largest cable broadband providers are UPC, T-Kabel, Fibernet, and DIGI. Magyar Telekom also offers the Sky DSL service, which provides broadband via satellite networks. As of the end of 2009, approximately 933,000 Hungarians subscribed to mobile Internet services, an increase of more than 80 percent over the previous year.[207]

Other Media: Hungary has a mixed system of state-supported public service broadcast media and private broadcasters. There are three publicly-owned TV channels, and the two main privately-owned TV stations are the major national broadcasters. Hungary also has a highly developed market for satellite and cable TV as well as community radio stations.

[203] *See* NHAH, http://www.hif.hu/index.php?lang=en.

[204] *See* http://www.epra.org/comasystem/view/presse/view_presse.pl?datensatz=preV7rd96SvzNUzFoipcbW5tIDnFvkN9BDzarZSNXoAcHAD1qJ9XS1282137319.

[205] *See* ITU, http://www.itu.int/wsis/stocktaking/plugin/documents.asp?project=1142001674&lang=en.

[206] *See* http://www.dteurope.com/business-sectors/news/government-pledges-full-broadband-coverage-in-hungary.html; http://nyitraizsolt.hu/news-in-english/digital-renewal-to-boost-hungarian-creativity/.

[207] IHS Global Insight, *Hungary: Telecoms Report* (2010) (accessed Mar. 2, 2011).

Topography: Hungary is slightly smaller than Indiana. The terrain is mostly flat to rolling plains; there are hills and low mountains on the Slovakian border.

Fixed	Total	Fiber	Cable	DSL	Other
Fixed broadband subs per 100 inhabitants[208]	19.6	1.8	8.7	8.2	1.0
Fixed broadband subs (June 2010)[209]	1,968,049				
% of households with fixed broadband access (2009) [210]	50.9				
Mobile					
Mobile wireless broadband subs per 100 inhabitants[211]	7.5				
Mobile wireless broadband subs (June 2010) [212]	752,768				

[208] OECD Broadband Portal, Table 1d (3) (June 2010) (accessed Feb. 11, 2011).

[209] *Id*.

[210] OECD Broadband Portal, Table 2a (July 2010) (accessed Feb. 11, 2011).

[211] OECD Broadband Portal, Table 1d (2) (June 2010) (accessed Feb. 11, 2011).

[212] *Id*.

17. Iceland

Regulation: Iceland's Post and Telecom Administration (PTA)[213] was created in 1997 and is an independent body under the direction of the Minister of Communications (MOC).[214] The PTA is responsible for granting operational licenses for posts and telecommunications, supervising licensees and enforcing telecommunications policy and regulations.

The legal framework for electronic communications services is influenced by the EU Directives. Having signed the Agreement on the European Economic Area, Iceland committed to adopt all of the EU Directives in the field of electronic communications. Iceland's Electronic Communications Act and the Act on the PTA, both of which were passed in 2003, implement the major provisions of the EU Communications Directive package of 2002.

In 2004, the government released a policy document called "Resources to Serve Everyone: Policy of the Government of Iceland on the Information Society 2004-2007."[215] This national policy document included targets for e-government, e-business, education, environment, security, health care and social services, including access to a secure, reliable, high-speed network at competitive prices.[216]

Market and Competition: Telecommunications infrastructure in Iceland is modern and fully digitized, with satellite-earth stations, fiber-optic cables, and an extensive broadband network. The incumbent Siminn and Vodafone Iceland offer broadband via DSL lines. Mobile phone and broadband penetration rates are among the highest in the world, the latter benefiting from extensive DSL and fiber networks.[217]

Other Media: Iceland has several privately-owned TV stations that broadcast nationally and roughly another half-dozen that operate locally. It also has state-owned TV and radio services. There are also multi-channel cable and satellite TV services.

[213] *See* PTA, http://www.pta.is/default.aspx?cat_id=101.

[214] *See* MOC, http://eng.samgonguraduneyti.is/.

[215] *See* http://eng.forsaetisraduneyti.is/media/English/IT_Policy2004.pdf.

[216] *Id.*

[217] http://www.ficora.fi/attachments/englantiav/5qfzR8JDE/Telecommunication_markets_in_the_Nordic_countries.pdf at p. 19.

Topography: Iceland occupies an area slightly smaller than Kentucky. Iceland's terrain is mainly a plateau interspersed with mountain peaks and ice fields. The coast is deeply indented by bays and fiords.

Fixed	**Total**	**Fiber**	**Cable**	**DSL**	**Other**
Fixed broadband subs per 100 inhabitants[218]	34.0	2.8	0.0	30.5	0.7
Fixed broadband subs (June 2010)[219]	108,391				
% of households with fixed broadband access (2009) [220]	86.7				
Mobile					
Mobile wireless broadband subs per 100 inhabitants[221]	34.3				
Mobile wireless broadband subs (June 2010) [222]	109,459				

[218] OECD Broadband Portal, Table 1d (3) (June 2010) (accessed Feb. 11, 2011).

[219] *Id*.

[220] OECD Broadband Portal, Table 2a (July 2010) (accessed Feb. 11, 2011).

[221] OECD Broadband Portal, Table 1d (2) (June 2010) (accessed Feb. 11, 2011).

[222] *Id*.

18. Ireland

Regulation: Policy is set by the Department of Communications, Energy and Natural Resources (DCENR).[223] The Irish telecom regulator is the Commission for Communications Regulation (ComReg).[224] Under the Communications Regulation Act of 2002, ComReg sets prices, allocates frequencies, and issues licenses to applicants. The incumbent, eircom, is required to provide unbundled loops and bitstream access to competitive providers.[225]

In January of 2009, the Irish government announced its National Broadband Scheme (NBS), with a goal of providing mobile and wireless broadband to regions and populations that do not have broadband access.[226] In December 2008, the government entered into a contract with Three (a Hutchison Whampoa company), to be the provider of services to unserved areas. Residential and business customers within those areas can access mobile wireless broadband services with a minimum download speed of 1.2 Mbps and a minimum upload speed of 200 Kbps with a contention ratio of 36:1.[227] In some areas where service will be very costly and difficult to reach, Three will be allowed to offer a satellite product of 1 Mbps download and 128 Kbps upload. As of the end of 2010, the NBS has provided broadband service to 1,028 areas where coverage was previously seen as insufficient.[228] Under the NBS, Ireland has met the EU target of having basic broadband available to everyone by 2013 two years early.

Market and Competition: Leading broadband competitors in Ireland include eircom, Irish Broadband, BT Ireland, and UPC. In the third quarter of 2009, eircom controlled 35.5 percent of the retail broadband market. The remainder of the market was held by operators of alternative broadband platforms, including cable, fixed wireless, fiber, satellite and mobile broadband.[229] Eircom and Three Ireland are the largest competitors in the mobile broadband market.[230]

Other Media: The publicly-owned broadcaster Radio Telefis Wireann (RTE) operates two television stations. Nearly 75 percent of the population utilizes multi-channel satellite and television services that provide access to a wide range of stations. In addition, the RTE also operates four national radio stations. A number of commercial broadcast stations operate at the local, regional, and national levels.

[223] *See* DCENR, http://www.dcenr.gov.ie/

[224] *See* ComReg, http://www.odtr.ie/.

[225] *See* ComReg, http://www.comreg.ie/_fileupload/publications/pres170402.pdf.

[226] *See* Department of Communications, Energy and Natural Resources, *National Broadband Scheme* (2008), http://www.dcenr.gov.ie/Communications/Communications+Development/National+Broadband+Scheme.htm.

[227] *Id.*

[228] "3 Ireland delivers broadband under National Broadband Scheme," (Dec. 10, 2010), http://www.telecompaper.com/news/3-ireland-delivers-broadband-under-national-broadband-scheme.

[229] ComReg, http://www.comreg.ie/_fileupload/publications/ComReg09101.pdf.

[230] Telegeography GlobalComms Database: Ireland (2010) (accessed Nov. 13, 2010).

Topography: Ireland occupies an area slightly larger than West Virginia. Over 40 percent of the population resides within 62 miles of Dublin. The terrain consists of mostly level to rolling interior plains surrounded by rugged hills and low mountains, with sea cliffs on the west coast.

Fixed	**Total**	**Fiber**	**Cable**	**DSL**	**Other**
Fixed broadband subs per 100 inhabitants[231]	22.3	0.1	3.9	16.3	2.3
Fixed broadband subs (June 2010)[232]	996,480				
% of households with fixed broadband access (2009) [233]	53.7				
Mobile					
Mobile wireless broadband subs per 100 inhabitants[234]	47.9				
Mobile wireless broadband subs (June 2010) [235]	2,139,829				

[231] OECD Broadband Portal, Table 1d (3) (June 2010) (accessed Feb. 11, 2011).

[232] *Id*.

[233] OECD Broadband Portal, Table 2a (July 2010) (accessed Feb. 11, 2011).

[234] OECD Broadband Portal, Table 1d (2) (June 2010) (accessed Feb. 11, 2011).

[235] *Id*.

19. Italy

Regulation: The Ministry of Economic Development (MED) is responsible for overall supervision of Italy's postal and financial systems, as well as coordination of telecommunications policy.[236] The Department of Communications, located within the MED, reviews technical regulations related to ensuring service quality for ICT users; publishes technical procedures regarding type approval for terminal apparatus and the use and connection to telecommunications networks; grants licenses and authorizations; and assists with the planning, allocation and management of spectrum. The Autorità per le Garanzie nelle Comunicazioni (AGCOM) is Italy's independent regulator.[237] Its responsibilities include determining which companies have significant market power; establishing interconnection agreements; setting conditions for access to public networks and granting licenses; ensuring quality of service; and supervising numbering policies.

The take-up of residential broadband services has been largely influenced by two phenomena: the absence of cable television and the relatively limited penetration (approximately 50 percent) of PCs in Italian households. These factors are only partially mitigated by the availability of FTTH and significant take-up of mobile broadband, which is growing.

The government's target is to have broadband available to all Italians by 2012, with 96 percent of the population receiving speeds of 20 Mbps, and the remainder receiving at least 2 Mbps.[238]

Market and Competition: The leading competitors in the Italian broadband market are Telecom Italia, FastWeb, Wind, Tiscali, and Vodafone (Tele2).[239] Alternative last-mile infrastructure (provided by competitive local exchange carriers and fixed wireless and satellite operators), the resale of DSL services, local-loop unbundling and WiMAX have all provided competition for the incumbent Telecom Italia. All four Italian mobile providers (Telecom Italia, Wind, Vodafone and 3 Italia) offer 3G mobile broadband service, with Telecom Italia and Vodafone having the largest shares of the market. Italy lags behind its neighbors in 4G testing and deployment, with Telecom Italia currently testing its technology and expected to be the first to offer service.[240]

Other Media: There are two main media leaders in Italy: the publicly-owned Radiotelevisione Italiana (RAI), and the privately-owned Mediaset. Both companies have three national terrestrial stations. Additional broadcasts are available through a large number of private stations and Sky Italia, which is a satellite TV network. RAI also operates three AM/FM nationwide radio stations. Italy has around 1,300 commercial radio stations.

[236] *See* MED, http://www.comunicazioni.it/english_version/english_ministry/.

[237] *See* AGCOM, http://www2.agcom.it/eng/eng_intro.htm.

[238] National strategies for ultrabroadband infrastructure deployment: Experiences and challenges (April 26-27, 2010), http://www.wik.org/index.php?id=492&L=1.

[239] AGCOM Report, *available at* http://www2.agcom.it/eng/mkt_analysis/mkt_12_summary.pdf.

[240] IHS Global Insight, *Italy: Telecoms Report* (2010) (accessed Mar. 2, 2011).

Topography: Italy occupies an area slightly larger than Arizona. The terrain is mostly rugged and mountainous with some plains and coastal lowlands.

Fixed	Total	Fiber	Cable	DSL	Other
Fixed broadband subs per 100 inhabitants[241]	21.4	0.5	0.0	20.9	0.0
Fixed broadband subs (June 2010)[242]	20,883,448				
% of households with fixed broadband access (2009) [243]	39.0				
Mobile					
Mobile wireless broadband subs per 100 inhabitants[244]	47.9				
Mobile wireless broadband subs (June 2010) [245]	2,139,829				

[241] OECD Broadband Portal, Table 1d (3) (June 2010) (accessed Feb. 11, 2011).

[242] *Id*.

[243] OECD Broadband Portal, Table 2a (July 2010) (accessed Feb. 11, 2011).

[244] OECD Broadband Portal, Table 1d (2) (June 2010) (accessed Feb. 11, 2011).

[245] *Id*.

20. Japan

Regulation: The Ministry of Internal Affairs and Communications (MIC) develops communications policy and administers the Telecommunications Business Law and the Radio Wave Law.[246] MIC also functions as Japan's regulator, issuing telecommunications and broadcasting licenses, and overseeing wire and radio-based services for domestic and international communications. The Telecommunications Business Dispute Resolution Commission (TBDRC) has the power to fine, revoke licenses, and order remedies without appeal or challenges from the government. MIC cannot overrule or challenge TBDRC decisions or become involved in its deliberations.

In September 2006, MIC released its "New Competition Promotion Program 2010," a roadmap for a comprehensive review of its competition rules. Revised by the MIC in 2008, the plan seeks to promote facilities-based competition, review regulations and the calculation method for interconnection charges of NTT East/West, promote competition in the mobile communications market, develop environments intended for implementation of IP-enabled communication terminals, review tariff policies, review universal service system, develop environments intended to ensure network neutrality, strengthen dispute settlement functions and enhance consumer protection measures. The proposed broadband infrastructure entailed establishing broadband in all regions that lacked broadband capability and 90 percent ultra-fast broadband coverage, as well as providing mobile phone access for 200,000 persons outside the range of mobile phone areas by the end of 2010.[247] Such proposed broadband infrastructure has made some progress but has been delayed in some areas due to lack of interest by investors.[248]

Market and Competition: The broadband market leader is NTT. Other providers include Jupiter Broadband (cable broadband); Japan Telecom, KDDI and PoweredCom (all through alternative last-mile infrastructure); SoftbankBB; KDDI; eAccess; Nifty, Opticom; TEPCO and NEC Big Globe. The focus of the broadband market in recent years is on fiber. The number of FTTH subscribers reached 17.2 million in January 2010. FTTH continues to be the most dominant broadband technology in the country and a key driver for overall growth in broadband services. Additionally, in the competitive mobile broadband market, NTT DoCoMo is the leader followed by KDDI and Softbank Mobile. Japan's mobile broadband providers are currently in the process of upgrading to a 4G technology platform.[249]

Other Media: Japan's other media consists of a combination of public, commercial broadcast television and radio stations including a total of five national terrestrial television networks that includes one public broadcaster. The large number of radio and television stations furnishes the public with a wide array of choices. Satellite and cable entities provide access to popular international media.

[246] *See* MIC, http://www.soumu.go.jp/english/index.html.

[247] *See* Ministry of Internal Affairs and Communication, *Efforts toward eliminating the digital divide*, http://www.soumu.go.jp.cache.yimg.jp/english/ib/index.html.

[248] MIC Communication News, Ministry of Internal Affairs and Communications, Vol. 19, No. 1 (Apr. 25, 2008) (accessed Dec. 14, 2010), http://www.soumu.go.jp/main_sosiki/joho_tsusin/eng/Releases/NewsLetter/Vol19/Vol19_01/Vol19_01.html.

[249] *See* IHS Global Insight, *Japan: Telecoms Report* (2010) (accessed Mar. 2, 2011).

Topography: Japan occupies an area slightly smaller than California. The terrain is mostly rugged and mountainous.

Fixed	Total	Fiber	Cable	DSL	Other
Fixed broadband subs per 100 inhabitants[250]	26.3	14.6	4.2	7.3	0.2
Fixed broadband subs (June 2010)[251]	33,550,555				
% of households with fixed broadband access (2009) [252]	65.2				
Mobile					
Mobile wireless broadband subs per 100 inhabitants[253]	75.3				
Mobile wireless broadband subs (June 2010) [254]	96,115,074				

[250] OECD Broadband Portal, Table 1d (3) (June 2010) (accessed Feb. 11, 2011).

[251] *Id*.

[252] OECD Broadband Portal, Table 2a (July 2010) (accessed Feb. 11, 2011).

[253] OECD Broadband Portal, Table 1d (2) (June 2010) (accessed Feb. 11, 2011).

[254] *Id*.

21. Korea

Regulation: The Korea Communications Commission (KCC) was created in February 2008 when the government combined the Ministry of Information and Communication (MIC) and Korean Broadcasting Commission (KBC) to form the KCC.[255] This converged body regulates telecommunications and broadcasting. The Korea Communications Standards Commission (KCSC) is responsible for ensuring "public value and fairness" of broadcasting and Internet content.[256] The KCSC is a non-governmental, independent organization, and its relationship with the rest of the government is unique. If the KCSC decides that government action is necessary to remedy a situation, it must make a recommendation to the KCC.

The KCC administers Korea's broadband plan – the "u-Korea Master Plan" – which MIC adopted in 2006. This plan's goal was "to achieve the world's first ubiquitous society" and to have every household, regardless of income, be equipped with access to the Internet with a minimum transmission speed of 1 Mbps.[257] In February 2009, Korea announced plans to upgrade the national network to offer 1 Gbps service by 2012. By May 2009, it was announced that the KCC was working with operators to establish a new regulatory framework designed to provide for an all-IP era. In addition, the report called on the KCC to improve the openness of fixed line and wireless networks.[258]

Market and Competition: KT Corp. is the broadband market leader, followed by SK Broadband and LGU+, respectively. Other competitors in this market are Tbroad and CJHelloVision.

In the earlier stages of broadband development in Korea, providers drove broadband adoption by developing interactive games and making them key services.[259] Gaming and music downloads are the top two most popular broadband services in Korea.[260] As for mobile broadband, SK Telecom recently announced a new strategy to invest 5.1 trillion by 2014 that will expand networks and meet the soaring demand for high-speed data services. This plan was sparked by the sales boom in smart phones and other digital gadgets in the last fiscal year.[261]

Other Media: Korea's television market is comprised of multiple national television networks; two of the three largest are publicly operated. The largest privately-owned television network is Seoul Broadcasting Service. Other types of television subscriptions available to the public are cable and satellite. As for radio, there are multiple publicly- and privately-owned broadcasting networks with numerous affiliates, as well as independent local stations.

Topography: Korea occupies an area slightly larger than Indiana. The terrain consists of mostly hills and mountains with wide coastal plains in the west and the south.

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[255] *See* KCC, http://www.kcc.go.kr/user/ehpMain.do.

[256] *See* KCSC, http://www.kocsc.or.kr/eng/01_About/Message.php.

[257] *See* http://www.ipc.go.kr/ipceng/public/public_view.jsp?num=2480&fn=&req=&pgno=1 (accessed Apr. 1, 2011).

[258] *See* http://www.ipc.go.kr/servlet/download?pt=/ipceng/public&fn=u-KOREA+Master+Plan+.pdf.

[259] Kim Yongsoo et al., World Bank, Building broadband: Strategies and policies for the developing world (Jan. 2010), *available at* http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTINFORMATIONANDCOMMUNICATIONANDTECHNOLOGIES/0,,contentMDK:20795271~pagePK:210058~piPK:210062~theSitePK:282823,00.html#2010 (download from 2010 publications list).

[260] *Id*.

[261] IHS Global Insight, *South Korea: Telecoms Report* (2010) (accessed Mar. 2, 2011).

Fixed	Total	Fiber	Cable	DSL	Other
Fixed broadband subs per 100 inhabitants[262]	34.4	17.9	10.6	5.9	0.0
Fixed broadband subs (June 2010)[263]	16,789,947				
% of households with fixed broadband access (2009) [264]	83.8				
Mobile					
Mobile wireless broadband subs per 100 inhabitants[265]	95.0				
Mobile wireless broadband subs (June 2010) [266]	46,302,317				

[262] OECD Broadband Portal, Table 1d (3) (June 2010) (accessed Feb. 11, 2011).

[263] *Id*.

[264] *See* KCC. The data for Korea available in the OECD Broadband Portal Table 2a (95.9%) includes mobile broadband access.

[265] OECD Broadband Portal, Table 1d (2) (June 2010) (accessed Feb. 11, 2011).

[266] *Id*.

22. Latvia

Regulation: Latvia's Department of Communications in the Ministry of Transport (MOT) is responsible for policy in the communications sector.[267] The Public Utilities Regulation Commission (Sabiedrisko pakalpojumu regulēšanas komisija or SPRK) was established in 2001 as a unified regulatory body with oversight of the telecommunications, energy, railway and postal sectors.[268] The SPRK approves tariffs, issues licenses and supervises technical regulations and standards.

There are no fully unbundled local loops in Latvia, and the typical wholesale access offer usually amounts to a simple resale agreement in which both the brand and the retail price of the service are controlled by the fixed incumbent.

The "Broadband Network Development Strategy 2006-2012," adopted in December 2005, uses state and EU structural funds (ERDF) to cover up to 35 percent of the total costs for the expansion of high-quality broadband network infrastructure in rural areas.[269]

Market and Competition: Competitors to the incumbent carrier, Lattelkom, include Telekom Baltija, Apollo (Lattelecom), Baltkom, Latnet, Izzi (formerly Telia Multicom), and Vernet. Cable companies and fixed wireless companies serve 43 percent of the total broadband lines and provide infrastructure-based competition in some parts of the country. Lattelecom and Baltkom have both invested in FTTH networks in the capital of Riga.

Bite Latvia, another Latvian operator, launched commercial 3G services in 2006 and eventually phased in High Speed Downlink Packet Access (HSDPA) technology to the country in 2007. In 2009, Bite further extended its 3G/3.5G service network to several new areas across Latvia, covering 19 towns and cities. Bite Latvia and Latvijas Mobilais Telefons (LMT) have planned 4G launches in the near future.[270]

Other Media: Latvia has several foreign-owned national and regional commercial TV stations. Two national TV stations are publicly-owned. Cable and satellite multi-channel TV services with domestic and foreign broadcasts are also available. There is a publicly-owned broadcaster that operates four radio networks with dozens of stations available throughout the country. In addition, a number of private broadcasters operate radio stations.

[267] *See* MOT, http://www.sam.gov.lv/satmin/content/?cat=134.

[268] *See* SPRK, http://www.sprk.gov.lv/?setl=2.

[269] *See* European Union, *eGovernment Fact Sheet – Latvia – Strategy* (last updated September 2009), *available at* http://www.epractice.eu/en/document/288288.

[270] Telegeography GlobalComms Database: Latvia (2010) (accessed Nov. 13, 2010).

Topography: Latvia occupies an area slightly larger than West Virginia. The terrain is mostly fertile, low-lying plains with some hills in the east.

Fixed	Total	Fiber	Cable	DSL	Other
Fixed broadband subs per 100 inhabitants[271]	18.64	Data N/A	Data N/A	9.6	Data N/A
Fixed broadband subs (2009)[272]	419,200				
% of households with fixed broadband access	Data N/A				
Mobile					
Mobile wireless broadband subs per 100 inhabitants[273]	7.21				
Mobile wireless broadband subs (Q4 2010) [274]	161,299				

[271] ITU Statistics Database (accessed Dec. 9, 2010).

[272] *Id*.

[273] Wireless Intelligence, https://www.wirelessintelligence.com/Index.aspx (accessed Apr. 14, 2011) (HSPA connections only).

[274] *Id.*

23. Lithuania

Regulation: The Information and Communication Technology Department of the Ministry of Transport and Communications (MTC) is responsible for making policy in the communications sector.[275] The independent regulator is the Communications Regulatory Agency (Ryšių Reguliavimo Tarnyba or RRT).[276] RRT promulgates rules and regulations on interconnection of telecommunications networks, pricing and the provision of telecommunications services.

The "Development Strategy of the Broadband Infrastructure of Lithuania for 2005-2010" was published on December 31, 2002. Its goals include ensuring availability of broadband to 98 percent of small and medium enterprises by 2010.[277] It also established the public company "Placiajuostis Internetas," a non-profit organization, to develop rural broadband access and training.[278]

Market and Competition: Incumbent TeoLT is the leader in the broadband market, followed by Balticum, Infrostruktura, Lithuanian Telecom (Takas), Microlink, Omnitel (TeliaSonera), Penkj Kontinentai, Tele2, and Vinita. These entities provide cable broadband, alternative infrastructure (via competitive local exchange carriers and satellite operators) and the resale of DSL services. In 2008, Omnitel was the market leader in mobile broadband with 3G operations and 1.991 million subscribers.[279]

Other Media: The public broadcaster in Lithuania operates three channels, one of which is a satellite channel that was introduced in 2007. Various privately-owned commercial television broadcasters operate national and multiple regional channels. Other services include a large number of privately-owned local TV stations, as well as multi-channel cable and satellite TV services. There are three publicly-owned radio networks and a multitude of privately-owned commercial broadcasters, many with repeater stations in various regions throughout the country.

[275] *See* MTC, http://www.transp.lt/en.

[276] *See* RRT, http://www.rrt.lt/index.php?-1341057335.

[277] *See* http://www.transp.lt/Default.aspx?Element=ViewArticle&Lang=EN&TopicID=215&ArticleID=1936.

[278] *See* http://www.placiajuostis.lt/index.php?option=com_content&task=view&id=4&Itemid=4&lang=en.

[279] IHS Global Insight, *Lithuania: Telecoms Report* (2010) (accessed Mar. 2, 2011).

Topography: Lithuania occupies an area slightly larger than West Virginia. The terrain consists of fertile lowlands and many scattered small lakes.

Fixed	**Total**	**Fiber**	**Cable**	**DSL**	**Other**
Fixed broadband subs per 100 inhabitants[280]	19.28	Data N/A	Data N/A	6.9	Data N/A
Fixed broadband subs (2009)[281]	6,333,800				
% of households with fixed broadband access	Data N/A				
Mobile					
Mobile wireless broadband subs per 100 inhabitants[282]	6.9				
Mobile wireless broadband subs (Q4 2010) [283]	229,470				

[280] ITU Statistics Database (accessed Dec. 9, 2010).

[281] *Id*.

[282] Wireless Intelligence, https://www.wirelessintelligence.com/Index.aspx (accessed Apr. 14, 2011) (HSPA connections only).

[283] *Id.*

24. Luxembourg

Regulation: The Ministry of Media and Communications (MMC) is responsible for telecommunications policy.[284] The Institut Luxembourgeois de Regulation (ILR) regulates the telecommunications sector under the guidelines of the EC's regulatory framework.[285]

In August 2008, the ILR adopted two important decisions focused on the market for local loop unbundling and the wholesale access market. [286] As a result of these two decisions, P&T Luxembourg, the incumbent, has an obligation to give access and interconnection to its local loops as well as demonstrate transparency and non-discrimination in its policy and accounting separation.[287] P&T Luxembourg is legally required to open its broadband networks to competitors via wholesale agreements and bitstream access.[288] At the end of 2008, there were 12,000 unbundled lines.[289]

Markert and Competition: Competitors include Luxembourg Online, P&T Luxembourg, and Orange.[290] P&T Luxembourg is the largest provider, holding a 68 percent share in the country's broadband market. Competition to P&T Luxembourg is provided via cable broadband, the resale of DSL service, and local-loop unbundling. Resale is the largest form of alternative broadband access in Luxembourg and accounts for 10 percent of the broadband market. As a result of Luxembourg's liberalized market, two new 3G operators, Astralis and Luxembourg Online have sparked competition in the mobile market.[291]

Other Media: Luxembourg is home to Europe's largest privately-owned broadcast media group, RTL Group, and its largest satellite operator, Societe Europeenne des Satellites (SES). The RTL Group operates 45 television stations and 31 radio stations in Europe. Domestically, the RTL group operates TV and radio networks; other domestic private radio and TV operators as well as French and German stations are available; satellite and cable TV services are accessible in Luxembourg.

[284] *See* MMC, http://www.mediacom.public.lu/.

[285] *See* ILR, http://www.ilr.public.lu/.

[286] Telegeography GlobalComms Database: Luxembourg (2010) (accessed Nov. 13, 2010).

[287] *Id.*

[288] *Id.*

[289] IHS Global Insight, *Luxembourg: Telecoms Report* (2010) (accessed Mar. 2, 2011).

[290] *Id.*

[291] *Id.*

Topography: Luxembourg occupies an area slightly smaller than Rhode Island. The terrain is mostly comprised of gently rolling uplands with broad, shallow valleys. In the north, there are uplands to slightly mountainous terrain and a steep slope down to the Moselle flood plain in the southeast.

Fixed	**Total**	**Fiber**	**Cable**	**DSL**	**Other**
Fixed broadband subs per 100 inhabitants[292]	34.1	0.2	5.8	28.0	0.1
Fixed broadband subs (June 2010)[293]	169,757				
% of households with fixed broadband access (2009) [294]	71.1				
Mobile					
Mobile wireless broadband subs per 100 inhabitants[295]	42.0				
Mobile wireless broadband subs (June 2010) [296]	209,178				

[292] OECD Broadband Portal, Table 1d (3) (June 2010) (accessed Feb. 11, 2011).

[293] *Id*.

[294] OECD Broadband Portal, Table 2a (July 2010) (accessed Feb. 11, 2011).

[295] OECD Broadband Portal, Table 1d (2) (June 2010) (accessed Feb. 11, 2011).

[296] *Id*.

25. Malta

Regulation: The Ministry for Infrastructure Transport and Communications (MITC) is responsible for making policy in the communications sector.[297] The Malta Communications Authority (MCA) was established in January 2001, under the Electronic Communications (Regulations) Act of 1997.[298] The MCA is tasked with regulating electronic communications and e-commerce. The Act of 1997, as amended, includes requirements for interconnection and access to unbundled loops for competitive providers.

Malta's broadband plan is titled "The Smart Island: The National ICT Strategy for Malta (2008-2010)." Among its goals for 2010 are to (1) connect 80 percent of households to broadband, (2) ensure that 75 percent of the population are "ICT-literate," and (3) establish 101 high-speed broadband access centers in communities throughout Malta.[299] The EU's Eurostat database indicates that in 2010 broadband service was available to 69 percent of households in Malta.

Market and Competition: Competitors in the broadband market include the incumbent carrier Go, Melita Cable, Vodafone and other smaller ISPs.[300] Go uses DSL, Melita Cable uses cable facilities, and Vodafone uses WiMAX. All three mobile operators, Vodafone, GO Mobile and Melita Mobile, have invested in HSPA technology allowing them to offer mobile broadband service in 2011.[301]

Other Media: There is one publicly-owned television station, Television Malta, and several national television stations, two of which are owned by political parties. Italian and British broadcast programs are available, while multi-channel cable and satellite TV services are obtainable. The publicly-owned radio broadcaster operates two stations, with roughly 50 commercial radio stations functioning.

[297] *See* MITC, https://mitc.gov.mt/?lid=1.

[298] *See* MCA, http://www.mca.org.mt/.

[299] *See The Smart Island, The National ICT Strategy for Malta 2008-2010,* http://www.thesmartisland.gov.mt/.

[300] MCA, *Wholesale Broadband Access Market: Identification and Analysis of Markets, Determination of Market Power and Setting of Remedies, Final Decision* (Nov. 14, 2008) at 40, http://www.mca.org.mt/.

[301] http://www.reportbuyer.com/telecoms/country_overviews_telecommunications/malta_telecoms_ip_networks_digital_media_forecasts.html.

Topography: Malta occupies an area that is slightly less than twice the size of Washington, DC. The terrain is mostly low, rocky flats to dissected plains with many coastal cliffs.

Fixed	**Total**	**Fiber**	**Cable**	**DSL**	**Other**
Fixed broadband subs per 100 inhabitants[302]	25.89	Data N/A	Data N/A	12.9	Data N/A
Fixed broadband subs (2009)[303]	105,800				
% of households with fixed broadband access	Data N/A				
Mobile					
Mobile wireless broadband subs per 100 inhabitants[304]	10.89				
Mobile wireless broadband subs (Q4 2010) [305]	43,985				

[302] ITU Statistics Database (accessed Dec. 9, 2010).

[303] *Id*.

[304] Wireless Intelligence, https://www.wirelessintelligence.com/Index.aspx (accessed Apr. 14, 2011) (HSPA connections only).

[305] *Id.*

26. Mexico

Regulation: The Ministry of Communications and Transportation (SCT) is the telecommunications policymaker in Mexico, and the Federal Telecommunications Commission (COFETEL), and agency within SCT, is the telecommunications regulator.

The SCT publishes regulations governing technical standards, establishes universal service targets, and together with COFETEL issues licenses. COFETEL, in turn, is responsible for planning and promoting telecommunications regulations and programs, defining and issuing regulations governing technical standards, allocating radio frequencies (in cooperation with SCT), mediating interconnection disagreements between operators, implementing price regulations, and establishing and monitoring service quality standards. COFETEL has technical, operative, expense and management independence from SCT.

The Federal Competition Commission regulates competition issues, and the National Commission on Foreign Investments has the authority to oversee issues regarding foreign-investment involvement in industry operators.[306]

In June 1995, the government approved the Federal Telecommunications Law (FTL) to replace the previous telecommunications regulation, which dated back to 1940. The FTL established the framework to liberalize the sector and open it up to competition.[307] In April 2006, the Mexican Congress amended the FTL and the Federal Radio and Television Law to allow for the provision of triple-play services and designated COFETEL as the entity responsible for the control and supervision of all telecommunications services, including broadcasting services.[308]

In 2007, the Mexican government unveiled its "National Infrastructure Program 2007-2012" to promote infrastructure and investment in Mexico. With respect to the telecommunications sector, the National Infrastructure Program aimed to increase: (1) investment in telecommunications infrastructure to achieve greater fixed and mobile coverage, (2) broadband coverage throughout the country, and (3) the number of Internet users and other communications services.[309]

Market and Competition: The market is dominated by Telmex, followed by a number of smaller competitors, the majority of which operate last-mile fixed-wireless access networks.[310] The leading broadband providers are Telmex, Alestra, Maxcom, Cablevision, Axtel, Cablemás, and Marcatel. As of 2009, the majority of subscribers accessed the Internet via DSL, followed by cable, other technologies (such as dedicated access, ISDN, satellite), and dial-up. According to the OECD's broadband statistics for September 2010, Mexico has the most expensive broadband in terms of cost per megabit per second.

[306] IHS Global Insight, *Mexico: Telecoms Report* (2010) (accessed Mar. 2, 2011).

[307] *Id.*

[308] *Id.*

[309] In particular, the Mexican government sought to promote private investment of at least US$25 billion between 2007 and 2012 as well as increase broadband coverage to 22 users per 100 residents and increase Internet usage to 70 million users by 2012.

[310] Fixed-wireless access networks use wireless technologies instead of copper wire to connect subscribers to the telephone network. *See* http://www.citi.columbia.edu/wireless/!citi_fw.htm.

As of September 2009, Telcel (formerly the mobile arm of Telmex and now owned by its sister group America Móvil), led the 3G market with an estimated 4.25 million subscribers, while Telefónica Móviles Mexico had around one million 3G subscribers. Iusacell had just 150,000 3G subscribers.[311]

Other Media: Mexico has a large number of television stations and more than 1,400 radio stations, most of which are privately owned. In the past, the Televisa group had a virtual monopoly in TV broadcasting, but new broadcasting groups and foreign satellite and cable operators are now available.

Topography: Mexico is slightly less than three times the size of Texas. The terrain is mostly high, rugged mountains, low coastal plains, and high plateaus with areas of desert.

Fixed	**Total**	**Fiber**	**Cable**	**DSL**	**Other**
Fixed broadband subs per 100 inhabitants[312]	10.3	0.0	2.2	7.8	0.3
Fixed broadband subs (June 2010)[313]	11,091,141				
% of households with fixed broadband access (2009)[314]	13.7				
Mobile					
Mobile wireless broadband subs per 100 inhabitants[315]	0.5				
Mobile wireless broadband subs (June 2010)[316]	507,069				

[311] Telegeography GlobalComms Database: Mexico (2010) (accessed Nov. 13, 2010).

[312] OECD Broadband Portal, Table 1d (3) (June 2010) (accessed Feb. 11, 2011).

[313] *Id*.

[314] OECD Broadband Portal, Table 2a (July 2010) (accessed Feb. 11, 2011).

[315] OECD Broadband Portal, Table 1d (2) (June 2010) (accessed Feb. 11, 2011).

[316] *Id*.

27. Netherlands

Regulation: The Directorate-General for Energy and Telecom (DGET) within the Dutch Ministry of Economic Affairs is charged with promoting the availability and use of high-quality electronic communication networks throughout the Netherlands.[317] Specifically, the DGET promotes the organization and operation of markets for energy, electronic communication and postal services, including advocating for users' rights and protection, and, where necessary, encourages the ICT market to develop facilities, products and services for electronic communication. The Independent Post and Telecommunications Authority of the Netherlands (OPTA) is the independent regulator.[318] OPTA is charged with promoting competition in the national telecommunications market. Every three years it is required to conduct analyses of all electronic communications services and examine price variations, the breakdown of the market and the opportunities available to new entrants.

In 2002, the Netherlands created Nederland Breedband Land (NBL), an independent national platform to facilitate the "better and smarter" use broadband.[319] Specifically, the NBL identifies and collects information regarding different broadband projects and bundles it in the Kennisbank or "Knowledge Bank." The NBL then disseminates this information through seminars, workshops and other events. In addition, the NBL tracks potential "breakthrough" community broadband projects on a sector-by-sector basis to support their development as "best practices" and ensure their expansion to the national level. The NBL primarily focuses on the following sectors: healthcare, small and mid-range enterprises, education, security, government, living and working, and traffic and transport.[320] In 2004, the Ministry of Economic Affairs released a Broadband Strategy Outline.[321]

Market and Competition: The Netherlands has one of the highest broadband penetration rates in Europe.[322] According to the OECD, in 2009 DSL was available to approximately 100 percent of the population.[323] Broadband providers in the Netherlands include KPN,[324] Orange,[325] Tele2-Versatel, UPC, BBned, Ziggo and other cable providers. The broadband sector reflects competition between the incumbent telecommunications carrier KPN, cable operators and other competitors utilizing unbundled local loops.[326] Ziggo is the largest fixed broadband provider with over a million broadband customers, while KPN is the second largest provider.[327] All three Dutch mobile operators – KPN, Vodafone and T-

[317] *See* DGET, http://ez.nl/english/Organisation/Organisation_chart/Directorate_General_for_Energy_and_Telecom.

[318] *See* OPTA, http://www.opta.nl/en/.

[319] *See* http://www.nederlandbreedbandland.nl/page/.

[320] *See* http://www.nederlandbreedbandland.nl/page/.

[321] Ministry of Economic Affairs (NL), *The Broadband Paper; A question of pace and better utilization* (May, 2004).

[322] *See* ITU, *ICT Statistics: Internet Indicators: Subscribers, Users, Broadband Subscribers*, http://www.itu.int/ITU-D/icteye/Reporting/ShowReportFrame.aspx?ReportName=/WTI/InformationTechnologyPublic&RP_intYear=2008&RP_intLanguageID=1.

[323] *See* http://www.oecd.org/document/36/0,3746,en_2649_33703_38690102_1_1_1_1,00.html.

[324] *See* KPN website, http://.kpn.com/reporting08/review08/group_at_a_glance/index.html.

[325] T-Mobile acquired Orange Netherlands in 2007. *See* http://www.t-mobile.nl/corporate/htdocs/page/en/home/about_t-mobile/the_company.aspx.

[326] *See* OPTA, *Broadband ULL*, http://www.opta.nl/nl/wat-doet-opta/markten/breedband-ull/; *see also* OPTA, *Broadband WBT*, http://www.opta.nl/nl/wat-doet-opta/markten/breedband-wbt/.

[327] KPN, *This Is KPN*, http://www.kpn.com/corporate/en/Company-profile-1/company-1/This-is-KPN.htm; http://www.broadbandtvnews.com/2011/04/26/ziggo-phasing-out-analogue-channels/; http://www.bloomberg.com/news/2011-04-05/ziggo-owners-said-to-seek-as-much-as-2-1-billion-in-share-sale.html.

Mobile – have 3G licenses and offer mobile broadband services. In April 2010, OPTA completed the auction of 2.6 GHz frequency licenses, which were awarded to two new entrants, Ziggo 4 and Tele2 Mobile, in addition to the three incumbents.[328]

Other Media: The Netherlands has more than 90 percent of households connected to cable or satellite TV systems that provide a wide range of domestic and foreign channels. They also have a public service broadcast system that includes multiple broadcasters and a number of commercial TV stations in regional and local markets. There are nearly 600 radio stations operating with a mix of public and private stations providing national or regional coverage.

Topography: Netherlands occupies an area that is slightly less than twice the size of New Jersey. The terrain is mostly coastal lowland and reclaimed land with some hills in the southeast.

Fixed	**Total**	**Fiber**	**Cable**	**DSL**	**Other**
Fixed broadband subs per 100 inhabitants[329]	37.8	0.9	14.8	22.0	0.0
Fixed broadband subs (June 2010)[330]	6,245,000				
% of households with fixed broadband access (2009)[331]	77.0				
Mobile					
Mobile wireless broadband subs per 100 inhabitants[332]	28.9				
Mobile wireless broadband subs (June 2010)[333]	4,777,000				

[328] IHS Global Insight, *Netherlands: Telecoms Report* (2010) (accessed Mar. 2, 2011).

[329] OECD Broadband Portal, Table 1d (3) (June 2010) (accessed Feb. 11, 2011).

[330] *Id*.

[331] OECD Broadband Portal, Table 2a (July 2010) (accessed Feb. 11, 2011).

[332] OECD Broadband Portal, Table 1d (2) (June 2010) (accessed Feb. 11, 2011).

[333] *Id*.

28. New Zealand

Regulation: The Ministry of Economic Development is tasked with fostering economic development and prosperity for New Zealand. The Ministry advises the government and implements policy in relation to a wide range of economic issues.[334] The broadband market is regulated by the Commerce Commission of New Zealand, an independent entity which was established under the Commerce Act of 1986.[335]

In late 2009 and early 2010, New Zealand announced two initiatives both aimed at increasing broadband penetration: the Ultra-Fast Broadband Initiative and the Rural Broadband Initiative. The overall aim of the Ultra-Fast Broadband Initiative is to have an ultra-fast broadband network available to 75 percent of the population by 2019, and to priority users, such as businesses, schools and health services by 2015.[336] The two main objectives for the Rural Broadband Initiative are providing 97 percent of New Zealand households and enterprises with broadband services capable of 5 Mbps or more, and connecting 97 percent of New Zealand schools to ultra-fast broadband at speeds of at least 100 Mbps.[337]

Market and Competition: The broadband market is dominated by Telecom New Zealand, which holds a 65 percent share. The leading providers in the broadband market are Orcon, Telecom New Zealand, TelstraClear, and Vodafone. Although Telecom New Zealand has maintained its dominant position, competition has begun to increase. Competition to Telecom New Zealand is provided in several ways: cable broadband, alternative last-mile infrastructure, resale of DSL services, and local-loop unbundling.

In November 2004, Telecom Mobile launched New Zealand's first 3G service, which was initially available only in the main metropolitan areas. In early 2005, Telecom Mobile introduced a video content service, and two months after that, announced that 3G would be rolled out to all major towns and cities in the country by the end of the year.[338] A new competitor, 2degrees, began offering 3G services in August 2010.[339]

Other Media: The state-owned Television New Zealand operates multiple television networks while the state-owned Radio New Zealand operates three radio networks and an external shortwave radio service to the South Pacific region. In addition, New Zealand has a small number of national commercial television and radio stations. A large number of regional commercial television and radio stations as well as accessible cable and satellite TV systems are available.

[334] Ministry of Economic Development, http://www.med.govt.nz/.

[335] Telegeography GlobalComms Database: New Zealand (2010) (accessed Nov. 13, 2010).

[336] Ministry of Economic Development, http://www.med.govt.nz/.

[337] *Id.*

[338] Telegeography GlobalComms Database: New Zealand, 2010.

[339] IHS Global Insight, *New Zealand: Telecoms Report* (2010) (accessed Mar. 22, 2011).

Topography: New Zealand is roughly the size of Colorado. Nearly 90 percent of New Zealand's population lives in cities. The country is predominantly mountainous with some large coastal plains.

Fixed	**Total**	**Fiber**	**Cable**	**DSL**	**Other**
Fixed broadband subs per 100 inhabitants[340]	24.5	0.1	1.5	23.0	0.0
Fixed broadband subs (June 2010)[341]	1,048,518				
% of households with fixed broadband access (2006) [342]	63.0				
Mobile					
Mobile wireless broadband subs per 100 inhabitants[343]	38.91				
Mobile wireless broadband subs (Q4 2010) [344]	1,645,964				

[340] OECD Broadband Portal, Table 1d (3) (June 2010) (accessed Feb. 11, 2011).

[341] *Id*.

[342] OECD Broadband Portal, Table 2a (July 2010) (accessed Feb. 11, 2011).

[343] Wireless Intelligence, https://www.wirelessintelligence.com/Index.aspx (accessed Apr. 14, 2011) (HSPA connections only).

[344] *Id.*

29. Norway

Regulation: The Ministry of Transport and Communications (MTC) monitors telecommunications markets in Norway.[345] The Norwegian Post and Telecommunications Authority (NPT) is an autonomous, self-financed administrative agency under the MTC.[346] The NPT is responsible for monitoring private sector compliance with national telecommunications statutes, regulations and license requirements; supervising telecommunications providers; supervising registries; assigning domain names; and contingency planning for national network security.

In 2009, NPT adopted voluntary guidelines on network neutrality.[347] These guidelines state that Internet users are entitled to an Internet connection with a predefined capacity and quality that enables them to use content, services, applications and devices of their choice, and that is free of discrimination with regard to the type of content, service, or application or based on the sender or receiver address.[348]

Market and Competition: Broadband penetration in Norway is one of the highest in Europe. The leading broadband competitors are Telenor and NextGenTel. Other competitors include Ventelo and Get.[349] Telenor has just over 50 percent of broadband subscribers. Mobile broadband has been growing rapidly, with subscriptions up nearly 85 percent in 2009.[350] NetCom's Norwegian 4G network is expected to have coverage of the country's four largest cities, with 4G voice services expected in 2011 after compatible handsets become available.[351] Telenor has also announced plans to run trials of its own LTE services in Oslo in the summer of 2011.[352]

Other Media: Norway's state-owned public radio-TV broadcaster operates three nationwide television stations, three nationwide radio stations, and 16 regional radio stations. There are also about a dozen privately-owned television stations that broadcast nationally and another 25 local TV stations. Nearly 75 percent of households in Norway have access to multi-channel cable or satellite TV systems. Additionally, Norway has two privately-owned radio stations that broadcast nationwide and another 240 stations that operate locally.

[345] *See* MTC, http://www.regjeringen.no/en/dep/sd.html?id=791.

[346] *See* NPT, http://www.npt.no/portal/page/portal/PG_NPT_NO_EN/PAG_NPT_EN_HOME.

[347] NPT, *Network neutrality – Guidelines for Internet neutrality* (Feb. 24, 2009), *available at* http://www.npt.no/ikbViewer/Content/109604/Guidelines%20for%20network%20neutrality.pdf.

[348] *Id*.

[349] *See* Ventelo, http://www.ventelo.no/om-ventelo/fakta-om-ventelo/eierforhold.html; Get, http://get.no/web/omGet.

[350] IHS Global Insight, *Norway: Telecoms Report* (2010) (accessed Mar. 2, 2011).

[351] Telegeography GlobalComms Database: Norway (2010) (accessed Nov. 13, 2010).

[352] *Id.*

Topography: Norway occupies an area slightly larger than New Mexico. Its terrain consists of mostly high plateaus and rugged mountains broken by fertile valleys. There are also small, scattered plains, and the arctic tundra in the north. The coastline is deeply indented by fjords.

Fixed	**Total**	**Fiber**	**Cable**	**DSL**	**Other**
Fixed broadband subs per 100 inhabitants[353]	35.0	4.8	9.2	20.2	0.8
Fixed broadband subs (June 2010)[354]	1,689,612				
% of households with fixed broadband access (2009) [355]	77.8				
Mobile					
Mobile wireless broadband subs per 100 inhabitants[356]	72.8				
Mobile wireless broadband subs (June 2010) [357]	3,517,859				

[353] OECD Broadband Portal, Table 1d (3) (June 2010) (accessed Feb. 11, 2011).

[354] *Id*.

[355] OECD Broadband Portal, Table 2a (July 2010) (accessed Feb. 11, 2011).

[356] OECD Broadband Portal, Table 1d (2) (June 2010) (accessed Feb. 11, 2011).

[357] *Id*.

30. Poland

Regulation: The Ministry of Infrastructure (MOI) is responsible for telecommunications policy.[358] In January 2006, Poland established the Office of Electronic Communications (UKE), which is the national regulatory authority for the telecommunications sector.[359] The UKE is charged with analyzing the Polish market to confirm that there is no distortion or restriction of competition; ensuring efficient investment in infrastructure and promoting innovation; encouraging efficient use and effective management of radio frequencies and numbering; supervising orbital and numbering resources; licensing operators; enforcing compliance with electromagnetic compatibility requirements; and cooperating with the Polish Office for Competition and Consumers Protection in matters related to the enforcement of the rights of citizens using postal and telecommunications services.

In April 2009, the government announced plans to direct 300 million Euros (US$397 million) for broadband expansion, with a goal of making broadband available to 90 percent of households and 100 percent of businesses and public institutions by 2013.

Market and Competition: Telekomunikacja Polska (TP), the incumbent wireline carrier, holds approximately 40 percent of the broadband market, while cable operators account for another 25 percent. The leading broadband cable providers include UPC Polska, Vectra, Aster City, and Multimedia Polska. Other competitors in the broadband market include resellers Netia, Dialog, Exatel, Tele2, NOM, GTS, and Energis; and alternative infrastructure providers Netia and Telefonia Dialog. Mobile broadband subscriptions more than doubled from the end of May 2008 through the end of May 2009. This growth has been partly due to poor fixed broadband infrastructure, giving mobile operators opportunities to acquire customers that do not have access to fixed broadband offerings.[360] In 2009, Mobyland and CenterNet signed a letter of intent to share usage of their 1700/1800 MHz spectrum to roll out 4G LTE services.[361] Also in 2009, Aero2 won a broadband license covering the entire country, which is also suitable for LTE services.[362]

Other Media: State-run public television operates two national channels supplemented by 16 regional channels and several niche channels. Other privately-owned entities operate several national TV broadcast networks and a number of special interest channels. A large number of privately-owned channels also broadcast locally. Nearly half of all Polish households are linked to either satellite or cable TV systems providing access to foreign television networks. Poland's state-run public radio operates five national networks and 17 regional radio stations. In terms of radio, Poland has two privately-owned national radio networks, several commercial stations broadcasting to multiple cities, and a large number of privately-owned local radio stations.

[358] *See* MOI, http://www.en.mi.gov.pl/.

[359] *See* UKE, http://www.en.uke.gov.pl/ukeen/index.jsp?place=Menu07&news_cat_id=79&layout=0.

[360] IHS Global Insight, *Poland: Telecoms Report* (2010) (accessed Mar. 2, 2011).

[361] Telegeography GlobalComms Database: Poland (2010) (accessed Nov. 13, 2010).

[362] *Id.*

Topography: Poland occupies an area slightly smaller than New Mexico. Poland's terrain is mostly flat plains with mountains along the southern border.

Fixed	Total	Fiber	Cable	DSL	Other
Fixed broadband subs per 100 inhabitants[363]	14.9	0.2	4.0	7.6	3.0
Fixed broadband subs (June 2010)[364]	5,677,795				
% of households with fixed broadband access (2009) [365]	51.1				
Mobile					
Mobile wireless broadband subs per 100 inhabitants[366]	48.3				
Mobile wireless broadband subs (June 2010) [367]	18,401,344				

[363] OECD Broadband Portal, Table 1d (3) (June 2010) (accessed Feb. 11, 2011).

[364] *Id*.

[365] OECD Broadband Portal, Table 2a (July 2010) (accessed Feb. 11, 2011).

[366] OECD Broadband Portal, Table 1d (2) (June 2010) (accessed Feb. 11, 2011).

[367] *Id*.

31. Portugal

Regulation: The Autoridade Nacional de Comunicações (ANACOM) is the independent regulator.[368] ANACOM has authority over postal and electronic communications. The Competition Authority, an independent and financially autonomous institution, is empowered to deal with competition issues in all sectors of the economy, including regulated sectors such as electronic communications. The Ministry of Public Works, Transportation and Communications (MOPTC) develops and implements national communications policies.

In April 2006, ANACOM set maximum charges for local-loop unbundling offers, and in June 2007, it approved a decision regarding collocation procedures.

In January 2009, Portugal's government announced an 800 million Euros (US$1.1 billion) credit line for the rollout of next-generation broadband networks in the country. This is the first step in a 2.18 billion Euros (US$3 billion) plan announced in December 2008 to boost the country's economy.[369]

Market and Competition: Portugal's leading broadband service providers include Portugal Telecom (PT), ZON Multimedia/TV Cabo, Sonaecom Group, and Cabovisão.[370] In the third quarter of 2009, Portugal Telecom held a 46 percent market share, ZON Multimedia/TV Cabo held 33 percent, and Sonaecom and Cabovisão each held eight percent.[371]

According to ANACOM, in March 2010, there were a total of 8.4 million 3G-capable devices active on Portuguese mobile networks, or more than 50 percent of the country's total cellular subscription base.[372] The number of mobile network subscribers who actually use 3G services, such as video telephony, broadband-speed data/Internet access/transmission on headsets or computers, mobile TV and other 3G applications, was 3.1 million, which represents 19 percent of the national 2G/3G subscriber market.[373]

Other Media: In Portugal, the publicly-owned TV broadcaster operates two domestic channels and external service channels to Africa. Overall, there are around 40 domestic television stations. Also, viewers have widespread access to international broadcasters with more than half of all households connected to multi-channel cable or satellite TV systems. There are three publicly-owned national radio networks, providing regional and external services. There are also several privately-owned national radio stations and around 300 regional and local commercial radio stations.

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[368] *See* ANACOM, http://www.anacom.pt/render.jsp?categoryName=CATEGORY_ROOT&languageId=1.

[369] *See* ITU, Developments of Next Generation Networks (NGN): Country Case Studies (2009), *available at* http://www.itu.int/ITU-D/treg/Documentation/ITU-NGN09.pdf at 44.

[370] *See* ANACOM, http://www.anacom.pt/render.jsp?contentId=996599.

[371] IHS Global Insight, *Portugal: Telecoms Report* (2010) (accessed Oct. 22, 2010).

[372] Telegeography GlobalComms Database: Portugal (2010) (accessed Nov. 13, 2010).

[373] *Id.*

Topography: Portugal occupies an area slightly smaller than Indiana. The terrain is mountainous north of the Tagus River with rolling plains in the south.

Fixed	Total	Fiber	Cable	DSL	Other
Fixed broadband subs per 100 inhabitants[374]	19.1	0.1	7.6	10.5	0.2
Fixed broadband subs (June 2010)[375]	2,036,790				
% of households with fixed broadband access (2009) [376]	46.2				
Mobile					
Mobile wireless broadband subs per 100 inhabitants[377]	21.3				
Mobile wireless broadband subs (June 2010) [378]	2,267,759				

[374] OECD Broadband Portal, Table 1d (3) (June 2010) (accessed Feb. 11, 2011).

[375] *Id*.

[376] OECD Broadband Portal, Table 2a (July 2010) (accessed Feb. 11, 2011).

[377] OECD Broadband Portal, Table 1d (2) (June 2010) (accessed Feb. 11, 2011).

[378] *Id*.

32. Romania

Regulation: The policymaker is the Ministry of Communications and Information Society.[379] The Romanian telecommunications regulator is the National Authority for Management and Regulation in Communications (ANCOM, previously ANC).[380] Romania has harmonized the country's regulatory system to meet the requirements of EU membership. The most significant items on ANCOM's current agenda include the revision of the tariffs for unbundled local loops and the liberalization of the 900 and 1800 MHz frequency bands for data services.[381]

The Ministry of Communications and Information Society issued a broadband strategy in 2009, which called for the installation of 500 hotspots all over the country.[382] The "Digital Romania - eStrategy for an Information Society" initiative and the National Broadband Strategy are the cornerstones of Romania's ICT efforts.[383] Among Romania's priorities are e-government and projects for education, health, culture and tourism and a portal to integrate all cultural, tourist, historical, geographical, religious and territorial administrative information.[384]

Market and Competition: Romtelecom, the incumbent wireline carrier, is the largest competitor in the broadband market, holding approximately 25 percent of the market. Competitors include broadband cable providers, UPC Romania, RCS&RDS; resellers, PCNet, EUfonica; and alternative service providers, RCS&RDS and Atlas Telecom. Subscriber growth has been limited in the past due to relatively high retail charges and poor network quality. A number of alternative providers have entered the market offering resale DSL access, but this competition has been directed mostly toward the enterprise sector, with the residential broadband market being served by the incumbent and cable-based operators. Leading mobile operators Orange and Vodafone have signaled that they plan to expand to the fixed sector as the regulatory conditions turn more favorable.[385]

Three of Romania's four mobile operators offer 3G services. At the end of 2008, Romania had the lowest mobile broadband penetration rate in the EU. UMTS 900 is viewed as the solution to deploying 3G to less densely populated parts of the market, thereby extending the reach of mobile broadband further. Vodafone Romania upgraded to a HSPA+ network in September 2009.[386]

Other Media: There is a mixture of public and private TV stations. The public broadcaster operates multiple stations which include roughly 100 private national, regional, and local stations. More than 75 percent of households are connected to multi-channel cable or satellite TV systems that provide access to Romanian, European, and international stations. The state-owned public radio broadcaster operates four national networks and regional and local stations while there is also more than 100 private radio stations broadcasting.

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[379] *See* Ministry, http://www.mcsi.ro/.

[380] *See* ANCOM, http://www.anrcti.ro/.

[381] IHS Global Insight, *Romania: Telecoms Report* (2010) (accessed Mar. 2, 2011).

[382] http://www.ecomunitate.ro/en/Internet_gratuit_pentru_zeci_de_mii_de_galateni_(17450).html.

[383] *See* Connect-World, http://www.connect-world.com/articles/recent_article.php?oid=Europe_II_2009_02; http://www.gov.ro/chapter-14-information-society__l2a1048.html.

[384] *Id.*

[385] IHS Global Insight, *Romania: Telecoms Report* (2010) (accessed Mar. 2, 2011).

[386] *Id.*

Topography: Romania occupies an area slightly smaller than Oregon. The central Transylvanian Basin is separated from the Moldavian Plateau in the east by the Eastern Carpathian Mountains, and it is separated from the Walachian Plain in the south by the Transylvanian Alps.

Fixed	**Total**	**Fiber**	**Cable**	**DSL**	**Other**
Fixed broadband subs per 100 inhabitants[387]	13.16	Data N/A	Data N/A	3.7	Data N/A
Fixed broadband subs (2009)[388]	2,800,000				
% of households with fixed broadband access	Data N/A				
Mobile					
Mobile wireless broadband subs per 100 inhabitants[389]	5.27				
Mobile wireless broadband subs (Q4 2010) [390]	1,149,193				

[387] ITU Statistics Database (accessed Dec. 9, 2010).

[388] *Id*.

[389] Wireless Intelligence, https://www.wirelessintelligence.com/Index.aspx (accessed Apr. 14, 2011) (HSPA connections only).

[390] *Id.*

33. Singapore

Regulation: The Ministry of Information, Communications and the Arts (MICA) develops policy on information technology and telecommunications, as well as the arts. MICA's mission is to maintain the "Singaporean identity" by developing and promoting the arts, culture, design, media, and information technology.

The Infocomm Development Agency (IDA) is Singapore's telecommunications regulator. Its duties include licensing, industry regulation, information security, and developing necessary infrastructure for e-commerce, multimedia, content hosting, and other services.

In 2006, Singapore launched Intelligent Nation 2015 (iN2015), a 10-year plan for ICT development. Under this plan, Singapore is deploying a seamless next-generation broadband network with both a wireline and a wireless part. The wireline portion is an ultra high-speed, all-fiber network that will provide access speeds of 1 Gbps and more to all physical addresses in Singapore, and is expected to reach 95 percent of homes and offices by 2012. The network will be wireline and wireless, and open to all service providers, competing with the two facilities-based operators, SingTel (incumbent and majority State-owned) and StarHub.[391]

In June 2010, the government launched the Singapore Internet Exchange (SGIX) which provides a neutral central point for traffic exchange.[392] The exchange will promote more efficient Internet service within Singapore and will also further the government's efforts to make Singapore a regional and international hub for Internet traffic.[393]

Market and Competition: SingTel and StarHub are the leading competitors in the broadband market. SingTel had 495,000 retail broadband subscribers, representing 51 percent of the country's broadband subscriber base as of the end of 2008. StarHub, a major cable broadband service provider, had 373,000 broadband subscribers with a market share of 38 percent. StarHub is the leading cable broadband service and alternative infrastructure service provider, while PacNet is the leading reseller of broadband Internet services. Singapore's three mobile operators all launched their 3G services in 2005. As of the end of 2009, they had a total of 3.16 million 3G subscribers or 46 percent of the total mobile subscriber base in the country.[394]

Other Media: The state controls broadcast media. MediaCorp, wholly owned by a state investment company, operates eight domestic TV stations. Broadcasts from Malaysian and Indonesian stations are also available. Satellite dishes are banned in Singapore while multi-channel cable TV service is accessible. A total of 18 domestic radio stations broadcasting with MediaCorp are closely linked to the ruling party or controlled by the Singapore Armed Forces Reservists Association.

[391] *See* http://www.ida.gov.sg/Infrastructure/20060919190208.aspx.

[392] *See* http://www.straitstimes.com/BreakingNews/Singapore/Story/STIStory_540557.html; http://sgix.sg/en/about/.

[393] http://www.igov.gov.sg/NR/rdonlyres/E980473A-76C6-408F-ABB7-8A042FEE9450/16292/SingaporeInternetExchangeCOSmediafactsheet.pdf.

[394] IHS Global Insight, *Singapore: Telecoms Report* (2010) (Mar. 2, 2011).

Topography: Singapore occupies an area that is slightly more than 3.5 times the size of Washington, D.C. The terrain consists of lowland and a gently undulating central plateau, which contains a water catchment area and nature preserve.

Fixed	**Total**	**Fiber**	**Cable**	**DSL**	**Other**
Fixed broadband subs per 100 inhabitants[395]	24.71	Data N/A	Data N/A	11.3	Data N/A
Fixed broadband subs (June 2010)[396]	1,170,700				
% of households with fixed broadband access (2009)[397]	80				
Mobile					
Mobile wireless broadband subs per 100 inhabitants[398]	62.97				
Mobile wireless broadband subs (Q4 2010) [399]	2,348,174				

[395] ITU Statistics Database (accessed Dec. 9, 2010).

[396] *Id*.

[397] http://www.ida.gov.sg/Publications/20070822125451.aspx#usageHse2b.

[398] Wireless Intelligence, https://www.wirelessintelligence.com/Index.aspx (accessed Apr. 14, 2011) (HSPA connections only).

[399] *Id.*

34. Slovak Republic

Regulation: The Ministry of Transport, Posts and Telecommunications (MTPT) sets policy and controls the government's ownership share in Slovak Telecom, the incumbent wireline carrier.[400] The Telecommunications Regulatory Authority of the Slovak Republic (Telekomunikačný úrad Slovenskej republiky or TÚSR) is the independent regulator.[401] The TÚSR implements the Act on Electronic Communications, a law that entered into force in January 2004.

Adopted in 2004, the National Strategy for the Broadband Access to Services of the Information Society in the Slovak Republic describes broadband availability in the Slovak Republic and sets a goal to achieve the level enjoyed by developed EU nations within five to eight years. Steps to reach that goal include legislative changes, efficient use of spectrum, completing a digital television transition by 2012, and state support of broadband access development.[402]

Market and Competition: Slovak Telekom controls over 90 percent of the DSL market. Other competitors include broadband cable providers, UPC Slovakia, Satro; resellers, GTS, Dial Telecom, Slovanet, and Swan; alternative infrastructure providers, Orange, Slovanet, Slovenkse Elektarne, Zeleznicne Telekomunikacie, Slovensky Plynarensky Priemysel, and Swan; and fixed wireless access providers, GTS Nextra, Slovanet and Swan. Three wireless providers hold 3G licenses, Orange Slovakia, T-Mobile Slovakia and Telefonica 02 Slovakia.

Other Media: The Slovak Republic's state-owned public broadcaster, Slovak Television, operates three national TV stations. There are about 35 privately-owned television broadcast stations operating nationally, regionally, and locally. About 40 percent of households are connected to multi-channel cable or satellite TV systems; channels from the Czech Republic and Hungary are widely viewed. There are more than 20 privately-owned radio stations in the country.

[400] *See* MPTP, http://www.telecom.gov.sk/index/index.php?lang=en.

[401] *See* TÚSR, http://www.teleoff.gov.sk/index.php?ID=9.

[402] *See* http://www.telecom.gov.sk/index/index.php?ids=8811&lang=en.

Topography: The Slovak Republic occupies an area about twice the size of New Hampshire. The terrain consists of rugged mountains in the central and northern region and lowlands in the south.

Fixed	Total	Fiber	Cable	DSL	Other
Fixed broadband subs per 100 inhabitants[403]	15.1	3.4	1.6	7.0	3.0
Fixed broadband subs (June 2010)[404]	816,179				
% of households with fixed broadband access (2009) [405]	41.7				
Mobile					
Mobile wireless broadband subs per 100 inhabitants[406]	32.7				
Mobile wireless broadband subs (June 2010) [407]	1,773,297				

[403] OECD Broadband Portal, Table 1d (3) (June 2010) (accessed Feb. 11, 2011).

[404] *Id*.

[405] OECD Broadband Portal, Table 2a (July 2010) (accessed Feb. 11, 2011).

[406] OECD Broadband Portal, Table 1d (2) (June 2010) (accessed Feb. 11, 2011).

[407] *Id*.

35. Slovenia

Regulation: Under the auspices of the Ministry of Economy, the Post and Electronic Communications Agency (Agencija za pošto in elektronske komunikacije or APEK) was created in 2004 as an independent regulatory body that regulates electronic communications, postal services and radio and television programs.[408]

Slovenia's "Strategy of the Development of Information Society" was initially created in 2007 in accordance with the European initiative i2010.[409] The strategy was revised in 2008, and commits the government of Slovenia to an investment of over 15 million Euros (US$20.4 million) over the next year, with a goal of extending broadband (at least 1 Mbps) to households and public institutions by the end of 2010.[410]

Market and Competition: Telekom Slovenije, the incumbent wireline carrier, is the leading competitor in the fixed broadband market, holding 46.149.1 percent of the market as of the end of 20098. T-2, a broadband service provider, follows with 19.68.2 percent. Amis, Telemach, Tusmobil, UPC Ljublijanski kabel, and Telemach Rotovz, and Telemach Taborus Telekom,, also fixed broadband service providers, all held less than 10 percent of the broadband market. Broadband competitors include broadband cable service providers, UPC Telemach, Ljublijanski, Kabel; alternative infrastructure providers, T-2; and reseller, T-2. At the end of 20098, competitors provided broadband service to 289,400 subscribers using xDSL, 104,939 subscribers using cable modem, and 58,200 subscribers with unbundled loops and 14,700 subscribers with bitstream access.[411] Providers used FTTH for 68,44227,100 subscribers using FTTH.[412][413] Three carriers offer 3G services Mobiletel, Si.Mobil and T-2. A fourth carrier, Tusmobil, is currently deploying its 3G service.[414]

Other Media: Radiotelevizija Slovenija, a public television broadcaster, operates a system of national and regional TV stations. RTV has 35 domestic commercial television stations operating nationally, regionally, and locally. About 60 percent of households are connected to multi-channel cable TV systems, and the public radio broadcaster operates three national, four regional stations and more than 75 regional and local commercial and non-commercial radio stations.

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[408] *See* APEK, http://www.apek.si/en/strategy.

[409] Government of the Republic of Slovenia, *Development Strategy for the Information Society in the Republic of Slovenia si2010* (June 2007), *available at* http://mvzt.gov.si/fileadmin/mvzt.gov.si/pageuploads/pdf/informacijska_druzba/61405-EN_Strategija_razvoja_informacijske_druzbe_v_RS_si2010.pdf.

[410] CESInfo, *DICE Report*, *available at* http://www.cesifo-group.de/portal/page/portal/DICE_Content/INFRASTRUCTURE/COMMUNICATION_NETWORKS/Cable%20Networks/dicereport309-db1.pdf.

[411] APEK, *Annual Report 2009, , available at* http://www.apek.si/datoteke/File/Porocila/AnnualReport2009_final2.pdf.

[412] APEK, *Annual Report 2009, 32-42 , available at* http://www.apek.si/datoteke/File/Porocila/AnnualReport2009_final2.pdf.

[413] *Id.*

[414] IHS Global Insight, *Slovenia: Telecoms Report* (2010) (accessed Mar. 2, 2011).

Topography: Slovenia occupies an area slightly smaller than New Jersey. The terrain consists of a short coastal strip on the Adriatic, an alpine mountain region adjacent to Italy and Austria, and a mix of mountains and valleys with numerous rivers to the east.

Fixed	**Total**	**Fiber**	**Cable**	**DSL**	**Other**
Fixed broadband subs per 100 inhabitants[415]	23.71	Data N/A	Data N/A	14.3	Data N/A
Fixed broadband subs (2009)[416]	479,000				
% of households with fixed broadband access (2009)	56.1				
Mobile					
Mobile wireless broadband subs per 100 inhabitants[417]	14.35				
Mobile wireless broadband subs (Q4 2010) [418]	286,962				

[415] ITU Statistics Database (accessed Dec. 9, 2010).

[416] *Id*.

[417] Wireless Intelligence, https://www.wirelessintelligence.com/Index.aspx (accessed Apr. 14, 2011) (HSPA connections only).

[418] *Id.*

36. Spain

Regulation: The Secretary of Telecommunications in the Ministry of Industry, Tourism and Trade is responsible for proposing and carrying out government policy in the areas of telecommunications and audiovisual media. Spain's telecommunications market is regulated by the Comisión del Mercado de las Telecomunicaciones (CMT), Spain's independent regulator. CMT was created by statute in 1997 to adjudicate disputes between operators and service providers, promote competition in the ICT market, and grant licenses to domestic and foreign telecommunications companies.[419]

In November 2009, the Spanish government announced that Spanish citizens will have a legal right starting in 2011 to buy broadband Internet service of at least 1 Mbps at a regulated price wherever they live.[420] The goals of Spain's "Avanza Plan" include: increasing the deployment of Internet services in every Spanish community, closing the digital divide in order to improve the quality of life of its citizens, and increasing the nation's public expenditure in ICT to 7 percent of Spain's GDP by 2010.[421]

Market and Competition: The broadband market is dominated by Telefónica. Other large competitors to Telefónica are Ono and France Telecom's Orange, followed by Vodafone and Jazztel. Broadband services are provided by broadband cable providers, Ono, R Cable, Euskaltel, Telecable; and resellers, Orange/Ya.com, Jazztel, Vodafone/Tele2. Additionally, there are four network operators for the mobile broadband market: Telefónica Móviles; Vodafone; Orange; and TeliaSonera Yoigo.[422]

Other Media: There is a blend of both publicly-operated and privately-owned radio and television broadcasting stations in Spain. These media outlets supply the public with a multitude of national, regional, local, public, and international channels. Other available services include satellite and cable television.

[419] CMT, *Creation and Objectives*, http://www.cmt.es/cmt_ptl_ext/SelectOption.do?nav=presentacion.

[420] Reuters, http://www.reuters.com/article/idUSLH61554320091117.

[421] OECD, *Information on Society Strategies: From Design to Implementation, The Case of Spain's Plan Avanza*, *available at* http://www.oecd.org/dataoecd/9/15/44242867.pdf*; see also* http://www.planavanza.es.

[422] IHS Global Insight, *Spain: Telecoms Report* (2010) (accessed Mar. 2, 2011).

Topography: Spain occupies an area that is slightly more than twice the size of Oregon. The terrain consists of a large plateau surrounded by rugged hills with the Pyrenees in the north.

Fixed	**Total**	**Fiber**	**Cable**	**DSL**	**Other**
Fixed broadband subs per 100 inhabitants[423]	22.4	0.1	4.1	18.0	0.2
Fixed broadband subs (June 2010)[424]	10,336,868				
% of households with fixed broadband access (2009) [425]	51.3				
Mobile					
Mobile wireless broadband subs per 100 inhabitants[426]	35.3				
Mobile wireless broadband subs (June 2010) [427]	16,290,524				

[423] OECD Broadband Portal, Table 1d (3) (June 2010) (accessed Feb. 11, 2011).

[424] *Id*.

[425] OECD Broadband Portal, Table 2a (July 2010) (accessed Feb. 11, 2011).

[426] OECD Broadband Portal, Table 1d (2) (June 2010) (accessed Feb. 11, 2011).

[427] *Id*.

37. Sweden

Regulation: The Post-och Telestyrelsen (PTS) is Sweden's independent telecommunications regulator. The agency is responsible for monitoring the electronic communications and postal sectors and works on consumer and competition issues, efficient utilization of resources and secure communications.[428] Organizationally, it falls within the Ministry of Enterprise, Energy and Communications (MEEC),[429] which is also responsible for the government's stake in TeliaSonera, the incumbent fixed telephone operator. Under the national telecommunications law, however, the MEEC is barred from any involvement with or direct management of the incumbent operator. Further, the Swedish Constitution safeguards the autonomy and independence of PTS by prohibiting any interference by Ministries in the day-to-day activities of PTS, which is governed by a nine-member Board of Directors appointed by the Government, and headed by a Director-General.

Sweden published its "Broadband Strategy for Sweden" in November 2009.[430] Sweden's goal is for 40 percent of all households and businesses to have access to broadband at a minimum speed of 100 Mbps by 2015 and for 90 percent to have access to that speed by 2020. In August 2010, the Swedish Government announced its plans to divest its remaining 37.3 percent stake in TeliaSonera worth an estimated 88 billion kronor (US$13 billion).[431] Speculation that the sale would be blocked by Social Democrats who oppose the sale and could overturn mandates to privatize the incumbent operator proved valid when, in March 2011, the Swedish Parliament voted to halt the sale.[432]

Market and Competition: TeliaSonera is the leading competitor in the broadband market, holding nearly 40 percent of the market share in 2010. Other competitors include Telenor Sweden, Com hem (cable modem), Tele2, and other players.[433]

Mobile broadband is set to be a dominant driver of growth in Sweden as a result of the rollout of 4G services and users abandoning fixed line connections. TeliaSonera announced its new 4G Long Term Evolution (LTE) network at the end of 2009 and was one of the first operators in the world to roll out 4G services.[434]

Other Media: Sweden's publicly-owned television broadcaster operates two terrestrial networks and regional stations. There are multiple privately-owned television broadcasters operating nationally, regionally, and locally. In addition, there are about 50 local TV stations in Sweden, and viewers also have access to pan-Nordic and international broadcasters through multi-channel cable and satellite TV systems. The publicly-owned radio broadcaster operates three national stations and a network of 25 regional channels. There are approximately 100 privately-owned local radio stations and an estimated 900 community and neighborhood radio stations that broadcast intermittently.

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[428] IHS Global Insight, *Sweden: Telecoms Report* (2010) (accessed Dec. 16, 2010); *See* PTS, http://www.pts.se/en-gb/.

[429] *See* MEEC, http://www.sweden.gov.se/sb/d/2067.

[430] *See* http://www.sweden.gov.se/sb/d/2025/a/134980.

[431] Communications Direct news and information service, https://www.communicationsdirectnews.com/do.php/140/41748?199 (accessed Dec.16, 2010). *See also* "Swedish Government Reveals Plans to Cut TeliaSonera Stake," Information Policy, *available at* http://www.i-policy.org/2010/08/swedish-government-reveals-plans-to-cut-teliasonera-stake.html.

[432] Bloomberg Businessweek, *Swedish lawmakers halt sale of state companies*, (March 16, 2011), http://www.businessweek.com/ap/financialnews/D9M0ERRG3.htm.

[433] Telegeography GlobalComms Database: Switzerland (2010) (accessed Dec. 16, 2010).

[434] IHS Global Insight, *Sweden: Telecoms Report* (2010) (accessed Mar. 2, 2011).

Topography: Sweden occupies an area that is slightly larger than California. The terrain is mostly flat or gently rolling lowlands with mountains in the west.

Fixed	**Total**	**Fiber**	**Cable**	**DSL**	**Other**
Fixed broadband subs per 100 inhabitants[435]	31.8	7.8	6.4	17.5	0.2
Fixed broadband subs (June 2010)[436]	2,972,866				
% of households with fixed broadband access (2009) [437]	79.5				
Mobile					
Mobile wireless broadband subs per 100 inhabitants[438]	75.6				
Mobile wireless broadband subs (June 2010) [439]	7,060,837				

[435] OECD Broadband Portal, Table 1d (3) (June 2010) (accessed Feb. 11, 2011).

[436] *Id*.

[437] OECD Broadband Portal, Table 2a (July 2010) (accessed Feb. 11, 2011).

[438] OECD Broadband Portal, Table 1d (2) (June 2010) (accessed Feb. 11, 2011).

[439] *Id*.

38. Switzerland

Regulation: The Federal Communications Commission (ComCom) is Switzerland's independent regulatory authority for the telecommunications market. ComCom was established by the Law on Telecommunications in 1997 and is not subject to any Federal Council or Department directives. It is independent of the administrative authorities and has its own secretariat. ComCom's duties include informing the public of its activities through public statements and producing a yearly report for the Federal Council. ComCom also plays an influential role in shaping the policies of the Swiss Ministry and the Federal Office of Communications (OFCOM), especially in regards to broadband deployment. Examples of other activities carried out by ComCom include granting licenses for the use of radiocommunications frequencies, awarding universal service licenses, approving national numbering plans, and fixing the terms of application of number portability and carrier selection. ComCom instructs OFCOM to prepare its business and implement its decisions.[440]

OFCOM's duties include handling policy questions related to telecommunications and broadcasting in regards to radio and television. It prepares decisions on these issues for the Federal Council, the Swiss Federal Department for the Environment, Transport, Energy, and Communications (DETEC), and ComCom.[441] OFCOM is generally responsible for the implementation and the day-to-day regulation of telecommunications and broadcasting. Although Switzerland is not part of the EU, ComCom endeavors to keep the Swiss regulatory regime in line with the EU's telecommunications policies.[442]

Market and Competition: The leading players in the broadband market are Swisscom, Sunrise, and Cablecom. Swisscom is the incumbent and leading telecommunications operator in Switzerland. Competition in the broadband Internet market is provided by cable broadband; alternative last-mile infrastructure provided by CLECs, fixed wireless, and satellite operators; resale of DSL services; and local loop unbundling.[443]

Swisscom was the first operator to offer commercial 3G services in 2004, with the launch of its mobile datacard product for laptop users. By the end of 2009, Swisscom had extended 3G/3.5G coverage to nearly 90 percent of Switzerland. It also plans to launch 4G coverage by 2011.[444]

Other Media: The Swiss Broadcasting Corporation, the publicly-owned radio and television broadcaster, operates seven national television networks total; three broadcasting in German, two in Italian, and two in French. There are a number of private commercial stations broadcasting regionally and locally. Also, television broadcasts from stations in Germany, Italy, and France are widely accessed using multi-channel cable and satellite TV services. The Swiss Broadcasting Corporation also operates 18 radio stations that provide national and local coverage.

[440] Federal Communications Commission (ComCom), http://www.comcom.admin.ch/index.html?lang=en.

[441] *Id.*

[442] IHS Global Insight, *Switzerland: Telecoms Report* (2010) (accessed Mar. 2, 2011).

[443] *Id.*

[444] Telegeography GlobalComms Database: Switzerland (2010) (accessed Nov. 13, 2010).

Topography: Switzerland is slightly less than twice the size of New Jersey. The terrain is mostly mountainous with a central plateau of rolling hills, plains, and large lakes.

Fixed	**Total**	**Fiber**	**Cable**	**DSL**	**Other**
Fixed broadband subs per 100 inhabitants[445]	37.1	0.4	10.4	25.9	0.4
Fixed broadband subs (June 2010)[446]	2,987,830				
% of households with fixed broadband access (2007)[447]	63.0				
Mobile					
Mobile wireless broadband subs per 100 inhabitants[448]	43.2				
Mobile wireless broadband subs (June 2010)[449]	3,373,000				

[445] OECD Broadband Portal, Table 1d (3) (June 2010) (accessed Feb. 11, 2011).

[446] *Id*.

[447] OECD Broadband Portal, Table 2a (July 2010) (accessed Feb. 11, 2011).

[448] OECD Broadband Portal, Table 1d (2) (June 2010) (accessed Feb. 11, 2011).

[449] *Id*.

39. Turkey

Regulation: The Telecommunications Authority (TK) is the independent regulatory authority for the telecommunications sector created in 2000 with financial and administrative autonomy. TK's decision-making body is the Telecommunications Board, consisting of five members, including a president, appointed for a five-year term. The main purpose of TK is to ensure complete liberalization in the telecommunications sector. In 2001, the scope of TK's power was expanded by giving it licensing powers. TK's main responsibilities include the management and supervision of frequencies, granting licenses, tariff and interconnection regulation, and the supervision of the law's implementation, with the ability to launch inquiries and impose penalties.[450]

Market and Competition: The leading operators in Turkey providing broadband services are TTnet, Superonline, Koc.net, and Eser Telekom. Turk Telekom, which owns TTnet, provides ADSL services directly to consumers, while also allowing private ISPs to resell the service to end-users. Superonline, a private company, holds over 40 percent of the ISP market.[451] The fixed telephone market is dominated by Turk Telecom with 91 percent of revenue from telephony services. Turk Telecom provides landline, mobile, and Internet services.[452]

In September 2010, there were 61.9 million mobile subscribers in Turkey, an 85 percent penetration rate. Turkcell, Vodafone, and Avea lead the mobile telephony market. All three won 3G licenses in December 2008 and launched 3G services at the end of July 2009. At the end of 2010, there were 1,158,866 mobile broadband subscribers and 16.6 million customers on 3G networks.[453]

Other Media: Turkish Radio and Television Corporation, the national public broadcaster, operates multiple TV and radio networks and stations. Turkey has multiple privately-owned national television stations and nearly 300 private regional and local television stations. In terms of radio, there are more than 1,000 private radio broadcast stations.

[450] IHS Global Insight, *Turkey: Telecoms Report* (2010) (accessed Mar. 2, 2011).

[451] *Id.*

[452] Turkey Broadband Overview, http://point-topic.com/content/operatorSource/profiles2/turkey-broadband-overview.htm.

[453] *Id.*

Topography: Turkey is slightly larger than the size of Texas. It has a high central plateau with narrow coastal plains and several mountain ranges.

Fixed	Total	Fiber	Cable	DSL	Other
Fixed broadband subs per 100 inhabitants[454]	9.4	0.1	0.3	9.0	0.0
Fixed broadband subs (June 2010)[455]	6,790,103				
% of households with fixed broadband access (2007)[456]	16.5				
Mobile					
Mobile wireless broadband subs per 100 inhabitants[457]	1.17				
Mobile wireless broadband subs (June 2010)[458]	841,945				

[454] OECD Broadband Portal, Table 1d (3) (June 2010) (accessed Feb. 11, 2011).

[455] *Id*.

[456] OECD Broadband Portal, Table 2a (July 2010) (accessed Feb. 11, 2011).

[457] OECD Broadband Portal, Table 1d (2) (June 2010) (accessed Feb. 11, 2011).

[458] *Id*.

40. United Kingdom

Regulation: Ofcom was established as a corporate body by the Office of Communications Act 2002.[459] Ofcom is the regulator for the UK communications industries, with responsibilities across television, radio, telecommunications and wireless communications services.[460] Ofcom manages spectrum and ensures that a "wide range of electronic communications services – including high speed data services – is available throughout the UK."[461]

The government's "Digital Britain: Final Report," released in June 2009, outlines the nation's broadband strategy.[462] In the report, the government committed to providing all British households with broadband access at a minimum speed of 2 Mbps by 2012. The network will consist primarily of DSL lines and fiber to the street cabinets, supplemented by mobile broadband and possible satellite infill for remote areas. Ofcom has also worked to encourage investment and competition in "super-fast broadband."[463] Key objectives include promotion of digital delivery of public services, on-line availability of government information, telemedicine, education, and finances.

In March 2011, the Broadband Stakeholders Group, the government's leading advisory group on broadband, issued a voluntary code of practice on traffic management transparency.[464] The code sets standards for what information broadband providers should disclose and how the information should be provided so that it will be understandable, accessible, current and comparable. The code has been signed by providers serving almost 95 percent of fixed-line broadband customers and over 90 percent of mobile customers in the UK.[465]

Market and Competition: The leading broadband service provider in 2009 was BT Retail with 26.7 percent of the retail broadband market. Other competitors include Virgin Media, Carphone Warehouse (unbundled loop), Tiscali (unbundled loop), BskyB, Orange (unbundled loop), Vodafone (resale), Post Office (resale) and many smaller ISPs.

Orange provides 3G coverage to 94 percent of the country, while T-Mobile, Vodafone and O2 provide 3G coverage to 91 percent, 88 percent, and 84 percent of the country, respectively. Ofcom continues to monitor the level of 3G coverage offered by operators, and published coverage maps for all five major players in 2009.[466]

Other Media: The public service broadcaster, BBC, is the largest broadcasting corporation in the world. It operates multiple TV networks with regional and local TV service. The United Kingdom has a mixed system of public and commercial TV broadcasters along with satellite and cable systems that provide

[459] Office of Communications Act 2002, 2002 Chapter 11, *available at* http://www.opsi.gov.uk/acts/acts2002/ukpga_20020011_en_1.

[460] *See* Ofcom, *Statutory Duties and Regulatory Principles*, *available at* http://www.ofcom.org.uk/about/what-is-ofcom/statutory-duties-and-regulatory-principles/.

[461] *Id*.

[462] Digital Britain: The Final Report, (June 16, 2009), *available at* http://www.culture.gov.uk/what_we_do/broadcasting/6216.aspx.

[463] Ofcom, *Delivering Super-fast Broadband in the UK: Promoting Investment and Competition* (Mar. 3, 2009), *available at* http://www.ofcom.org.uk/consult/condocs/nga_future_broadband/statement/statement.pdf.

[464] *See* http://www.broadbanduk.org/content/view/479/7/.

[465] *Id.*

[466] Telegeography GlobalComms Database: United Kingdom (2010) (accessed Nov. 13, 2010).

access to hundreds of TV stations throughout the world. With regard to radio, the BBC also operates multiple national, regional, and local radio networks with multiple transmission sites. A large number of commercial radio stations, as well as satellite radio services, are available.

Topography: The United Kingdom occupies an area that is slightly smaller than Oregon. The terrain consists of mostly rugged hills and low mountains with level to rolling plains in the east and southeast.

Fixed	**Total**	**Fiber**	**Cable**	**DSL**	**Other**
Fixed broadband subs per 100 inhabitants[467]	30.5	0.0	6.4	24.1	0.0
Fixed broadband subs (June 2010)[468]	18,845,700				
% of households with fixed broadband access (2009) [469]	69.5				
Mobile					
Mobile wireless broadband subs per 100 inhabitants[470]	30.0				
Mobile wireless broadband subs (June 2010) [471]	18,550,000				

[467] OECD Broadband Portal, Table 1d (3) (June 2010) (accessed Feb. 11, 2011).

[468] *Id*.

[469] OECD Broadband Portal, Table 2a (July 2010) (accessed Feb. 11, 2011).

[470] OECD Broadband Portal, Table 1d (2) (June 2010) (accessed Feb. 11, 2011).

[471] *Id*.

APPENDIX F: Actual Broadband Speeds

The BDIA provides that the Commission "shall include information comparing the extent of broadband service capability (including data transmission speeds and price for broadband service capability) in a total of 75 communities in at least 25 countries."[1] The index included in Appendix C addresses this requirement, providing advertised broadband speeds and prices in 37 foreign countries. As some commenters have pointed out, however, actual speed data can provide a more accurate picture of the state of broadband service than advertised speed.[2]

The Commission itself has recognized the value of actual speed data, both to consumers and policymakers. In March 2010, the Commission launched The Consumer Broadband Test, a tool that measures broadband quality indicators such as speed and latency, and reports that information to consumers and the FCC.[3] The purpose of the Consumer Broadband Test is to give consumers additional information about the quality of their broadband connections and to create awareness about the importance of broadband quality in accessing content and services over the Internet. Additionally, the FCC may use data collected from the tool to analyze broadband quality and availability on a geographic basis across the United States. Two broadband testing tools are used in this beta version: the Ookla, Inc. Speed Test and the Network Diagnostic Tool (NDT) running on the Measurement Lab (M-Lab) platform.[4] In addition to making these broadband tests available to consumers, the Commission has asked for 10,000 volunteers to participate in a study to measure home broadband speed in the U.S.[5] The Commission is partnering in this effort with SamKnows Limited, a firm that successfully conducted a similar test in the United Kingdom.[6] The testing requires installation of specialized performance-monitoring equipment at each volunteer's home.

Ookla is one of the largest providers of speed test services for Internet users across the globe. Ookla determines speed and cost indices from the data it collects, which it provides on its website, www.netindex.com. Though this *IBDR* explains the need to obtain better international speed data, some speed data that is currently available, such as Ookla's, may be useful in comparing the range of actual broadband speeds available across different countries and regions. Therefore, we provide in this appendix the average actual download speeds determined by Ookla in 15 foreign capital cities, and compare those speeds to 15 U.S. cities with comparable populations.

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[1] 47 U.S.C. § 1303(b).

[2] AT&T Comments at 4. *See also* Prof. Rob Frieden Comments at 3 (the IBDR should "[u]se a credible average of delivered broadband speeds rather than advertised speeds" as broadband performance is affected by a number of factors, and advertised speeds "typically contain a disclaimer stating that actual performance may vary"); UK fixed broadband speeds, November/December 2010 Research Report: The performance of fixed-line broadband delivered to UK residential consumers, March 2, 2011 (finding that, among other things, ADSL speeds "varied widely and were typically much lower than advertised speeds"), a*vailable at* http://stakeholders.ofcom.org.uk/binaries/research/telecoms-research/bbspeeds2011/bb-speeds-nov-2010.pdf.

[3] *See* FCC Launches Broadband Consumer Tools: Agency Introduces First Mobile App, Consumer Broadband Test, and Broadband Dead Zone Report, *News Release* (March 11, 2010); *see also* Consumer Broadband Test website, http://www.broadband.gov/qualitytest/about/#qualitytest.

[4] These applications transfer a small amount of generic data back and forth between a user's computer and a testing server, measuring the rate of transmission from the server to user (download) and user to the server (upload). *See* http://www.broadband.gov/qualitytest/about/#qualitytest.

[5] *See* FCC Survey Finds 4 out of 5 Americans Don't Know Their Broadband Speed, *News Release*, June 10, 2010, *available at* http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-298525A1.doc; *see also* Comment Sought on Residential Fixed Broadband Services Testing and Measurement Solution, *Public Notice*, DA 10-670 (rel. April 20, 2010), *available at* http://hraunfoss.fcc.gov/edocs_public/attachmatch/DA-10-670A1.pdf.

[6] *Id.*

We preface our summary of this speed data by reiterating what the Commission states on broadband.gov about the quality of speed test data: it may not be an accurate representation of connection quality.[7] The Ookla data in this appendix provides a snapshot of actual speeds users are experiencing in various cities. We do not believe this data accurately represents the *complete* broadband picture necessary for a meaningful comparison of U.S. and foreign city speeds.[8] Speed test results can be impacted by a range of factors, including the distance of the user from the testing server, end-user hardware, network congestion, and time of day. Additionally, software speed tests only measure the line speed of the broadband service level for which a user subscribes and not the full capability of the broadband technology. We also note that since Ookla's speed test data is dependent on users who elect to run the test, the test results for a given city may not be representative of that entire population's broadband service. Further, Ookla's netindex.com site does not indicate whether test results are from residential or business users. A different mix of residential and business segments may affect the data because business users tend to have faster speeds than residential users. Moreover, Ookla uses a subset of the total tests from any given area to compile its speed index. The Ookla results may be a more accurate reflection of the speeds that customers choose to purchase than of the speeds that are available. Finally, Ookla's speed test data for the U.S. cities in the below table is based on test results from a wide range of broadband providers, both fixed and mobile. The number of test results from each carrier may influence the average speed that Ookla reports (*e.g.*, the overall average speed reported by Ookla could experience a downward shift if the majority of tests originate from users of slower providers or individuals who subscribe to lower speed tiers, or an upward shift if most tests results are from users of high-speed providers).

U.S. Cities	**Population (2009 U.S. Census estimates)[9]**	**Average Download Speed (Mbps)[10]**
Olympia, WA	46,100	21.0
Washington, DC	599,657	8.6
Denver, CO	610,345	10.2
Seattle, WA	616,627	11.7
Boston, MA	645,169	9.8

[7] *See* http://www.broadband.gov/qualitytest/about/#qualitytest.

[8] For example, Akamai, which operates a global network of Internet servers, presents broadband speed findings in its quarterly "The State of the Internet" report that are quite different than Ookla's. Akamai, The State of the Internet, 4th Quarter, 2010 Report, *available at* http://www.akamai.com/stateoftheinternet/ (Akamai Report). Akamai gathers data via its server network on connection speeds, traffic patterns, and many other Internet metrics. The latest Akamai Report provides a list of the 100 fastest cities in the world based on average connection speed, none of which have speeds that exceed 20 Mbps. (The average connection speed metric "is used in order to mitigate the impact of unrepresentative maximum measured connection speeds." Akamai Report at n. 14). In contrast, the Ookla data for seven out of the 15 foreign cities we surveyed show speeds that exceed 20 Mbps. Additionally, Akamai shows that the average connection speed in Seoul is 13.8 Mbps, whereas Ookla shows Seoul's average speed is 35.8 Mbps. These and other variations (*e.g.*, Akamai removes data from known academic and mobile networks when compiling its top 100 city lists, Akamai Report at 11, 14) contribute to our assessment that speed measurements on the city or country level may not be entirely representative.

[9] *See* http://factfinder.census.gov/home/saff/main.html?_lang=en (site visited February 28, 2011).

[10] According to Ookla, this "value is the rolling mean throughput in Mbps over the past 30 days where the mean distance between the client and the server is less than 300 miles." *See* http://www.netindex.com/download. The data in this table was collected February 25-March 9, 2011.

Columbus, OH	769,332	8.3
San Francisco, CA	815,358	6.9
Dallas, TX	1,299,542	6.8
San Diego, CA	1,306,300	11.4
Philadelphia, PA	1,547,297	9.8
Phoenix, AZ	1,593,659	9.9
Houston, TX	2,257,926	7.7
Chicago, IL	2,851,268	9.4
Los Angeles, CA	3,831,868	7.8
New York, NY	8,391,881	11.7

Data Source, unless otherwise noted: Net Index, by Ookla (http://www.netindex.com/value)

Foreign Cities	**Population**[11]	**Average Download Speed (Mbps)**[12]
Reykjavik, Iceland	119,900	20.2
Bern, Switzerland	122,496	22.9
Canberra, Australia	345,257	6.1
Copenhagen, Denmark	511,686	17.4
Oslo, Norway	567,980	17.0
Helsinki, Finland	573,604	26.3
Amsterdam, The Netherlands	747,093	20.3
Ottawa, Canada	1,198,668	10.0
Paris, France	2,125,851	24.8
Rome, Italy	2,710,932	5.6
Madrid, Spain	3,213,271	9.3
Berlin, Germany	3,386,667	26.2
London, UK	8,278,251	11.2
Tokyo, Japan	8,489,653	13.1
Seoul, South Korea	10,031,719	35.8

Data Source, unless otherwise noted: Net Index, by Ookla (http://www.netindex.com/value)

The data suggests that actual download speeds in some large European and Asian cities are substantially higher than the speeds in large U.S. cities (*e.g.*, 24.8 Mbps in Paris versus 6.9 Mbps in San Francisco and 9.9 Mbps in Phoenix.). Making definitive conclusions, however, are problematic due to

[11] Population data obtained from United Nations Demographic Yearbook 2008, *available at* http://unstats.un.org/unsd/demographic/products/dyb/dybsets/2008%20DYB.pdf.

[12] According to Ookla, this "value is the rolling mean throughput in Mbps over the past 30 days where the mean distance between the client and the server is less than 300 miles." *See* http://www.netindex.com/download. The data in this table was collected February 25-March 9, 2011.

the issues discussed above: variations in time of day of testing; variations in distance from server and equipment of testing subscribers; speeds are reflective of the service purchased rather than what is available; subscribers that elect to test their speed may not be representative of all subscribers; and the mix of residential versus business subscribers and mobile versus fixed subscribers can skew the results. Our goal for future *IBDRs* is to obtain and share more detailed actual broadband speed data that will assist in making more robust comparisons.

APPENDIX G: Econometric Analysis

There are many factors that influence residential broadband penetration and adoption. In general, the number of broadband connections and the price of broadband service in a given region are likely to be determined by the interaction of supply-side and demand-side factors. In addition, both the demand and supply curves will be influenced by other (exogenous) economic and demographic factors. For example, demand for broadband will likely depend on income, age, education, and computer literacy; while the supply of broadband will depend on factors such as the population, population density, terrain, number of competitors, and government subsidies.

As an initial attempt to examine the impact of certain economic and demographic characteristics on regional broadband adoption, we analyze OECD data on broadband connections, population, income, and education that were collected from the OECD.*Stat* database for 2006 and 2007.[1] The OECD compiles various economic and demographic data series for 355 regions in 37 countries. Of those, 170 regions in 14 countries (including the District of Columbia and 50 U.S. states) have complete data for broadband connections, population, population density, and GDP per capita for at least one of the years. The list of countries (and number of regions) for which complete data were obtained from OECD.*Stat* are listed in Table 1.[2]

Table 1: Number of Regions and Broadband Penetration by Country

Country	2006		2007	
	Number of Regions	Percentage of Households with Broadband[3]	Number of Regions	Percentage of Households with Broadband
Australia	8	28.4	8	43.6
Austria	9	32.8	8	45.7
Czech Rep.			8	27.8
Finland	4	53.2	5	62.7
Germany	13	34.7	13	49.7
Italy	21	16.2	21	25.1
Luxembourg	1	44.0	1	58.0
Netherlands	4	66.1	4	74.0
Norway	7	56.6	7	66.6
Portugal			7	30.2
Slovak Rep.	4	11.5		

[1] *See* http://stats.oecd.org/Index.aspx. Regional data were obtained for the "Large Regions (TL2)" classification (*i.e.*, the first sub-national level such as a U.S. state or Canadian province). The data were accessed on Nov. 22, 2010, and are contained in the full version of Appendix D (available at http://www.fcc.gov/reports/international-broadband-data-report-second) as they were on the access date at http://stats.oecd.org/Index.aspx. These years were chosen because they are the most recent years for which complete data is available from enough countries and communities to make the analysis worthwhile.

[2] The OECD database does not have broadband data for the U.S. on a state-by-state basis for 2006. To maintain consistency across countries, we limited our study to the OECD's data. Similarly, the OECD database does not include region-specific data for both 2006 and 2007 for the Czech Republic, Portugal, or the Slovak Republic.]

[3] The regional percentages are weighted by population and then averaged over the entire country.

Spain	19	29.2	19	39.2
United Kingdom	12	44.0	12	56.8
United States			51	50.5
Total	**102**		**164**	

The co-variation between broadband adoption and various economic and demographic factors can be estimated through the following baseline regression model:

$$PctHHBB_{it} = \beta_0 + \beta_1 Pop_{it} + \beta_2 PopDen_{it} + \beta_3 GDP_{it} + \sum_j \phi_j C_j + \lambda T_t + u_{it}$$

where $PctHHBB_{it}$ is the percentage of households with a broadband connection in region i at time t, Pop_{it} is the total population (in 100,000s) in the region, $PopDen_{it}$ is hundreds of people per square kilometer (100/km^2), GDP_{it} is the regional per capita gross domestic product (in thousands of US dollars). Country fixed effects are denoted by C_j, and T_t is a year fixed effect. In addition to the baseline model above, other models (that control for the log of the independent variables or that include controls for education levels) are also estimated.[4]

Broadband connections are measured as a fraction of households (instead of a fraction of population) for two primary reasons. First, measuring connections at the household level is likely more representative of the residential, wireline broadband market, as consumers typically make purchase decisions at the household level. Therefore, the number of households in a region is likely to be a more accurate representation of what would be considered the upper bound of residential broadband penetration. This is in contrast to the wireless broadband market where mobile phones and smart cards may lend themselves to a per-person interpretation. Second, although the OECD collects per-person broadband data at the country level, only per-household data is reported at the regional level. Therefore, using subscriptions per 100 people is not an option for this regional analysis.

It is important to note some of the limitations of this analysis. As in any regression, a causal interpretation of the regression parameters requires that the error term be strictly exogenous (or, loosely speaking, that there be zero correlation between the regressors and error term). Without strict exogeneity, the estimated coefficients can (at best) be interpreted as (conditional) correlations between the independent variables and the percentage of households with broadband in a given region. Correlation between the regressors and error (or the failure of strict exogeneity) may enter from a number of causes; three of them are omitted variables, endogeneity, and measurement error. We briefly discuss each of these in turn.

First, the analysis is limited by the data currently available from the OECD. Because of this, the analysis cannot consider other factors that may have an important impact on the supply and/or demand for broadband, including such factors as population age, computer literacy, government subsidies and regulation. Any factor that is not explicitly modeled in the regression is implicitly included in the error term. If any of the omitted factors is correlated with the included regressors, the model may over- or

[4] Population, population density, GDP, and education are the variables that are most widely available across a large number of regions in the OECD database. There are other variables that may also impact broadband subscriptions, such as public and private R&D expenditures, number of people enrolled in college, persons employed in technology jobs, unemployment, etc. However, values for these variables are not reported for many regions, and the inclusion of these variables in the model would lead to the exclusion of many more region-country-observations. As noted above, over half of all OECD countries and regions have already been excluded from the analysis due to missing broadband data.

under-state the true impact of the independent variables on the percentage of households with broadband connections.

Second, *GDP* may actually be endogenous to the model. That is, the level of income in the region may impact broadband penetration and adoption, but the extent of broadband availability is likely to contribute to a region's level of income and both variables are likely affected by other exogenous factors. Any endogeneity between broadband penetration and income will lead to correlation between GDP and the error term and to bias in the estimated coefficients.

Last, it is unclear whether the variables in the analysis are directly comparable across countries. For example, the definition of "broadband" may differ from one country to another; accounting procedures used to construct GDP may not be uniform across countries; and the independent variables in the model are, themselves, estimates of unknown parameters with their own respective standard errors. There could also be large variation in the independent variables *within* regions that is not captured by simply looking at the region averages (*e.g.*, population density). Any differences in variable definitions or sampling techniques across countries would prevent us from interpreting the model coefficients as causal effects.

In spite of these challenges, it is still a useful exercise to examine the relationships between broadband adoption and the demographic variables in our model. In fact, we find that almost 36% of the total variation in broadband adoption rates across regions can be explained by simply controlling for the four variables in our model – population levels, population density, GDP, and education. (This percentage jumps to 50% if year fixed effects are included in the model, and jumps to almost 90% with the inclusion of year and country fixed effects.)

Descriptive statistics for the model variables are given in Table 2. The average region in the OECD sample has a population of 3.4 million people, a population density of 346 people per kilometer, and a per capita GDP of $35,660. On average, almost 40% of the households in a region have a broadband connection, and about 24% of labor force participants in a typical region have a tertiary education.[5]

Table 2: Descriptive Statistics

Variables	Scale	Obs.	Mean	St. Dev.	Min	Max
$PctHHBB_{it}$		266	39.80	15.54	9	76
Pop_{it}	(in 100,000s)	266	34.71	41.03	0.27	363.78
$PopDen_{it}$	(100 per km^2)	266	3.46	8.73	0.0016	52.79
GDP_{it}	(in billions US$)	266	129.24	185.93	1.16	1801.76
GDP_{it}	(in thousands US$)	266	35.66	13.31	12.43	157.37
$PctTerEduc_{it}$		250	24.09	8.00	7.66	47.74

Before proceeding to the regression results, we present scatter plots of the unconditional correlations between broadband adoption rates and the independent variables of our regression in Figure 1.[6] There appears to be little correlation between the percentage of households with broadband and either total population or population density, at least before controlling for other factors. However, there seem to be strong positive correlations between broadband adoption and both per capita GDP and the percentage of the labor force with a tertiary education.[7] For regions with comparable GDP, it appears that the US

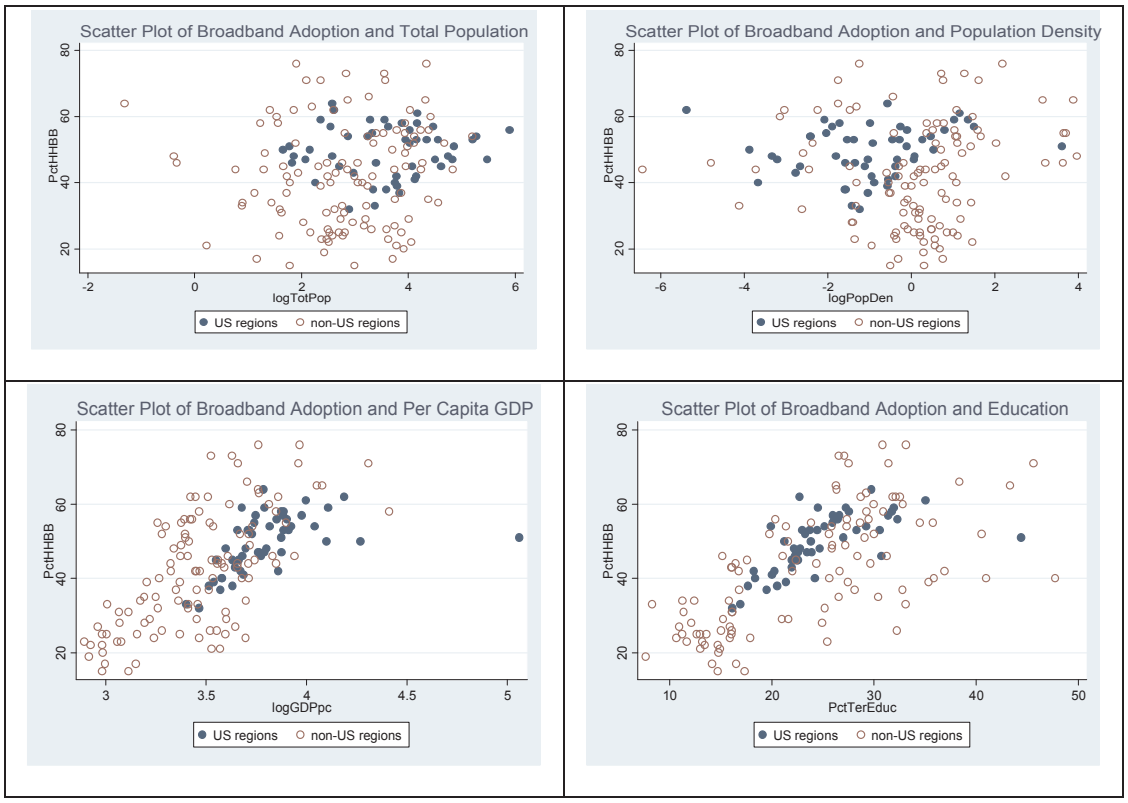
[5] Education data is missing for the 8 Australian regions for both 2006 and 2007.

[6] The US regions are denoted with solid circles, while hollow circles denote non-US regions.

[7] The US outlier in the GDP scatter plot is Washington, DC.

regions may lag slightly behind non-US regions in terms of broadband adoption. This relationship seems to be reversed, though, with respect to education; for regions with comparable levels of education, the US regions appear to have slightly higher broadband adoption rates than non-US regions. All four explanatory variables, however, are highly correlated with each other, so these plots may not be an accurate representation of how broadband adoption in US regions compares to the adoption of other regions. The full regression model will allow us to estimate the conditional correlations between broadband adoption and each explanatory variable, while holding the others constant.

Figure 1: Broadband Adoption Scatter Plots



Regression results are presented in Table 3. Column (1) reports the results from the baseline model presented above. The results indicate that, controlling for population density and income, regions with one million additional individuals will have broadband adoption rates that are 0.25 percentage points higher. Regions with more highly concentrated populations will have higher broadband adoption rates (controlling for population and GDP), with adoption rates increasing by 0.20 percentage points for each additional 100 people per square kilometer. These positive (and statistically significant) correlations are evident only after controlling for GDP. Last, controlling for population and population density, a $1000 increase in a region's per capita GDP corresponds to a 0.25 percentage-point increase in broadband adoption.[8]

[8] The inclusion of both total population and population density makes interpretation of the marginal effects of population changes more complicated. Strictly speaking, it would not be possible to simultaneously increase a region's population while holding population density constant without also increasing the geographic size of the region. However, region boundaries rarely change and are likely constant for all regions over the two years in our

(continued....)

The regression model in column (2) includes a regressor for education. The estimated coefficient indicates that regions with a more educated workforce have higher broadband adoption rates, though the result is not statistically significant. The coefficients on the other regressors are largely unchanged, though the coefficient on per capita GDP falls slightly and is no longer statistically significant.

Columns (3) and (4) replicate the regressions from columns (2) and (3), but the population, population density, and GDP variables are replaced by their respective logarithms.[9] In these specifications, the coefficient on population is no longer statistically significant, and is fairly small in magnitude. Population density and GDP, however, remain positively correlated with broadband adoption rates at a statistically significant level. More concentrated regions have higher adoption rates, as do regions with higher per-capita incomes (see column 3). A 10% increase in the number of people per square kilometer corresponds to a 0.15 percentage-point increase in the percentage of households with broadband connections, and a 10% increase in per capita GDP corresponds to a 1.53 percentage-point increase in the percentage of households with a broadband connection.

Once again, the estimated coefficient on education (when added) is small in magnitude and not statistically different from zero (see column 4). Overall, the regressions explain anywhere between 87% and 90% of the total variation in the percentage of households with broadband.

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sample. Consequently, the impact from a marginal change in population on broadband adoption will be a weighted average of the coefficients on total population and population density.

One way to avoid this issue would be to drop total population from the model. We estimated the models both with and without total population and found that the impact on the estimated coefficients of other regressors was negligible. (For example, the coefficients on PopDen and GDP in Column (1) change from 0.198 and 0.254 to 0.192 and 0.258, respectively. Such is also true of the coefficient and standard error estimates in other specifications.) Consequently, we include total population in the model for completeness.

[9] The logarithmic specification is often used to improve estimation when the scale of the variables differs across observations. For example, a 100,000 person increase in population may have different implications for broadband penetration in different regions. The 100,000 person change would increase New York's population by less than 1%, but would increase the population in the Oslo Norway region by about 10%. We would not expect a 100,000 person change in population to have the same impact on broadband in both regions. The logarithmic specification eliminates differences in scale and allows for a "percentage-change" interpretation of the regression coefficients rather than a "level-change" interpretation.

Table 3: Reduced-Form Panel Regression Results (2006-2007)[10]				
Dep. Var: Percentage of households with a broadband connection				
	(1)	**(2)**	**(3)**	**(4)**
Regressors				
Pop (100,000)	0.026 (0.011)** [0.005]**	0.024 (0.011)** [0.007]**	---	---
Log(Pop)	---	---	0.062 (0.416) [0.339]	0.032 (0.451) [0.300]
PopDen (100 per km)	0.198 (0.035)** [0.043]**	0.195 (0.042)** [0.059]**	---	---
Log(PopDen)	---	---	1.545 (0.389)** [0.702]**	1.567 (0.435)** [0.982]
GDP ($1000s per capita)	0.254 (0.140)* [0.105]**	0.193 (0.150) [0.165]	---	---
Log(GDP)	---	---	15.27 (2.78)** [1.95]**	14.78 (2.79)** [3.08]**
Educ	---	0.184 (0.136) [0.309]	---	-0.019 (0.111) [0.224]
Country F.E.	Yes	Yes	Yes	Yes
Year F.E.	Yes	Yes	Yes	Yes
R-squared	0.87	0.87	0.89	0.90
N	266	250	266	250

[10] Standard errors clustered at the region level are denoted by (·), and standard errors clustered at the country level are denoted by [·]. There are 170 regions and 14 countries in the sample. Statistical significance at the 5% and 10% levels are denoted by ** and *, respectively.