TESTIMONY

OF

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BEFORE THE

COMMITTEE ON COMMERCE, SCIENCE AND TRANSPORTATION

UNITED STATES SENATE

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Mr. Chairman and Members of the Committee, thank you for the opportunity to appear before you today to discuss issues relating to communications, broadband and U.S. competitiveness.

I have had the opportunity to study communications and broadband policy issues over the course of many years, and in several capacities, including in my current positions as an adjunct faculty member at George Mason University Law School and as Chairman of Criterion Economics, an economic consulting firm based here in Washington. I should note that, while my consulting practice often involves issues relating to communications and broadband policy, I am appearing today solely on my own behalf.

The role of information technology in promoting economic growth and productivity is well documented. Digital computers allow information to be stored, analyzed, manipulated – and turned into useful knowledge. High capacity communications networks allow those computers to work together, and increase exponentially society's ability to create knowledge and put it to work. Ethernet inventor Bob Metcalfe formalized this notion in what has become known as Metcalfe's law: the value of a communications network is a function of the number of users, squared.

Because the relationship between broadband and prosperity is now so widely understood, nearly every advanced nation has adopted policies aimed at increasing investment in communications infrastructure and making advanced communications services widely available at affordable prices. There is virtually no limit to the diversity of policy tools being deployed, from subsidies and state ownership, on the one hand, to tax cuts and deregulation, on the other.

How does the U.S. stack up? Based largely on statistics collected by the Organization for Economic Cooperation and Development (OECD), some have argued that we are "behind," or at least "falling behind," in the broadband race. Indeed, the now familiar chart showing the U.S. at 11th or 12th in the world in broadband adoption has become sort of a modern version of the 1957 Sputnik launch – an indicator, to some, that the U.S. has fallen behind in a key technology. Now, as then, the argument is usually rolled out in service of some sort of proposed policy

change – more regulation, or less; more subsidies, or stronger tax incentives; even direct government involvement, as in the case of municipalities building their own telecommunications networks to compete with private providers.

Happily, it turned out our fears about losing the space race to the Russians were, to say the least, highly exaggerated. I suspect the same is true with respect to our fears about broadband. On balance, the U.S. is doing pretty well when it comes to broadband deployment and adoption.

That said, it is important for policymakers, including this Committee, to continue monitoring our broadband policies and making improvements. With that in mind, I would like to focus today on two topics. First, I would like to suggest that we can and should do a better job of collecting information on broadband deployment in the U.S. Second, I will comment briefly on the state of broadband deployment in rural America.

What We Know

We know a lot about broadband deployment in the U.S. We know, for example, that broadband deployment and adoption are both growing at a very rapid pace, and hence that, at least at a macro level, our current policies are working. But we don't know as much as we could or should know – or as much as we *need* to know – to further improve those policies. Let me provide a couple of examples.

First, we have good macroeconomic data on the performance of different sectors of the economy, including the IT sector. We can use this data to assess, for example, the effect of Federal Communications Commission (FCC) policies on investment. Figure 1 presents information on investment in communications equipment in the U.S., by quarter, from 1996 to the present. The data comes from the Bureau of Economic Analysis at the Department of Commerce, and is part of the National Income and Product Accounts. At the bottom of the chart I have added a timeline showing some key FCC policy decisions relating to broadband regulation. As the figure shows, investment in communications equipment began to recover from the disastrous 2001-2002 "meltdown" at almost precisely the time the FCC began deregulating broadband. Some might say that's just coincidence, but in my opinion the chart provides clear evidence that removing excessive regulation led to greater investment.

History aside, Figure 1 demonstrates an important and largely undisputed fact: investment in broadband networks is moving ahead very rapidly. The two leading providers, the telephone and cable companies, are investing literally tens of billions of dollars to upgrade their networks, with cable companies adding voice telephony, telephone companies adding video, and both increasing dramatically the capacities of their networks to carry high speed data. But cable and telephone companies are hardly alone. Wireless broadband – both fixed and mobile – is the fastest growing broadband delivery mechanism. It is widely expected, for example, that private sector firms will, later this year, pay more than $10 billion for additional spectrum in the 700 Mhz band that will be used to provide wireless broadband services.

Second, in addition to having pretty good data on investment, we also have good aggregate data, at a national level, on the extent of broadband adoption. We can use this data to assess the

technologies people use to get broadband, and to compare U.S. broadband adoption to adoption rates in other countries.

For example, Figure 2 shows the growth of high speed broadband connections in the U.S. since 1999, as reported by the FCC. Clearly, broadband adoption is proceeding at a rapid pace: Indeed, between June 2005 and June 2006, the number of broadband connections grew by 52 percent. Most remarkable, however, is the growth of wireless connections: Between June 2005 and June 2006, the number of mobile wireless broadband connections went from under 400,000 to over 11 million, a growth rate of over 2800 percent.

How does this compare with other nations? Before answering that question, it is perhaps useful to step back for a moment and consider the process by which new technologies spread. In general, new technologies – and especially technologies like telephony, fax machines and the Internet, where network effects play important roles – propagate in a pattern known as an "S" curve, like the one shown in Figure 3. Initially, uptake is slow. Then, a tipping point is reached, and propagation accelerates, as if, suddenly, everyone *has* to have one. Eventually, the product reaches a saturation point, and propagation slows. At that point, everyone who will ever want or need the product already has it. This pattern has characterized the propagation of virtually every major new IT product or service, from the telephone to fax machine to the I-Pod. Broadband is no exception.

To see the S-Curve at work, consider the four charts shown in Figure 4, which show broadband propagation in four countries. Belgium and Korea, both of which lead the U.S. in broadband penetration (as measured by the OECD), appear to have reached at least temporary saturation points. Poland and Australia, on the other hand, both of which lag behind, have passed at least a local tipping point, and penetration is growing rapidly.

With this in mind, let's turn to the OECD data. Figure 5 shows the usual OECD figure, with the U.S. ranked 12th in the world, as measured by the number of broadband connections per 100 inhabitants. In Figure 6, however, I have added another set of bars, which shows 2006 growth rates. Figure 6 shows an interesting pattern: The countries in which broadband penetration is growing most rapidly are the ones where penetration currently is lowest, while growth in countries with higher penetration has begun to slow.

Where is the U.S. on its S-Curve? Figure 6 shows that the U.S. has one of the fastest growth rates of any of the high-penetration rate countries, at 25 percent. Only the United Kingdom, at 30 percent growth, was significantly faster, while several countries, including Canada and Japan as well as Belgium and Korea, appear to have hit at least temporary saturation levels. As shown in Figure 2 above, and confirmed in Figure 7, broadband growth in the U.S. is continuing at a healthy pace.

Thus, at the national level, we have a lot of aggregate data, and we can use it to perform lots of useful analysis. And when we do, it appears the U.S. stacks up better than some people seem to think.

What We Don't Know

When you dig a little deeper, there is also a lot we don't know – and what we don't know is hindering our ability to make informed policy choices. For example:

- As the General Accounting Office noted in a May 2006 report,[1] broadband availability data reported by the FCC in its annual reports under section 706 of the Telecommunications Act do not permit an accurate assessment of broadband availability on a geographically disaggregated basis. Simply put, the data collected through Form 477, and reported by the FCC, tells us whether one or more providers have customers in each zip code, but it does not tell us how many households or businesses in that zip code actually have broadband availability. Nor does it tell us anything about the quality or price of service.

- The most recent U.S. government data on broadband adoption rates by different segments of the population (for example, broadband adoption in urban versus rural areas; adoption by people of different ages; adoption by households with children), was collected in October 2003 and published by the Department of Commerce in 2004 (in its last *Nation Online* report) and by the U.S. Census Bureau in 2005 (in Special Study P23-208). Given the overall growth rates we have seen since then, data from 2003 is virtually worthless for assessing the effects of our current policies.

- For a variety of reasons, surprisingly little is known about broadband adoption by businesses, including especially small businesses. For example, the most recent government data available on small business broadband penetration was collected in late 2003 as part of a study by the Small Business Administration.[2]

Of course, the fact that government is not collecting data does not necessarily mean that data is not available. Several non-profit organizations, including the Pew Internet and American Life Project[3] and the Center for the Digital Future,[4] conduct surveys on Internet use on a regular basis. The Pew Project, for example, regularly surveys Internet adoption in rural America. And, for those with the means to purchase data from private sector sources, much richer data can be had from companies such as Insight Research, In-Stat, Nielsen//Net Ratings and Warren Communications. I have had the opportunity to use all of these sources extensively, and while the data they provide is certainly helpful, it is far from comprehensive.

Given the importance of broadband to America's economic competitiveness, and the appropriately intense interest of policymakers in ensuring we are doing everything possible to create a healthy environment for broadband deployment to all Americans, it is clear the government could and should be doing more to collect information about broadband deployment,

[1] United States Government Accountability Office, Broadband Deployment Is Extensive Throughout the United States, but It Is Difficult to Assess the Extent of Deployment Gaps in Rural Areas, GAO-06-426 (May 2006).
[2] *See* "A Survey of Small Businesses' Telecommunications Use and Spending," Stephen Pociask, TeleNomic Research for the Office of Advocacy, Small Business Administration Contract No. SBA-HQ-02-M-0493, Washington, DC, March 2004 available at http://www.sba.gov/advo/research/rs236tot.pdf.
[3] *See* http://www.pewinternet.org/. I serve on the Pew Project's Board of Advisors.
[4] *See* http://www.digitalcenter.org/.

and to disseminate that information in a far more timely manner. While the FCC's recent Notice of Proposed Rulemaking on improving broadband data collection efforts is a hopeful step in the right direction, other agencies, including the Census Bureau, also need to look at how they can improve their efforts.

The Rural Challenge

Let me conclude my testimony with a brief discussion of broadband deployment in rural America.

As noted above, official data on rural broadband deployment are relatively sparse. In recent years, however, I have had the opportunity to look closely at the data that are available, from both public and private sources. The signs, I am pleased to report, strongly suggest our current policies are working to rapidly increase the availability of affordable, high capacity broadband services to rural Americans.

First, to be clear, there is no doubt that rural America lags behind urban and suburban regions in broadband adoption. For example, as shown in Figure 8, the Pew Project's most recent data shows that only 24 percent of rural households had broadband connections in 2005, as compared with 38 percent in suburban areas and 40 percent in urban areas.

What is less clear, however, is whether rural adoption lags behind due to lack of availability, or for other reasons.[5] Overall, the evidence is strong that broadband is generally available in rural America and that availability is increasing rapidly.

In expert testimony I filed on behalf of Verizon earlier this year, I examined in detail the state of telecommunications competition in the state of Virginia, including the availability and use of broadband.[6] The results there, it seems to me, are quite encouraging.

Figure 9, for example, shows the growth of broadband services in wire centers served by Verizon in the state of Virginia, based on the FCC's Form 477 data.[7] For reasons discussed above, these data are far from a perfect measure, but the trend it represents is nevertheless significant: The average number of broadband providers in rural areas is growing rapidly, and even wire centers with population densities of less than 100 now average more than four broadband providers.

Figure 10 presents data on the availability of cable modem service in Virginia. This map, which is based on commercially available data backed up by extensive original research (e.g., data from the web sites of individual cable providers), shows that 88 percent of households in Verizon's service territory in Virginia have access to cable modem service. In fact, 99 percent of households passed by cable now have access to broadband cable modem service (and more than

[5] There is some evidence, for example, that broadband adoption is correlated with income, and incomes in rural America tend to be lower than in urban and suburban areas.

[6] The publicly available version of my testimony is available at http://scc.virginia.gov/division/puc/industry/vv_comp/rsc_app.htm

[7] To produce this figure, we mapped data for individual zip codes (obtained from the FCC) into corresponding wire centers within those zip codes.

two-thirds have access to voice services from their cable operator). That's the good news. The bad news is that about 10 percent of households have no cable service at all, that these households are concentrated in very rural areas, and that as a result there are some very rural areas where cable modem service is available to only a small fraction of the population.

The story does not end here, however. Figure 11 shows areas where broadband is available from fixed wireless providers, based on information obtained from the providers themselves. It shows that wireless broadband service is available to 71 percent of Virginia households, including in many of the most rural areas of state.

I looked closely at the services offered by these providers, and was positively surprised by what I found. Companies like Citizens Telecom, Ntelos and Virginia Broadband offer robust, high-speed connections, at competitive prices, with minimal set up fees.[8]

Wireless broadband providers are not the only innovative companies bringing broadband to rural areas. Broadband over powerline (BPL) providers are also showing increasing promise. In Virginia, for example, a company called IBEC has partnered with the Central Virginia Electric Cooperative to bring high speed BPL services to two service areas, and has committed to roll out service throughout CVEC's multi-county, very rural service territory. IBEC, I should note, has received significant support for the Rural Utilities Service loan guarantee program, which in my experience appears to represent, on balance, a cost-effective and efficient means of providing support for broadband deployments in rural areas.

Finally, I would note that America's rural telephone companies are actively rolling out broadband services, including fiber to the home, within their service territories. OPASTCO, the Organization for the Promotion and Advancement of Small Telecommunications Companies, reports that its members offer broadband services to approximately 90 percent of their customers.[9]

So, overall, there is a lot of activity happening to bring broadband to rural America, and a fair amount of evidence that progress is being made. Unfortunately, however, the available data is limited in both quality and geographic reach. Some states – and Kentucky certainly is a leader – have taken steps to more comprehensively assess what is available, and where, and what can be done to "fill in the gaps." Those efforts, in my opinion, need to be expanded to a national scale.

Summary

To sum up, while there are certainly flaws in our systems of data collection, the data that are available show that our current policies are working reasonably well, both in the aggregate and, specifically, with respect to promoting broadband availability in rural America. This does not mean, however, that we can or should be sanguine. Too little is known about the adoption and use of broadband, and our current data collection efforts provide little information on broadband

[8] Virginia Broadband, for example, offers download speeds up to 15 Mbps, with 400 Kbps for $49.95 per month and 1.2 Mbps for $89.50. The company also offers a bundled VoIP service for $32.95 per month for residential customers and $31.95 per seat for businesses.

[9] OPASTCO *Ex Parte Presentation to FCC Commissioner Robert McDowell*, September 16, 2006.

availability, especially in rural America. Moreover, important policy issues loom in the immediate future that could have effects – positive or negative – on America's broadband infrastructure and, in turn, our competitiveness in the world economy. This Committee is correct to be concerned about these issues, and to give them careful deliberation, as it is doing today.

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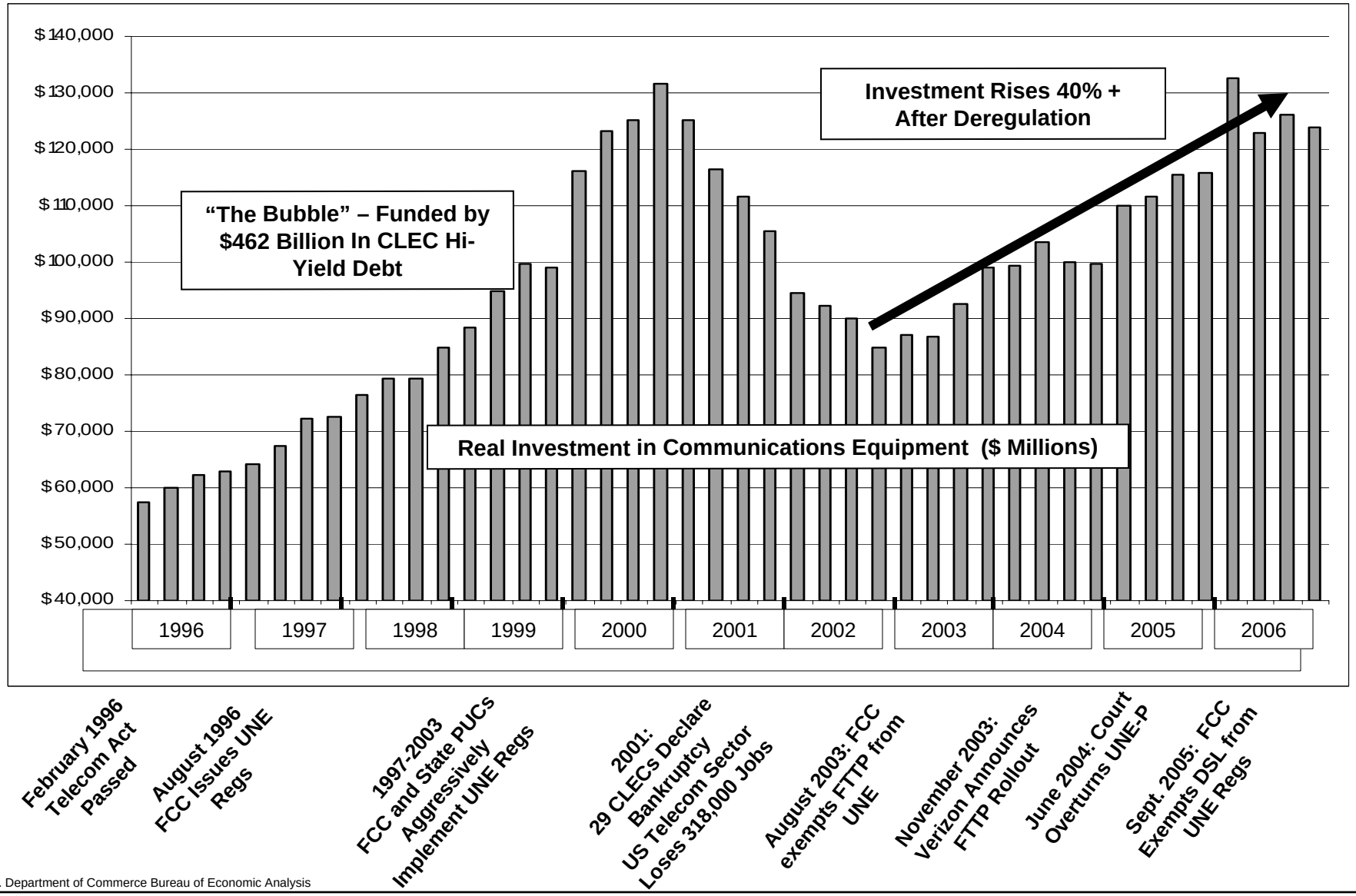
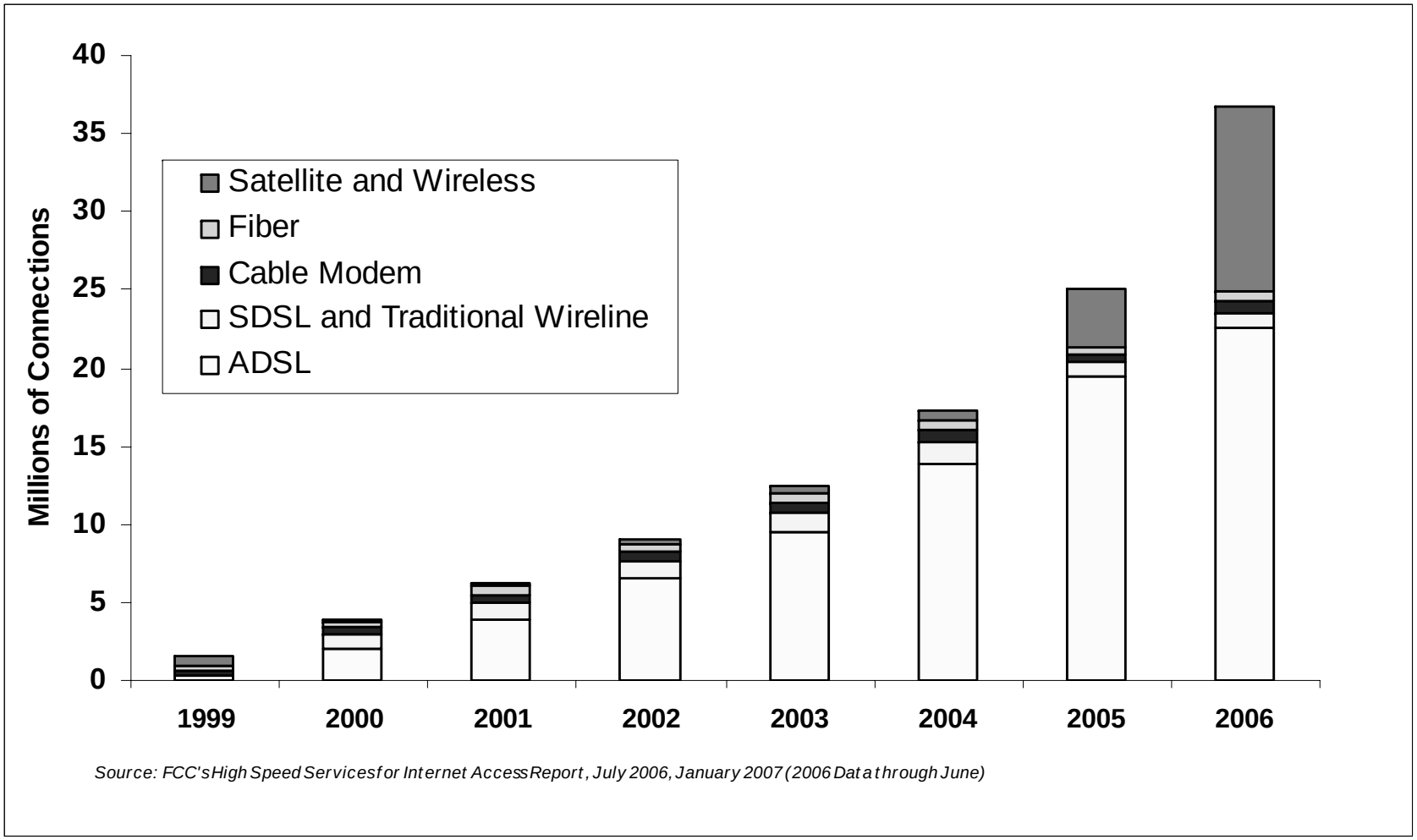
Mr. Chairman and Members of the Committee, that completes my testimony, and I look forward to any questions you may have.

Figure 1: Deregulation and Investment



Source: U.S. Department of Commerce Bureau of Economic Analysis

Figure 2: Broadband Adoption is Growing Rapidly



Source: FCC's High Speed Services for Internet Access Report, July 2006, January 2007 (2006 Data through June)

Figure 3: The Classic "S Curve"

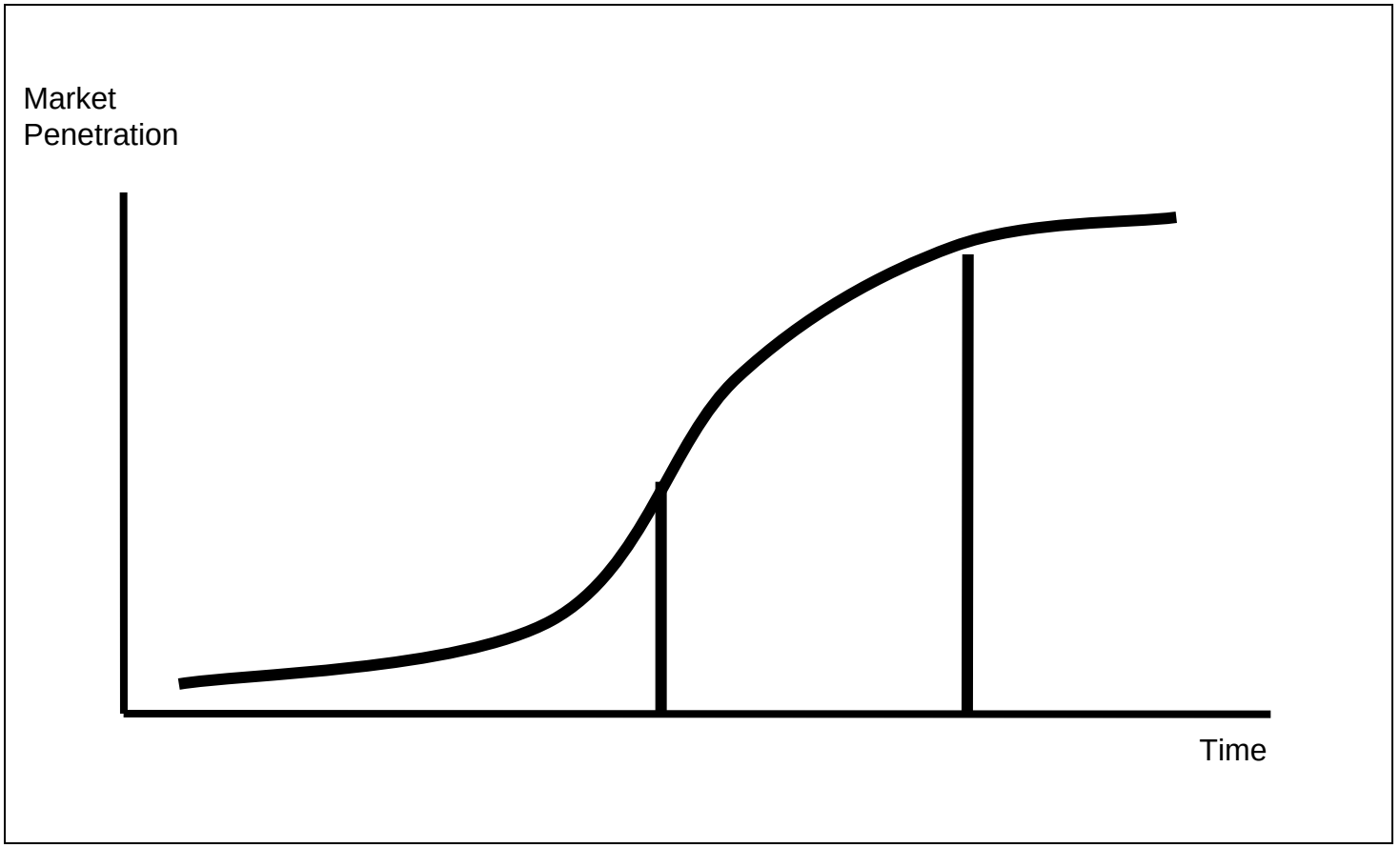
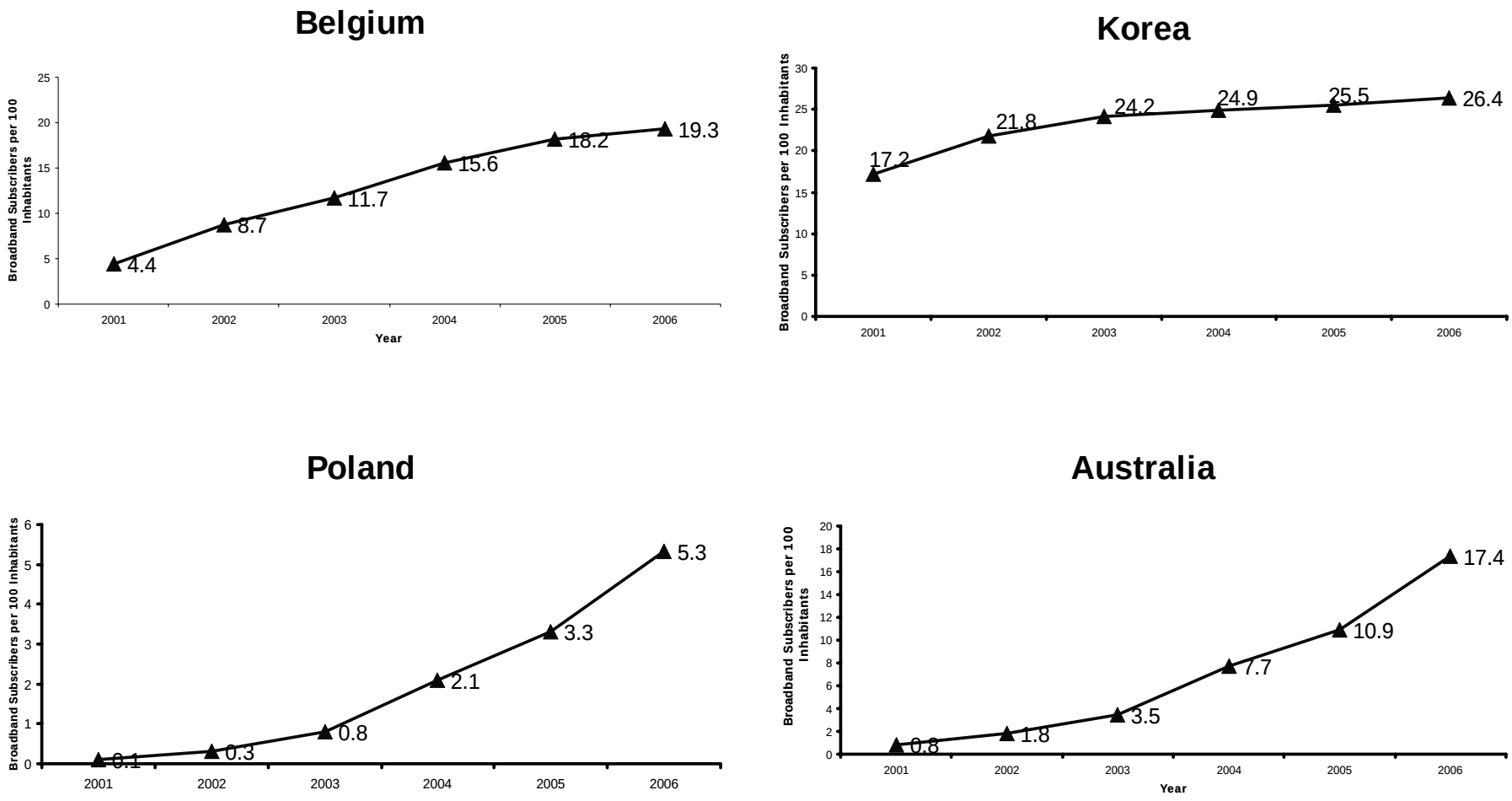


Figure 4: Broadband Propagation in Four Countries



Source: OECD

Figure 5: OECD Broadband Data

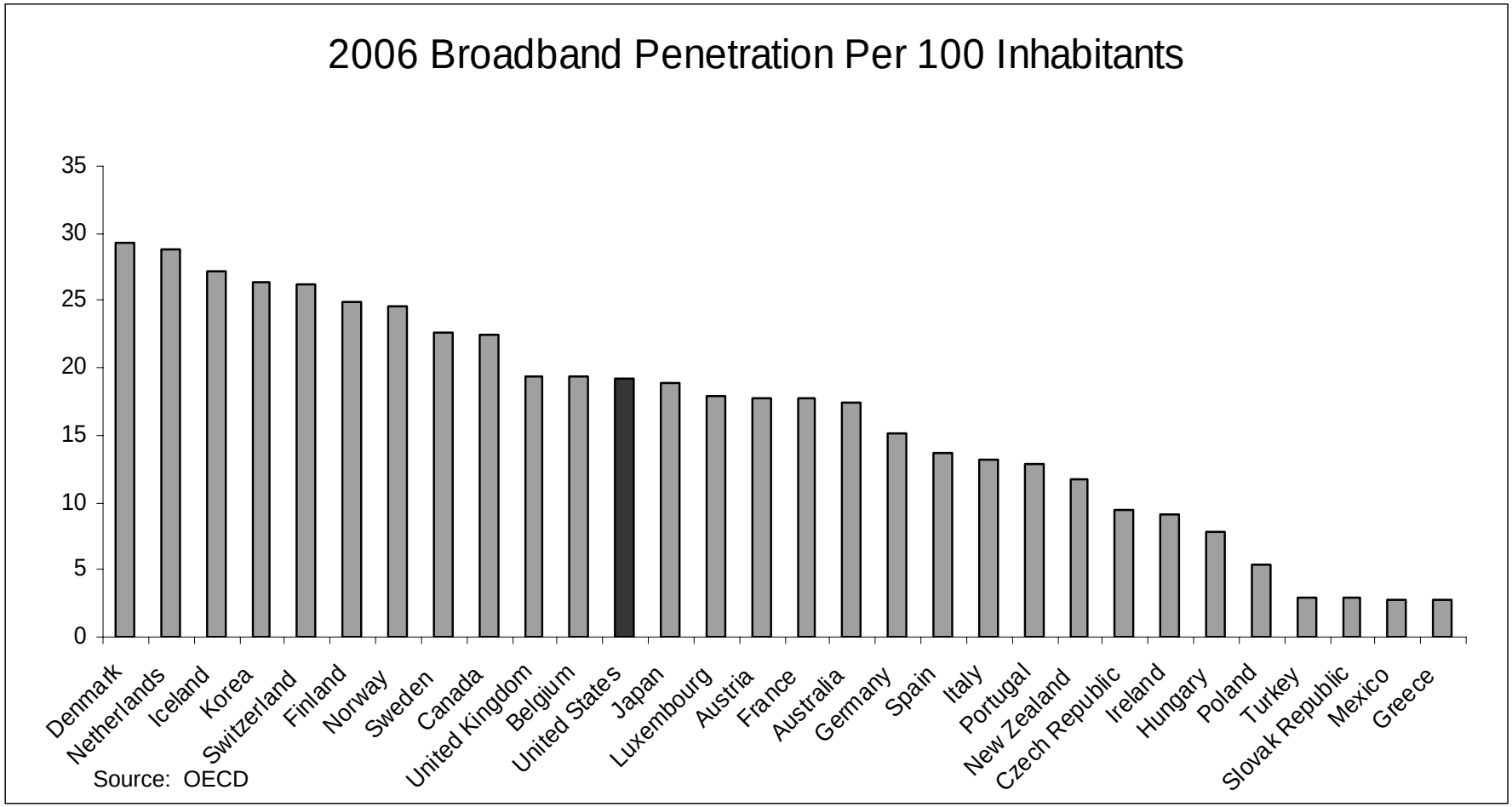


Figure 6: Growth Rates Slow as Penetration Grows

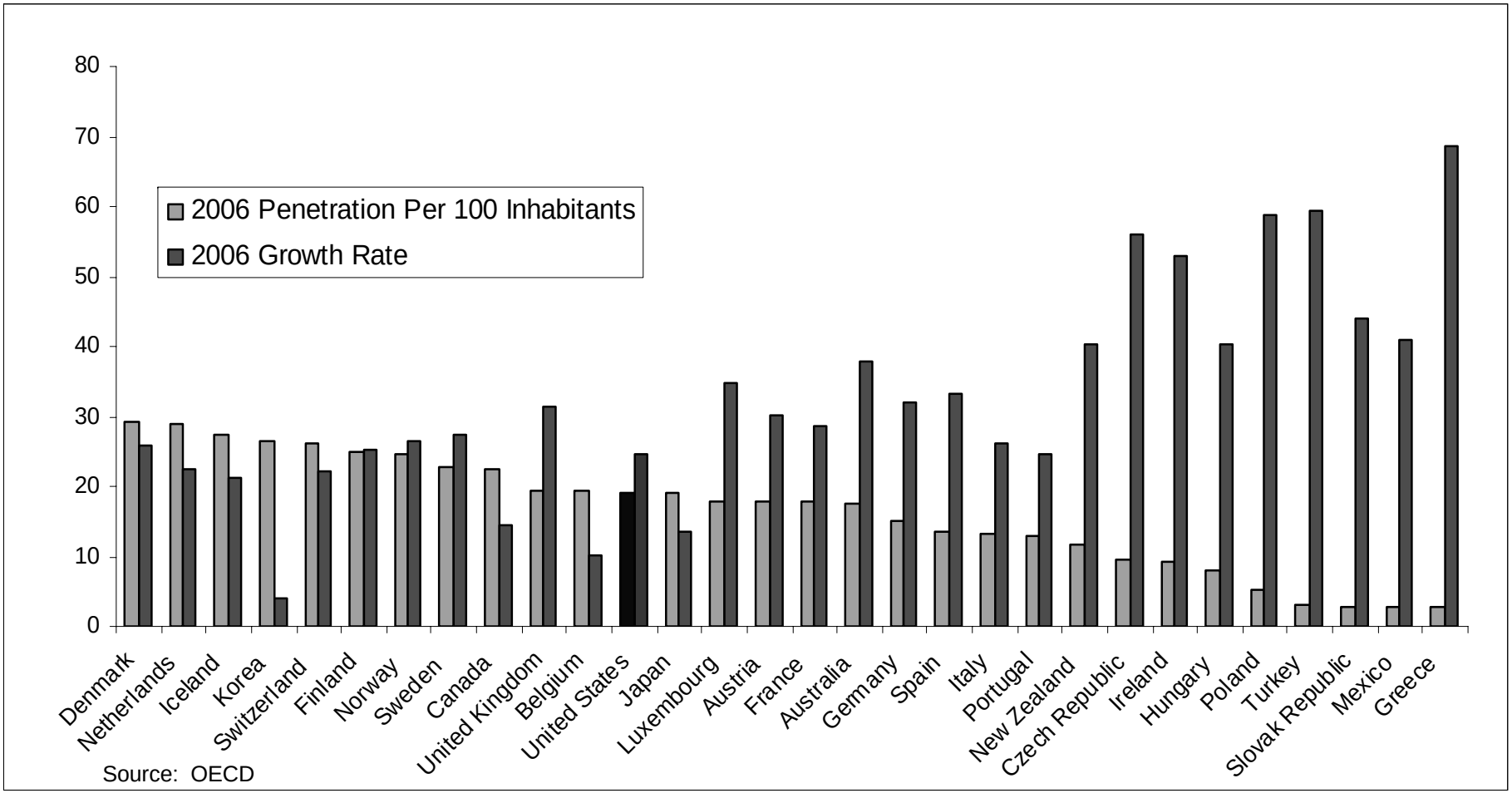
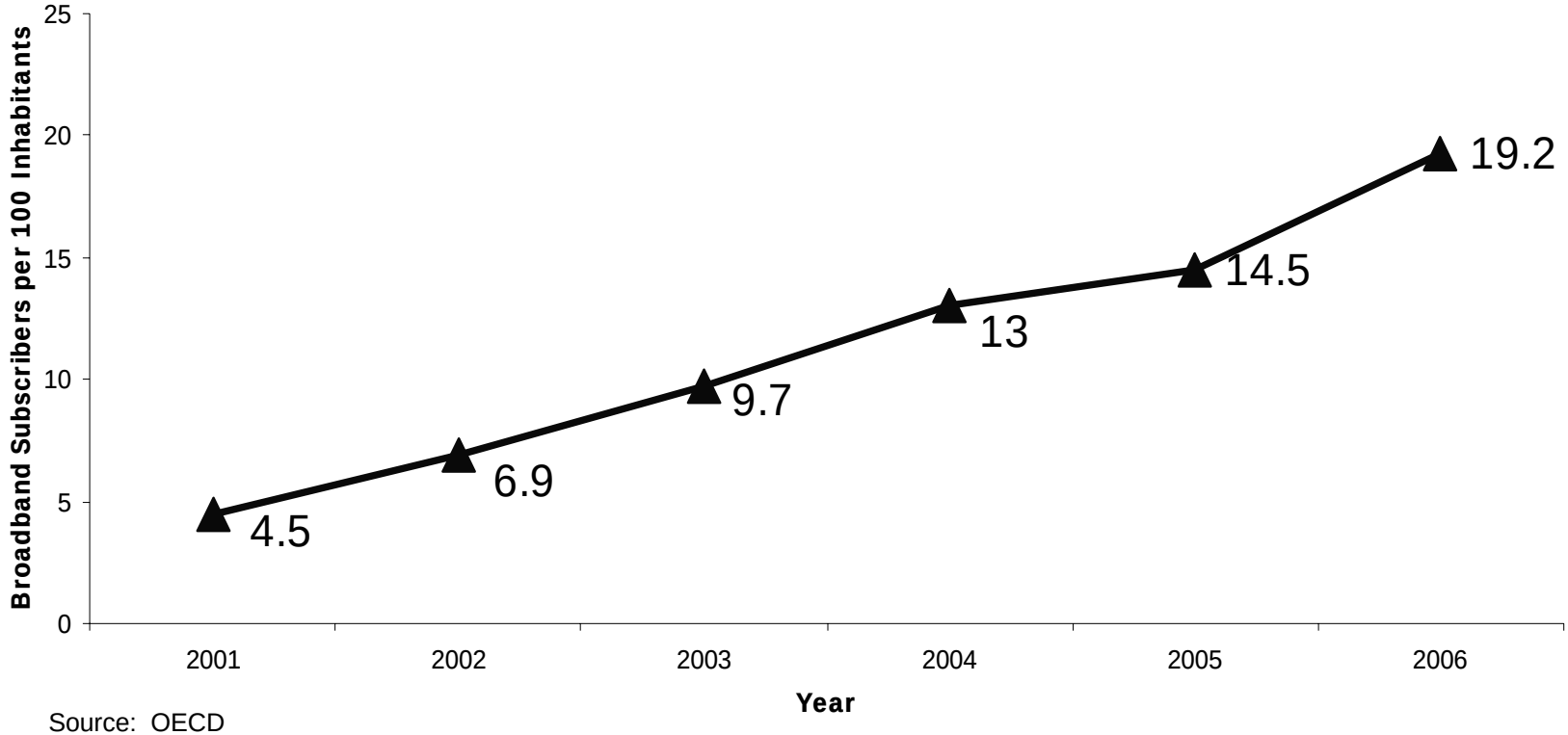
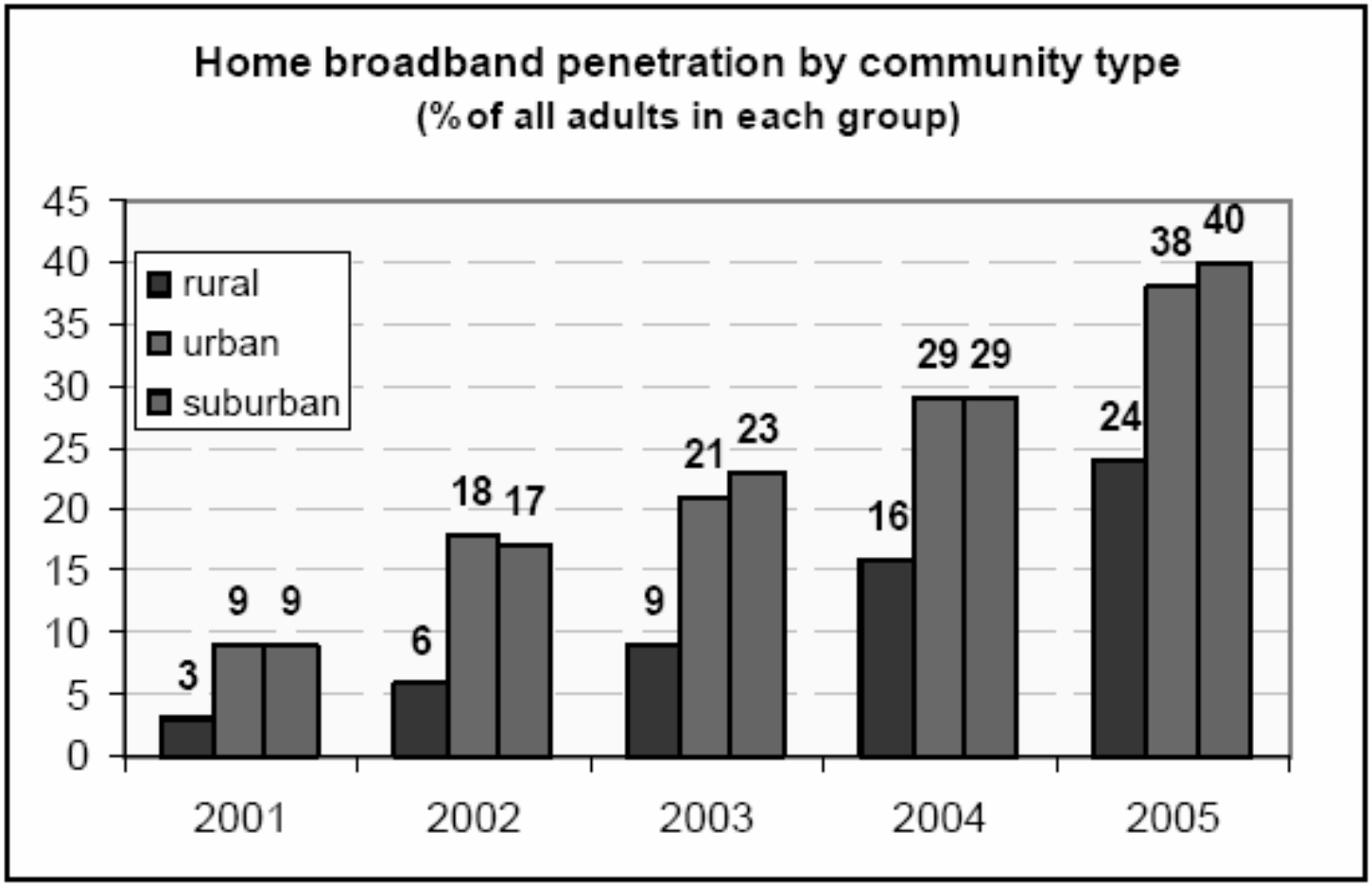


Figure 7: Broadband Propagation in the U.S.



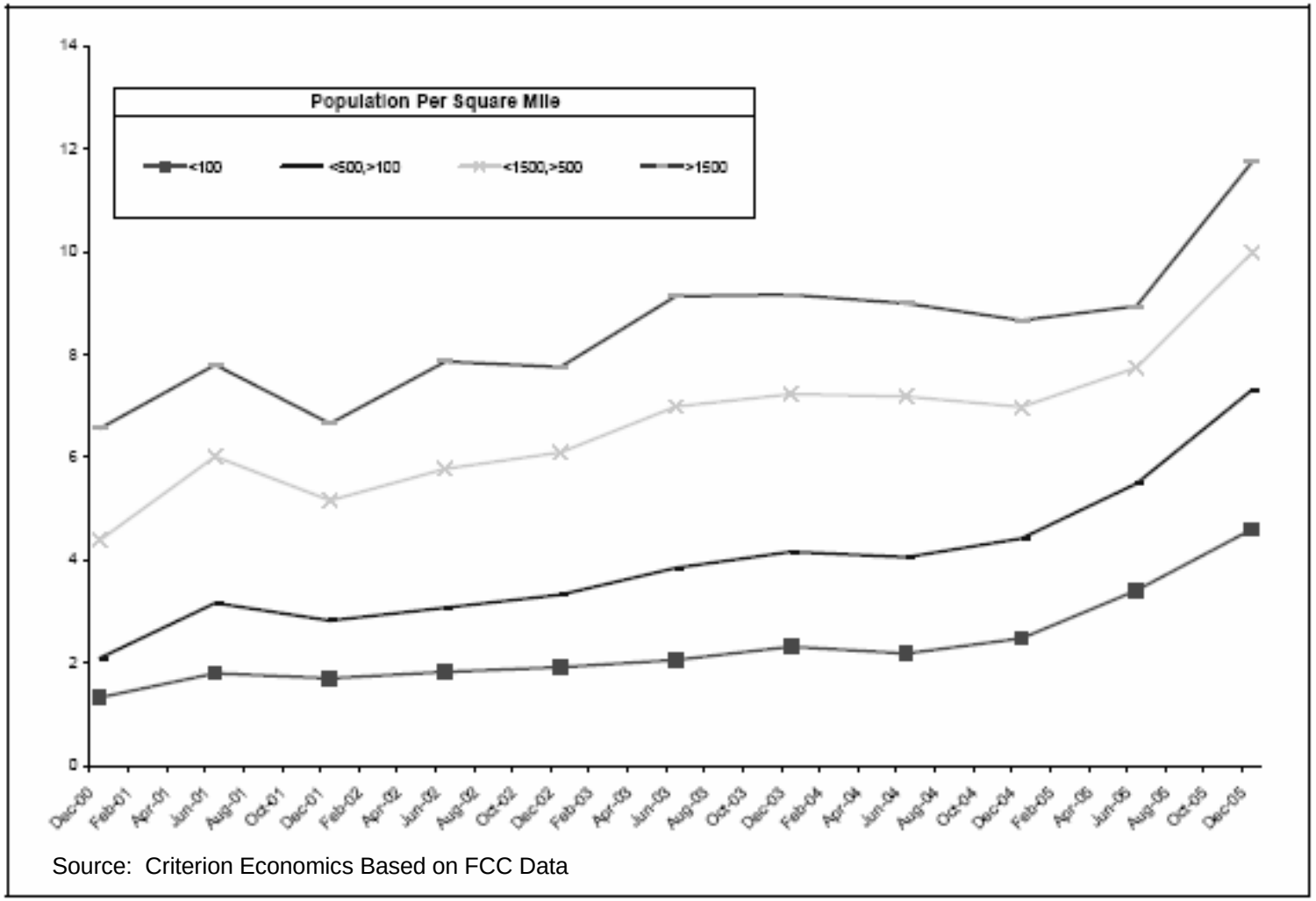
Source: OECD

Figure 8: Rural Broadband Penetration, 2001-2005



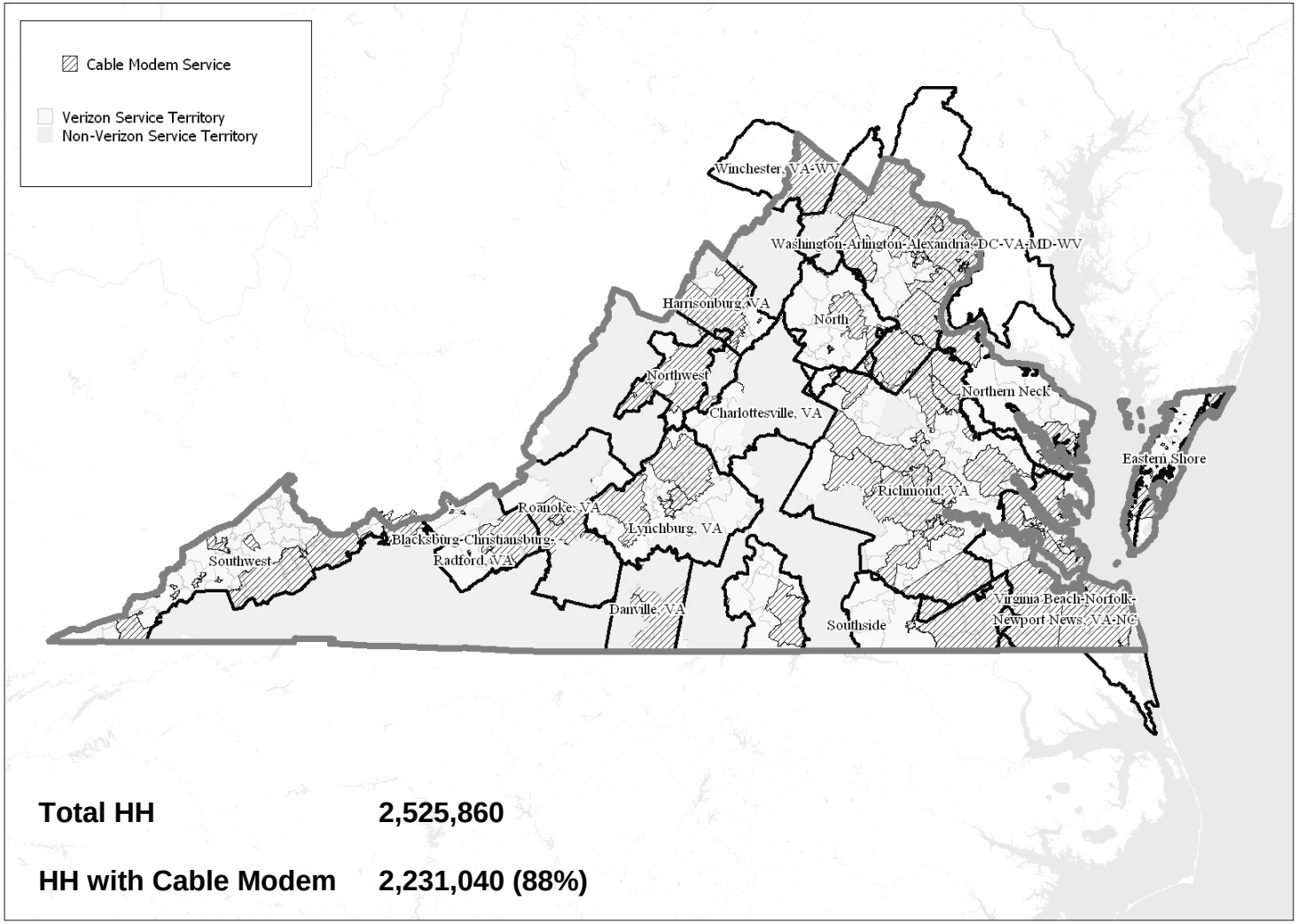
Source: Pew Project on the Internet and American Life

Figure 9: Broadband Providers/Wire Center



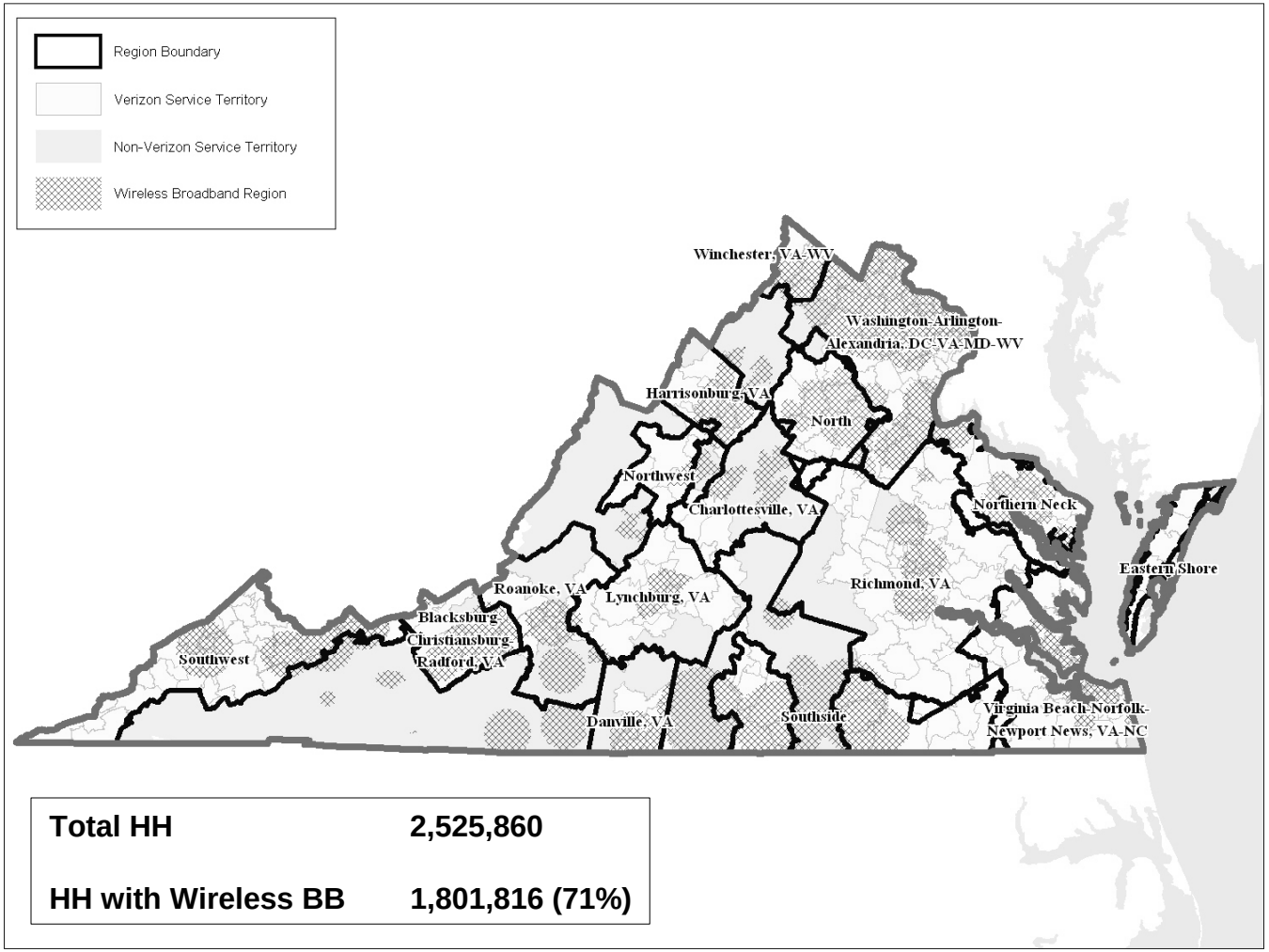
Source: Criterion Economics Based on FCC Data

Figure 10: Cable Modem Availability in Virginia



Source: http://scc.virginia.gov/division/puc/industry/vv_comp/b3_maps/va.pdf

Figure 11: Fixed Wireless Availability in Virginia



Source: http://scc.virginia.gov/division/puc/industry/vv_comp/b3_maps/va.pdf