



The European Union's Broadband Challenge

By Roslyn Layton

Key points in this Outlook:

- Even though it is often idealized as a technologically connected continent, Europe's broadband system is actually highly fragmented and in great need of overall improvement.
- The American market-led approach of facilities-based competition has resulted in greater investment in next-generation broadband technologies. Many European leaders are increasingly abandoning their regulatory approach and looking to the US broadband model.
- The European Union should simplify and reduce regulation of broadband providers, remove barriers to consolidation, and embrace a market-led, technology-neutral approach to broadband.

"In telecoms, of all sectors, there is no place for borders," European Commission for the Digital Agenda Vice President Neelie Kroes declared last year in a speech to the European Parliament's Internal Market and Consumer Protection Committee.¹ "The time for change is now."

The potential impact of a revitalized European Union (EU) telecom market is substantial: the creation of a fully functioning digital single market alone would be worth an estimated €110 billion (US\$150 billion) each year.² However, the EU needs to overcome several challenges to reach that goal.

According to the European Commission's 2013 Digital Agenda Scoreboard, the EU is not on track to meet its 2020 goals of making sure its citizens (some 500 million) have access to a 30 Mbps broadband connection and at least 50 percent of

households subscribe to Internet connections faster than 100 Mbps.³ The progress on these goals is just 54 percent and 2 percent, respectively. For the record, 24 percent of European households do not subscribe to broadband at all.⁴

The European Commission has taken on this effort in an attempt to catch up to the United States and other regions. European telecom regulators have used managed or "open-access" policies to create low prices and superficial competition in each national marketplace. These policies set wholesale rates at which incumbents must lease infrastructure to competitors and have induced falling revenues for operators, hindering their ability and willingness to invest in necessary infrastructure expansions and upgrades. According to the executive director of the European Telecommunications Network Operators Association, Luigi Gambardella, the EU faces an investment shortfall of €110–170 billion (\$150–230 billion) to reach its connectivity goals by 2020.⁵

The idea of the mandated access model, also called the "ladder of investment," was to give

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new entrants a leg up in investing in their own infrastructure. However, investments by new entrants are rare under this model, as virtual competitors prefer to piggy-back on existing infrastructure at low regulated rates rather than make new capital outlays. Even the *New York Times* has recognized that the tradeoff for low prices is costly, writing “Many of the largest European operators, like Vodafone of Britain and Deutsche Telekom, the German owner of T-Mobile, have delayed investment because competition between operators has depressed their revenue.”⁶

Competition created by government with imposed price controls to access an incumbent’s network is called *service-based competition*. It needs to be contrasted with *facilities-based competition*, where players compete in terms of technology, free from artificial price controls. With service-based competition, as in Europe, a regulator counts the number of competitors in the marketplace as evidence of success. However with facilities-based competition, as in the US, the level and types of advanced technologies create a dynamic, competitive market.

In addition to lost revenue resulting from mandated access rules, European operators also struggle with consolidating operations across borders. Operators would have a better chance to invest if they could realize cost savings and economies of scale that come from consolidation. Such an effort would no doubt translate into better quality for consumers and more profitability for the ailing operators. However, the EU’s telecom market consists of 28 individual regulatory regimes, with each country specifying its own rules. This is at odds with creating an efficient single marketplace. In stark contrast to the glowing picture of a seamless “connected continent” some journalists and pundits wish to paint, the reality is that Europe is highly fragmented, with only pockets of advanced broadband networks amid a prevalence of older broadband technologies.

Present Challenges

The EU has a number of challenges to address in realizing its vision for a digital single market for telecom and a connected continent.

Broadband Investment. The EU’s struggle with broadband connectivity is largely due to inadequate investment in infrastructure from broadband providers. As the European Commission explained in its memo about the connected continent, there are hundreds of

telecom operators in Europe, but none active in all member states.

Several major companies (for example, Vodafone and France Telecom) have begun to withdraw and instead expand outside the European Union. “Operators need bigger scale to become more competitive global players and increase their ability to invest and expand at a time when consumers increasingly value faster networks and EU-wide convenience,” notes a memo from the European Commission.⁷

The reality is that Europe is highly fragmented, with only pockets of advanced broadband networks amid a prevalence of older broadband technologies.

By contrast, American operators have invested almost twice as much per capita as their European counterparts in recent years. While broadband investment can be cyclical, with periods of high spending for network upgrades followed by periods of lower spending and maintenance, the US has been the world pacesetter, investing some \$1.2 trillion since 1996.⁸ Since then, an average of at least \$60 billion annually has been invested to build and upgrade wired and wireless networks, lay millions of miles of fiber-optic cable (more than in the whole EU combined), and erect cell towers.⁹ In 2013, the amount was nearly \$75 billion.¹⁰

US investment has continued even in the face of the financial crisis. Not so for Europe. From 2004 to today, the EU’s contribution to the world’s communications infrastructure investment has fallen from one-third to less than one-fifth. Meanwhile, the US contribution has remained steady at roughly a quarter of the world’s total, even as the total pie of infrastructure investment has increased globally. Americans, who comprise just 4 percent of the world’s population, enjoy one-fourth of the world’s broadband infrastructure investment.

Figure 1 illustrates the growing gap between per-capita spending on communications infrastructure in the US and in the EU, showing how the US is pulling ahead by an increasing margin.

The Digital Economy. The EU is composed of some 28 nations, 24 official languages, and 11 currencies. This diversity can be an obstacle to realizing a single digital

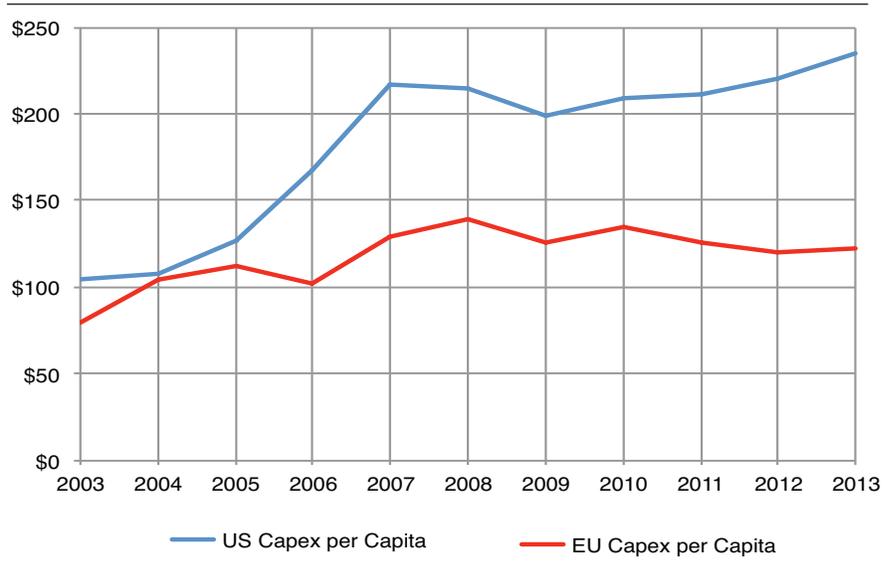
economy. Kroes observed, “We can’t afford to remain trapped in 28 national markets; if this continues, we will fail to feed the digital economy the raw materials it needs: connectivity and scale.”¹¹

Reflecting on the challenges of the EU illustrates a number of advantages the US enjoys, including that the 50 states are organized under a federal government and share a single language and currency. America’s de facto single market allows companies of all sizes to achieve scale, and this holds true for both large broadband providers that deploy infrastructure and for entrepreneurs and emerging companies that want access to a large domestic market.

In her speech to the World Economic Forum in Davos, Switzerland, in January 2014, Kroes observed that European start-ups have difficulty getting scale on the continent, not to mention on the global stage. “Europe needs thriving startups and global internet companies to become a global growth centre again,” she said.¹² Not lost on Kroes and many Europeans is that the US leads in the number of global Internet companies and that Europeans overwhelmingly use American, not European, search engines, social networks, and mobile applications. Of the top 25 Internet companies as measured by revenue and market value, some 15 come from the US. Just one, Asos, comes from the EU.¹³

It was only a decade ago that Europeans expected to be first in the digital age. Fleur Pellerin, the French minister delegate with responsibility for small and medium enterprises, innovation, and the digital economy, noted that Europe was once leading the world in mobile innovation, but lost its place. The European GSM standard has been supplanted by America’s movement to 4G/LTE. Developers of mobile applications in the US can take advantage of a venture capital environment that is eight times larger than Europe’s. In her speech, Pellerin explained that in 2002 six European phone makers were manufacturing up 50 percent of the world’s phones, but now, none exist.¹⁴ Microsoft purchased Nokia, the last European phone maker. France’s Alcatel-Lucent has already laid off 10,000 workers, and lack of revenue is expected to force the telecom industry to shed

FIGURE 1
INFRASTRUCTURE INVESTMENT PER CAPITA BY PRIVATE TELECOM, CABLE, WIRELESS, AND SATELLITE PROVIDERS



Source: Capital expenditure (Capex) data from Infonetics. Population data from US Census and Eurostat.

10 percent of its workforce in the near future.

Kroes added, “The world envied Europe as we pioneered the global mobile industry in the early 1990s (GSM), but [because] our industry often has no home market to sell to (for example, 4G) consumers miss out on latest improvements or their devices lack the networks needed to be enjoyed fully. These problems hurt all sectors and rob Europe of jobs it badly needs. EU companies are not global internet players. . . . 4G/LTE reaches only 26% of the European population. In the US one company alone (Verizon) reaches 90%!”¹⁵

The United States International Trade Commission (USITC) has now started including digital goods and services in its export data. In 2013, USITC reported for the first time on the value of America’s broadband-based Internet companies, noting that digital exports from the US amounted to more than \$356 billion in 2011, making this America’s third-largest category of exports.¹⁶ Indeed, Europe is the top location for America’s digital exports, and some concern exists that the lack of broadband investment in the EU could inhibit the growth for some digital exports to Europe in the future.

To be sure, measuring the Internet economy is challenging, as Internet-enabled services and efficiencies have long been internalized in many traditional companies. As the Boston Consulting Group (BCG) noted in a study, some 75 percent of the Internet’s value is captured by traditional companies. Their study estimates

that 4–5 percent of America’s gross domestic product (GDP) is related to the Internet.¹⁷ Given that America’s GDP was estimated to be under \$17 trillion in the third quarter of 2013, the Internet economy, by BCG’s calculation, should be about \$850 billion.¹⁸

That helps explain why the European Commission is working toward a digital single market across the EU, with initiatives aiming to bring American-style investment, innovation, and entrepreneurship to the European broadband market and Internet-based industries.

Broadband Penetration and Speed. Largely reflecting the shortfall in investment in broadband infrastructure, access to high-speed broadband in the EU is limited. The United States has greater choice of broadband technologies and speeds than nearly anywhere in the world, including the EU.

Table 1 summarizes availability of different broadband technologies based on the EU’s Digital Agenda Scoreboard report, America’s National Broadband Map, and other sources. The data show the US outperforming the EU on every measure.

As I discuss here, a few European countries are on track to reach their broadband goals. Overall, however, the EU is a patchwork of broadband technologies of vastly divergent quality.

Of the top 25 Internet companies as measured by revenue and market value, some 15 come from the US. Just one, Asos, comes from the EU.

Figure 2, a map commissioned by the EU government for an assessment of broadband across the continent, shows the degree to which next-generation broadband technologies (VDSL, FTTP, Cable DOCSIS3, and LTE) are available. The dark green areas have high penetration while the lighter areas have low penetration. The map clearly shows that much of Ireland, France, Italy, Greece, former Eastern bloc countries, and even parts of Germany do not have access to high-speed Internet of at least 24 Mbps or an LTE service.

Broadband Prices. Comparing broadband prices between the US and EU is a difficult exercise for a number of reasons. The US is a larger region where a higher percentage

TABLE 1
BROADBAND TECHNOLOGY AVAILABILITY IN THE US AND EU, 2013

| | US (%) | EU (%) |
|---|--------|--------|
| Availability of broadband with a download speed of 100 Mbps or higher | 85* | 30 |
| Availability of cable broadband | 93** | 42 |
| Availability of LTE | 95*** | 26 |
| Availability of FTTH | 23 | 12 |
| Total population who subscribe to broadband by DSL | 34 | 74 |

Notes: *See National Cable Telecommunications Association, “America’s Internet Leadership,” 2013, www.ncta.com/positions/americas-internet-leadership.

**National Cable and Telecommunications Association, “America’s Internet Leadership,” 2013, www.ncta.com/positions/americas-internet-leadership.

***Verizon’s most recent report notes that it reaches 97 percent of America’s population with 4G/LTE networks. See Verizon, News Center: LTE Information Center, “Overview,” www.verizonwireless.com/news/LTE/Overview.html.

Sources: US data from National Broadband Map, “Access to Broadband Technology by Speed,” *Broadband Statistics Report*, July 2013, www.broadbandmap.gov/download/Technology%20by%20Speed.pdf. EU data from European Commission, “Chapter 2: Broadband Markets,” *Digital Agenda Scoreboard 2013* (working document, December 6, 2013), http://ec.europa.eu/digital-agenda/sites/digital-agenda/files/DAE%20SCOREBOARD%202013%20-%202-BROADBAND%20MARKETS%20_0.pdf.

of people live in suburban and rural areas than in the EU. Generally, the cost of deployment is lower in areas with higher population densities. Furthermore, broadband is often bundled with other services, making an apples-to-apples comparison across countries difficult. For example, cable broadband generally includes a TV package, but each country will have a different set of local language content and channels. American content tends to have a higher value because it is in English and highly demanded around the world, whereas the local language TV and films of any European nation have a smaller audience and hence a lesser nominal value. This can account for some difference in price. Prices will also be affected by government policies and the availability and cost of substitutes and taxes.

Some studies point to lower broadband prices in Europe, but they frequently exclude the cost of taxes (a 25 percent value-added tax is standard in many countries) and mandatory media license fees (some hundreds of euros per year on top of broadband subscriptions). When price comparisons are adjusted for these realities,

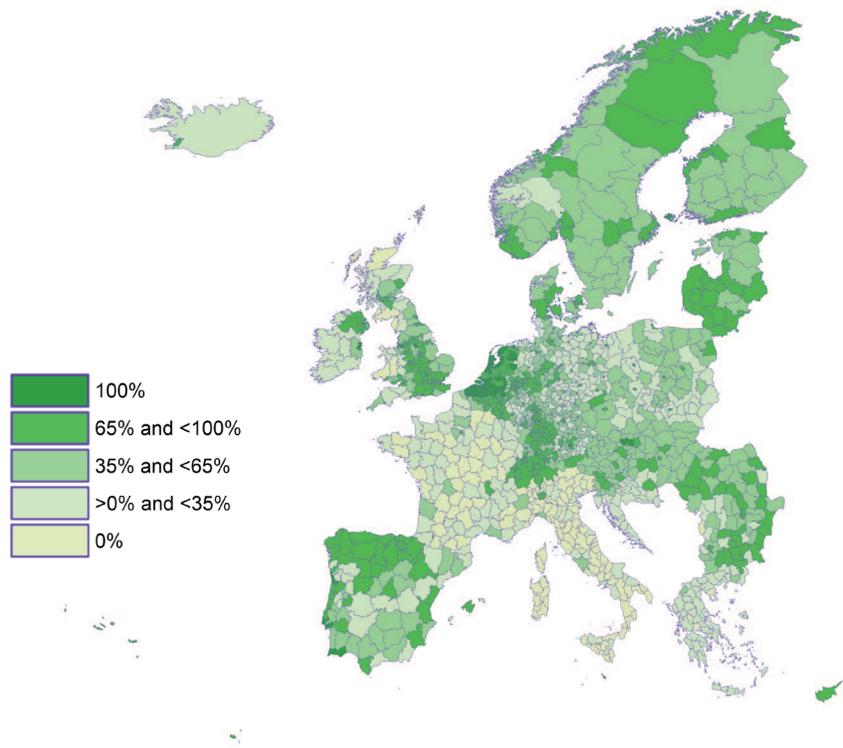
American prices are frequently lower.

But none of this seems persuasive to the “Europe is better” detractors. Some point singularly to a report by the New America Foundation (NAF) that claims that Americans pay more for inferior broadband service.¹⁹ But the NAF’s findings are contradicted by far more comprehensive reports from the Organisation for Economic Co-operation and Development (OECD), the International Telecommunication Union (ITU), and the Information Technology & Innovation Foundation (ITIF), which all found that the US has more choice among competing technologies and compares favorably on speed and pricing.²⁰ Even Harvard University’s Berkman Center study on global broadband statistics showed that entry-level prices for broadband are some of the lowest in the world.²¹

The NAF study, based on a random set of cities around the world, reaches its conclusions because of a number of false assumptions, methodological errors, and careless mistakes. For instance, the study lauds Danish cable company Stofa for providing ultra-high broadband speeds in Copenhagen, but Stofa does not serve that city; the bulk of its customers are 160 miles away. The NAF report also applauds EU companies that offer “low” broadband prices but then fails to mention that broadband service is tied to a customer’s purchase of cable. It also neglects to take into account that many of the “low” broadband price offerings of European ISPs reflect only temporary, sales-pitch discounts.

While by no means an attempt at comprehensive analysis, here is an example of what an honest comparison of broadband prices between the US and a European country should look like. Figure 3 illustrates a comparison of two premium cable broadband packages in the US and Denmark. Broadband and content account for a larger portion of the total cost of the cable subscription in the US (about 86 percent of the total price), and the US package also includes more premium channels. The

FIGURE 2
TOTAL NEXT-GENERATION ACCESS COVERAGE, 2013



Source: Courtesy of Point Topic.

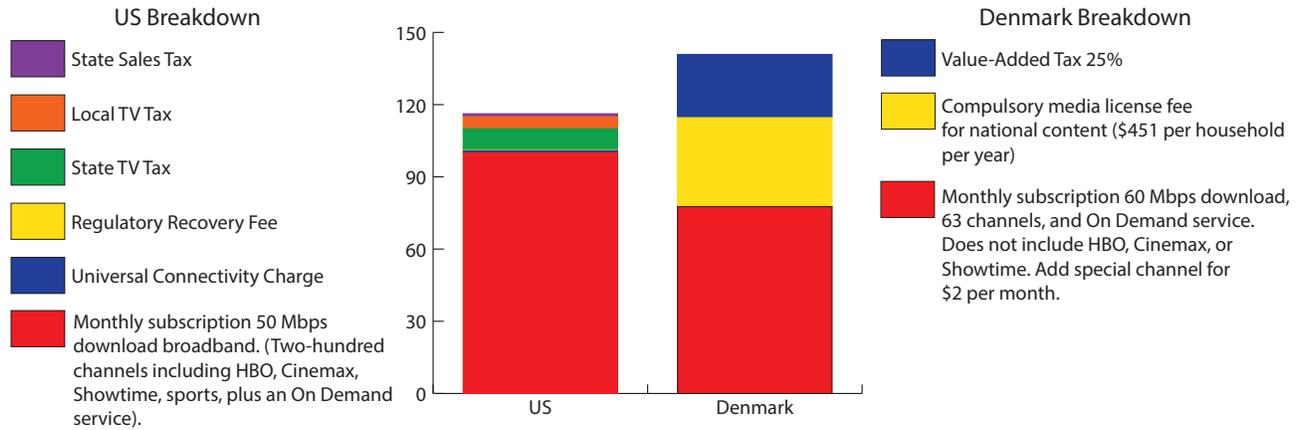
US package has 200 channels, while the Danish package offers only 63 and does not include HBO, Cinemax, ESPN, and others that are part of the premium package in the US.

In the Danish offering, which has a slightly higher broadband speed but two-thirds less content, broadband and content make up just 60 percent of the cost. The remaining 40 percent is taxes and compulsory fees. On balance, Danish subscribers pay 35 percent more than Americans for a similar premium package. Figure 3 clearly shows that taxes and fees dramatically change the overall picture of broadband prices. Not incorporating all relevant costs makes for a superficial and incomplete analysis.

The Exceptions

As I have mentioned, a few European countries—Denmark, Norway, Sweden, Belgium, Netherlands, Luxembourg, and Switzerland—have succeeded in moving toward their broadband goals. Data from the OECD Broadband Portal can be helpful to highlight some of the advances.²²

FIGURE 3
COMPARISON OF CABLE TV PRICES IN THE US AND DENMARK, JANUARY 2014



Note: Prices are in US dollars.
Source: The author prepared the data from actual customer bills from leading US and Danish cable companies.

Denmark is the only OECD country to score in the top five for both fixed and mobile broadband subscriptions per 100 inhabitants, and it has had high historical rates of penetration for both wired and wireless networks. Finland does not have the historically high rate of fixed broadband penetration, but it has the world's highest rate of mobile subscriptions, 88 per 100 inhabitants. Switzerland, a small, rich country that is not part of the EU, has the highest rate of fixed broadband penetration, 43.4 subscriptions per 100 inhabitants. It is followed closely by the Netherlands and Denmark.

In Denmark, the private sector provides broadband infrastructure, investing some \$1.2 billion annually.

Those who argue that the EU is outclassing the US on broadband performance frequently point to these countries, but they just as frequently neglect to mention some of the reasons behind the countries' apparent broadband success. This is important to note because these reasons make it inappropriate to make direct country-to-country comparisons.

One explanation is favorable geodemographics. The Netherlands, for example, is the size of Maryland but has almost three times the population. The Netherlands also

has flat topography organized on a grid, making fixed broadband deployment relatively easy and cost effective. Similarly, Denmark has a land area closely equivalent to the state of Vermont, but with nearly nine times the population. Additionally, the simple fact of history that the Netherlands deployed cable television in the 1950s, before the rest of Europe, gave the country an early advantage. Today the Netherlands has two next-generation access (NGA) lines to almost every home and four mobile networks.

It is also worth mentioning another source of success: competition. The European countries that perform better in OECD broadband indicators generally have high rates of competition between technologies.²³ In some of these countries it is also the case that the mandated access model allows for some consolidation. For example, in Denmark incumbent providers can acquire their virtual competitors and offer broadband products and services under multiple company names. In practice, this means that Denmark's TDC, the telecom incumbent, also owns the leading cable company and a number of virtual competitors. Two-thirds of the broadband subscriptions in Denmark come from TDC or one of its daughter companies.

However, private-sector entrants have created credible facilities-based competition. Mobile operators Telenor and Telia built nationwide 4G/LTE networks, and private utility companies invested in FTTH. These

developments force the incumbent TDC to remain competitive, and the company continues to upgrade its cable and mobile facilities.

Denmark, a country that is rightly recognized for superior broadband performance, has an interesting story to tell about FTTH. In 2005, 14 private utility companies in Denmark invested \$2 billion in FTTH, particularly in rural regions. Today, 65 percent of Denmark's population has access to ultra-fast broadband of 100 Mbps or higher, but just 1.4 percent subscribe to the highest-speed tier.²⁴ The utility companies have just 250,000 broadband customers combined, and most customers subscribe to the tiers below 100 Mbps to satisfy their needs and budget.

The Danish telecom regulator reports that 79 percent of Danes purchase broadband packages with speeds of less than 30 Mbps, even though prices of all tiers are reasonable and broadband is widely available.²⁵ This is particularly important because in many sectors of the economy, including banking, health, and government, users can access services only digitally. Services are fully functional at speeds less than 30 Mbps, particularly mobile services. This is further underscored as 7 percent of Danes now use 3G or 4G as their primary broadband connection, surpassing FTTH customers by 100,000.

Policy Lessons

The keys to Denmark's success may be summarized in two policy principles:

1. Technology neutrality. No one broadband technology is favored over another.
2. Market-led broadband development. The government does not decide which technology citizens should have, nor does it give government subsidies for broadband deployment.²⁶

In Denmark, the private sector provides broadband infrastructure, investing some \$1.2 billion annually. This is more than the Danish government spends on railroads, highways, or hospitals.²⁷ This indicates that consumers and private providers can make efficient decisions about broadband. Furthermore, Danish taxpayers are not on the hook when technologies change or fall out of favor. Instead, shareholders bear these risks.

Policymakers can learn a lesson from this example: while both private and public investments can be used to achieve broadband goals, the Danish example shows

that given the right regulatory circumstances, the marketplace is both willing and able to make efficient decisions about broadband. This means that precious taxpayer resources need not be spent on broadband.

A smart vision for broadband realizes that no one network can do it all and embraces a variety of network solutions and innovations that are driven by the market.

Calls for taxpayer investment in FTTH are frequently made with a justification that it supports rural economic development, even though the evidence for this is limited. Taxpayer investment in FTTH should be seen in the light of the continuing financial crisis in Europe. It is a particularly important question for the EU, where governments already have difficulty meeting current obligations for health, education, unemployment payments, and pensions.

Sinking massive amounts of public funds into one single technology creates a double whammy: it is a gamble with taxpayers' monies and it forces out private investment. A far better strategy for the EU would be to deregulate the telecom market so operators can invest, rather than require taxpayers to shoulder additional tax burdens.

In general, the quality and extent of Internet access and infrastructure varies significantly across the EU. While regions such as the Benelux and Nordics have been recognized for scoring well on a variety of broadband measures, prosperous nations such as France, Germany, Italy, and Ireland have not kept pace with the rollout of next-generation networks. Furthermore, fixed broadband adoption is particularly low in Estonia, Slovakia, Slovenia, and Portugal, even though these countries have been lauded for their FTTH rollouts.²⁸

Potential Solutions

Although the EU's broadband challenge is significant, it has some potential pathways to meeting its broadband goals.

Creating a Single Market. On a fundamental level, the creation of a digital single market—described by Kroes as “the missing cornerstone in this digital ecosystem”—would permit the consolidation of broadband providers

across borders, reduce costs through economies of scale, and create a better business case for operators to invest in broadband infrastructure.²⁹ A fully integrated digital market would also permit a more effective and continent-wide spectrum policy through the expansion of scale economies, the removal of inefficient national divisions, and the introduction of more comprehensive secondary markets to allow more efficient usage of the limited resource. Harmonizing tax regimes across the continent would also reduce the burden on consumers and businesses and allow an even playing field for providers across countries.

Simplifying and Reducing Regulation. Regulatory reform is another necessary step in resolving Europe's broadband challenge. Removing the open-access mandate would encourage investment by market incumbents in next-generation infrastructure without fear of being undercut by noninvesting new entrants. It would also allow credible competition among—rather than simply within—different technologies.

The continuation of diminished regulation may encourage more independent and substantial investment in upgrading existing infrastructure as well, from both European and American firms. Most important is the removal of ad-hoc national restrictions on consolidation across countries. This would allow operators to find the cost savings across borders and build a business case for infrastructure deployment.

Technological Innovation. In Europe, as in the US, real-time entertainment is the leading source of Internet traffic. High-bandwidth video services such as Netflix and YouTube can each account for as much as 15–30 percent of a country's traffic. This surge in streaming activity has put pressure on broadband providers, and some argue that large-scale, government-funded deployment of FTTH is the only way to meet growing demand.

However, such a move is essentially a taxpayer-funded subsidy to already-profitable content providers. It may undercut the efforts by existing providers to upgrade their networks (Cable and DSL networks are capable of achieving speeds of 100 Mbps and greater with technological upgrades), not to mention progress in areas such as content delivery networks, video compression, multi-casting for over-the-top (OTT) services, and high-efficiency video coding, which all help deliver high-bandwidth video more efficiently.

Consumers and providers are still experimenting

with content formats and devices, which will likely drive bandwidth needs in the future. As applications become more efficient and better designed, they require less bandwidth. This changes the demand for ever-higher broadband speed. Another possibility is that mobile will emerge as the preferred connection for broadband, further changing the economics for fixed-line broadband.

A smart vision for broadband realizes that no one network can do it all and embraces a variety of network solutions and innovations that depend on the market. The broadband market, if allowed to operate freely, can meet the demands of today and the future.

Conclusion

Contrary to the view of many in the popular media who portray it as a broadband utopia, the EU continues to face substantial obstacles in realizing next-generation broadband deployment. A key reason is the open-access mandate, which creates strong disincentives to invest and fosters only service-based competition, not the facilities-based competition that it was intended to deliver. Additionally there are a number of barriers to consolidation. As a result, the EU finds itself trying to survive on a patchwork of broadband networks of different quality and a digital economy that has fallen woefully behind America's.

Many desirable measures have been floated by European authorities, the most important of which is the creation of a digital single market that would offer the scale necessary for operators to have the incentives and means to make adequate investments. While the European Commission should be commended for taking this important step, its effort falls short of making the necessary allowances for cross-border consolidation. It must fully comprehend the scale and nature of the challenge before the EU.

The Internet and America's digital economy have flourished precisely because they have been lightly regulated. American Internet providers have invested heavily in broadband over almost two decades. Their yearly investment comprises a quarter of the world's total annual outlay of communications capital investment. In turn, American consumers fuel the boom for innovation in digital content and applications. Because of broadband, the US has transformed its economy to the point where digital goods and services are now the third leading category of exports.

America's success with broadband investment, Internet innovation, and digital transformation is the envy of the EU. This is why many European leaders are abandoning their regulatory approach and looking to the American broadband framework.

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