



Mobile Wireless Performance in the EU & the US

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1.

Executive Summary

There is broad agreement that the EU mobile wireless market is underperforming relative to other advanced economies, including the U.S. We find that the EU is lagging well behind the U.S. in deployment of next generation wireless infrastructures and the advanced services they make possible, and that EU consumers are worse off as a result. EU regulatory policies have resulted in a fragmented market structure which prevents carriers from capturing beneficial economies of scale and scope and retards the growth of the mobile wireless ecosystem. We recommend reforming and harmonizing spectrum policies, permitting efficient levels of consolidation, and promoting innovation by fostering dynamic competition.

First, the U.S. market is outperforming the EU market in many important respects:

- EU consumers pay less per month than U.S. consumers for mobile wireless services, but U.S. consumers use five times more voice minutes and twice as much data.
- Growth in investment in the U.S. is translating into faster data connection speeds: U.S. speeds are now 75 percent faster than the EU average, and the gap is expected to grow.
- The U.S. is deploying LTE at a much faster pace than the EU; by YE 2013, 19 percent of U.S. connections will be on LTE networks compared to less than two percent in the EU.

Part of the cause for the divergent performance is the relatively inefficient structure of mobile wireless markets in the EU:

- Market fragmentation prevents EU carriers from capturing economies of scale and scope. America's two largest carriers are each larger than the three largest EU carriers combined.
- Market fragmentation limits consumer choice: it explains, at least in part, why Apple chose not to make the iPhone 5 compatible with some EU mobile networks.

- Efficient consolidation would provide incentives for investment, facilitate a more integrated mobile wireless ecosystem and improve consumer welfare.

Renewed growth in the mobile wireless ecosystem depends in significant part on regulatory reform, including:

- Harmonization of spectrum policy, including a coordinated release of spectrum by EU Member States in a narrow window, foregoing discrimination in favor of new entrants, and creating a presumption of license renewal with flexible ownership rights;
- Reducing impediments to efficient consolidation by simplifying merger reviews and taking a more cautious approach to the imposition of remedies;
- Refocusing policy on enhancing dynamic competition and fostering innovation rather than preserving competitors and achieving short-run price cuts.

The mobile wireless marketplace is extremely dynamic. While the current performance of the EU market is below par, sensible policy reforms could bring rapid improvement, creating substantial benefits for EU consumers and spurring accelerated economic growth.

Introduction

As recently as five years ago, markets for mobile wireless services in Europe were performing on par with, or even better than, markets in the United States.

Today, there is broad agreement that the EU has fallen behind in at least some dimensions, and especially with respect to the deployment of next generation LTE networks.¹ We assess the divergence in performance, analyze its causes, and suggest policy changes that would improve performance going forward.

We conclude, in part, that the current market structure inhibits the realization of economies of scale and scope. The reforms we suggest include improving coordination and harmonization of spectrum management policies, permitting efficient levels of consolidation, and incentivizing investment to promote infrastructure-based competition.

To be clear, it is not our contention that U.S. markets are outperforming EU markets in every respect, but rather that the comparison can be useful from the perspective of benchmarking policies and outcomes. Similarly, we do not assert that all or even most of the divergence in performance is accounted for by differences in market structures or regulatory policies, but suggest that market structure is likely one significant factor, and that potentially beneficial changes in policy should be considered in all cases.

The remainder of this paper is organized as follows. Section 2 compares the performance of EU and U.S. mobile wireless markets currently and over time, noting that while prices in the EU are by some measures lower than those in the U.S., U.S. consumers increasingly benefit from more advanced networks, and, partly as a result, consume more services – which in turn generates the

revenues necessary to support continued investment. Section 3 discusses the relationship between industry structure and market performance in dynamic markets such as mobile broadband, compares the structures of mobile wireless markets in the EU and the U.S., and posits that at least some of the differences in performance can be traced to differences in industry structures. Section 4 discusses the ways in which three key policy areas – spectrum allocation, competition policy, and policies towards investment and infrastructure-based competition – may affect mobile wireless market performance, and presents recommendations for beneficial reforms. Section 5 summarizes our conclusions.

1. See e.g., Neelie Kroes, "Building Our Digital Single Market: 10 Steps to Deliver Broadband," (January 30, 2013) ("Once, Europe led the world in wireless communication: now we have fallen behind. Europe needs to regain that lead.") (available at http://europa.eu/rapid/press-release_SPEECH-13-80_en.htm) See also Prepared Statement of FCC Chairman Julius Genachowski, Hearing on Oversight of the Federal Communications Commission (July 10, 2012) ("The U.S. has regained global leadership, particularly in mobile. The U.S. leads the world in 3G subscribers by a wide margin, and we are leading the world in deploying 4G mobile broadband at scale.") (available at http://transition.fcc.gov/Daily_Releases/Daily_Business/2012/db0710/DOC-315097A1.pdf).

3.

The Diverging Performance of EU and U.S. Mobile Wireless Markets

While European consumers pay less per month than those in the U.S., U.S. consumers use their devices more intensely than consumers in the EU, and thus pay relatively lower unit prices. Beginning in 2008, U.S. adoption of 3G data services outpaced adoption in the EU, and U.S. carriers have a clear lead in deploying 4G networks. The consumer value created by the move to 4G networks has generated increasing revenues for U.S. carriers, while EU carriers have not kept pace.

In May 2008, Commissioner Viviane Reding warned in an important speech that the EU was losing its lead in mobile wireless:

“[G]rowth [in mobile wireless] has been faster in the U.S., particularly in mobile services [which are] growing more than three times faster in the USA than in Europe. Despite our widely applauded leadership in rolling out the 2nd Generation services we seem to be lagging behind on moving to the mobile web.”²

The data presented below suggest that Commissioner Reding’s concerns were well-founded.

This section reviews the comparative performance of EU and U.S. mobile wireless markets. Data on prices and output show that EU consumers incur lower monthly fees than their U.S. counterparts, but that U.S. consumers utilize mobile services more extensively and thus pay lower unit costs. The higher levels of use exhibited by U.S.

consumers are broadly consistent with the thesis that, in a differentiated product market, policies that reduce the amount consumers spend do not necessarily enhance consumer welfare.

The data we present on service quality and choice also suggests that U.S. markets are outperforming EU markets in many respects. For example, while the proportion of customers using smartphones does not differ significantly between the EU and the U.S., it appears that significant numbers of EU smartphone users forego data plans and instead rely on Wi-Fi networks (or do not use data services on their phones at all). The data also suggests that connection speeds on U.S. data networks have surpassed those in the EU.

The third set of performance data we present focuses on network investment and, in particular, the transition to LTE technologies. As noted in the introduction, the EU is deploying LTE more slowly than the U.S.

2. Viviane Reding, “Europe on the Way to a High Speed Internet Economy” (May 8, 2008) at 4.

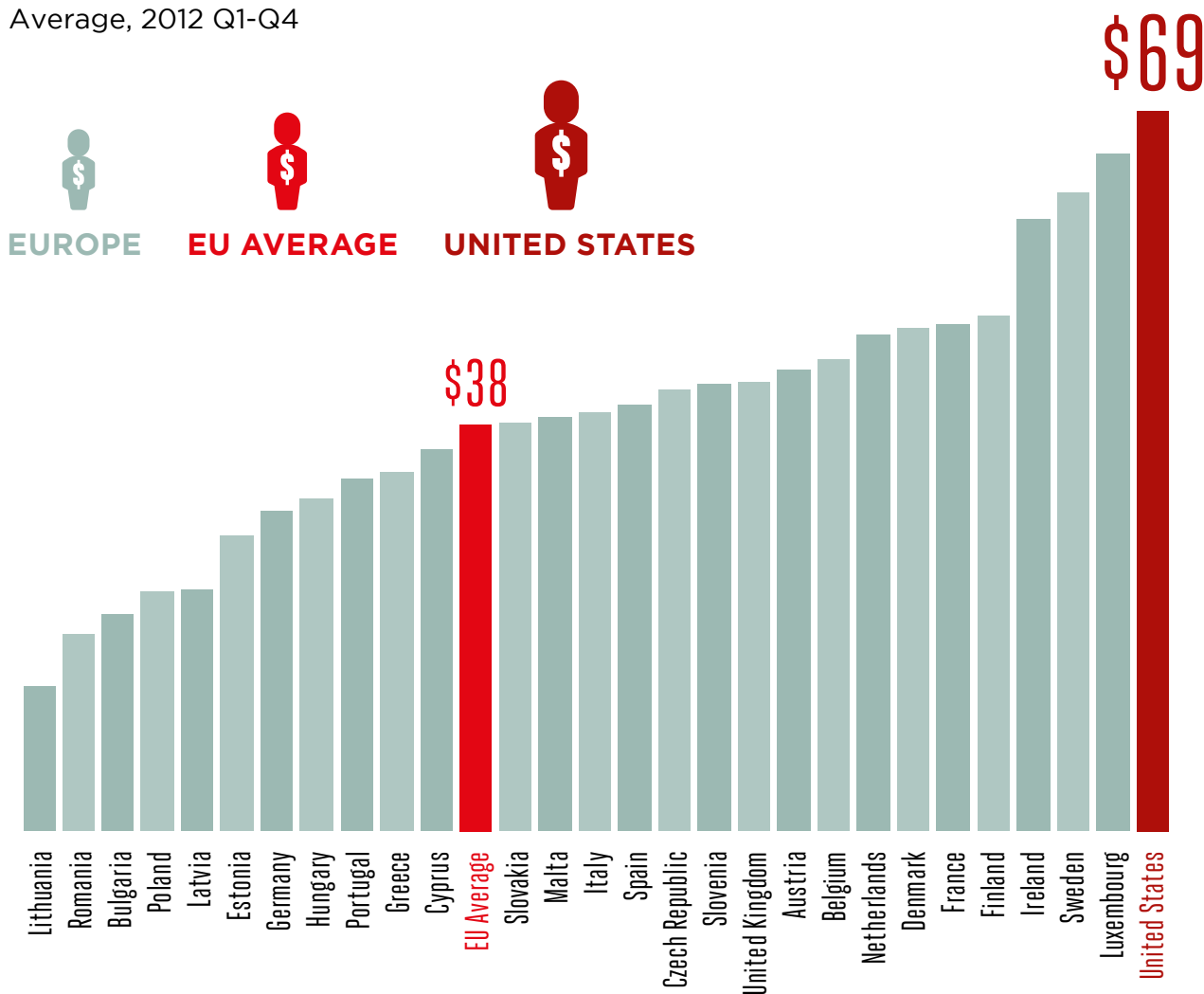
A.

Prices and Output

On average, consumers in the EU pay less per month for mobile wireless services than consumers in the U.S. Figure 1 below shows 2012 average revenue per user (ARPU) for the EU countries as compared to the U.S. As the figure indicates, ARPU in the U.S. is higher than in any EU country, \$69 per month compared with an average of \$38 for the EU.

MONTHLY REVENUE PER SUBSCRIPTION

Average, 2012 Q1-Q4



Source: GSMA Wireless Intelligence

Figure 1

While EU consumers pay less per month, U.S. consumers use mobile services more intensely, spending more time on the phone and downloading more data than in the EU. As shown in Figure 2, U.S. consumers use 901 voice minutes per month, more than five times the European average of 170 minutes.

VOICE MINUTES OF USE PER SUBSCRIPTION

2012

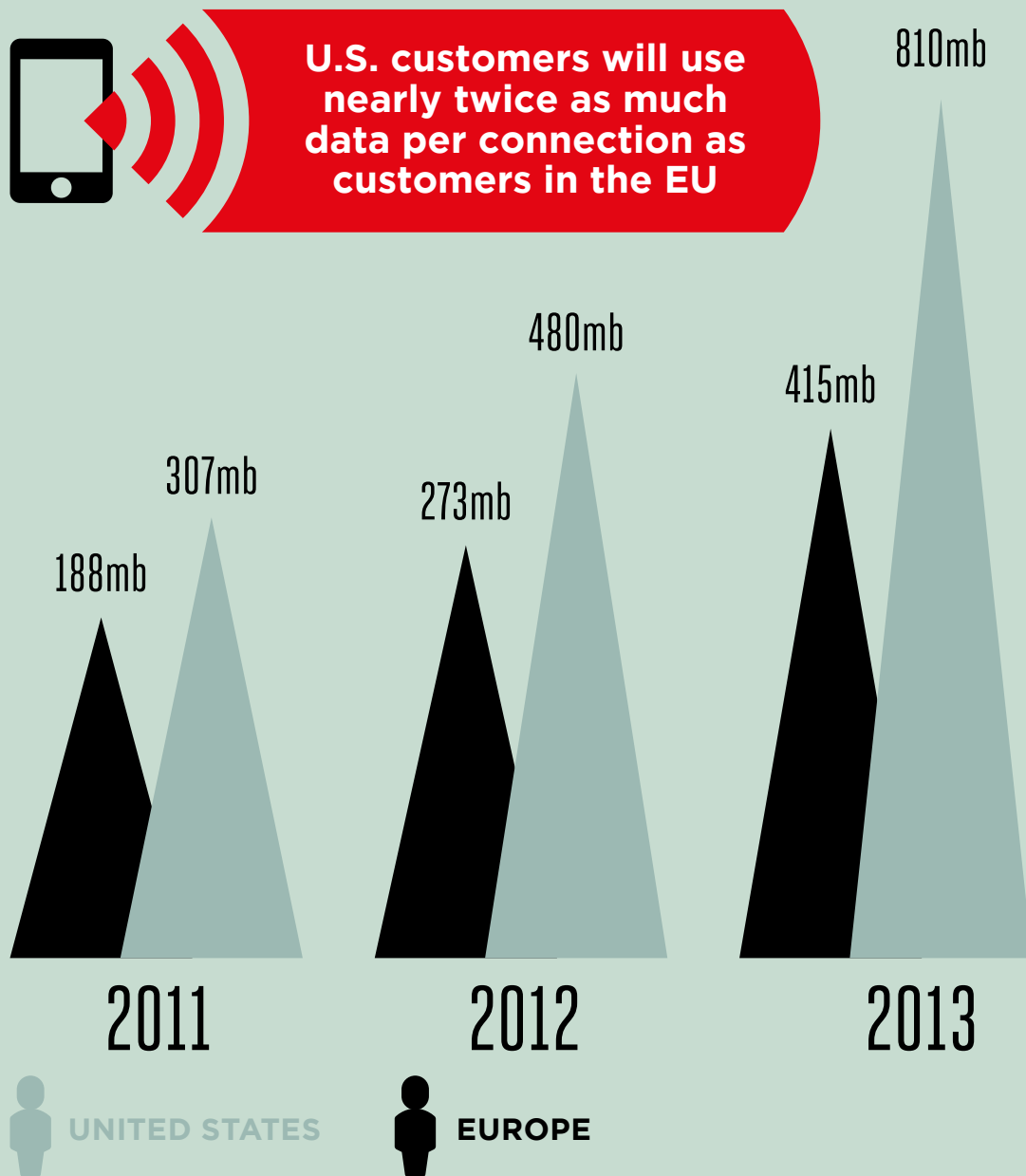


Merrill Lynch Global Wireless Matrix 4Q12 (hereafter, "Global Wireless Matrix")

Figure 2

Similarly, as shown in Figure 3, data from Cisco's Visual Networking Index shows that mobile wireless data use per connection in the U.S. is significantly higher than in the EU: in 2013, Cisco projects U.S. customers will use nearly twice as much data per connection as customers in the EU.

MEGABYTES OF DATA TRAFFIC PER CONNECTION 2011-2013

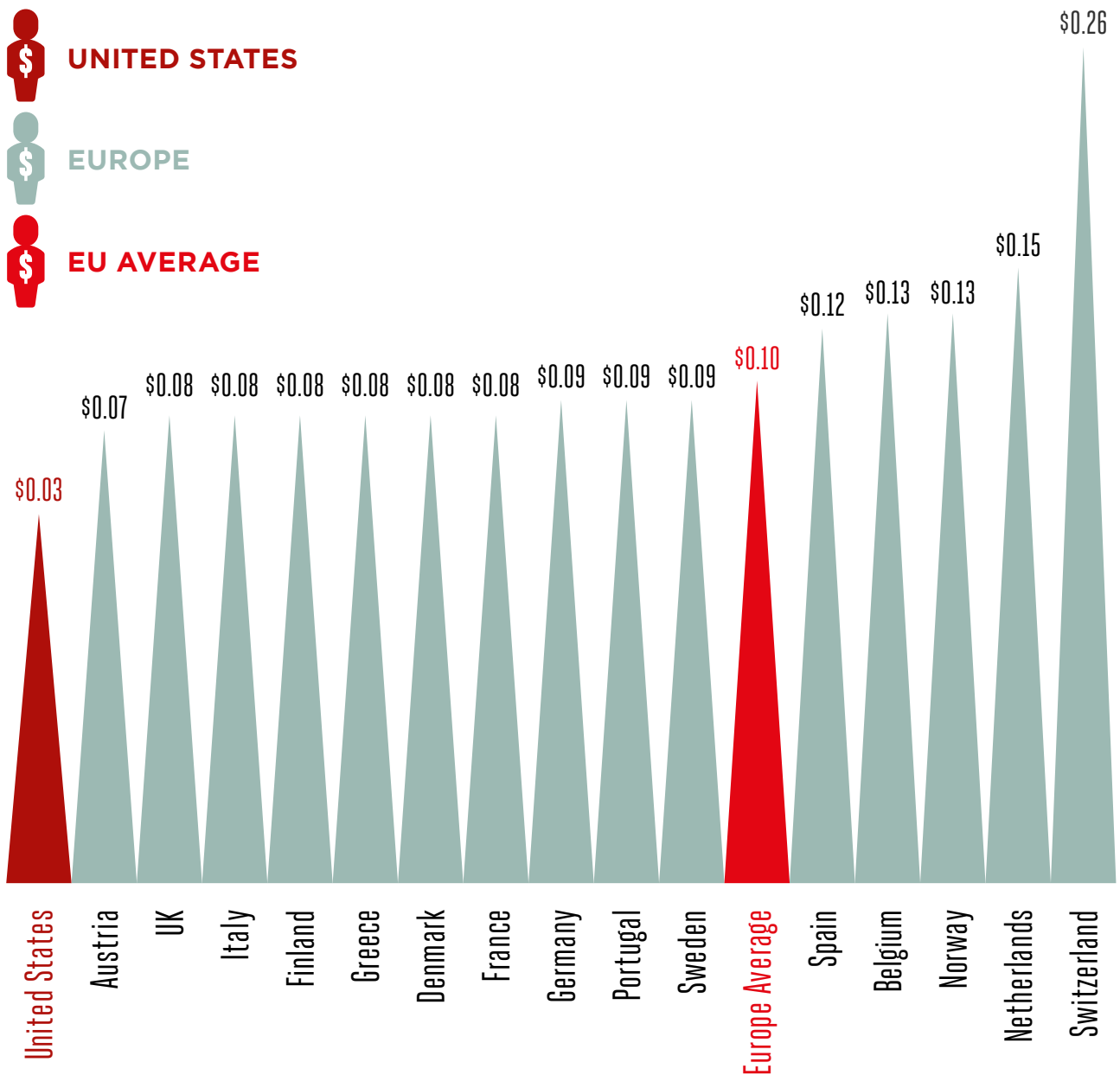


Cisco VNI

Figure 3

Thus, while U.S. consumers pay more per month than those in the EU, they pay less per unit of usage. For example, as shown in Figure 4, Merrill Lynch reports that average revenue per minute of voice usage in the U.S. is far lower than in any European country, and less than a third of the European average.

VOICE REVENUE PER MINUTE 2012



Source: Merrill Lynch

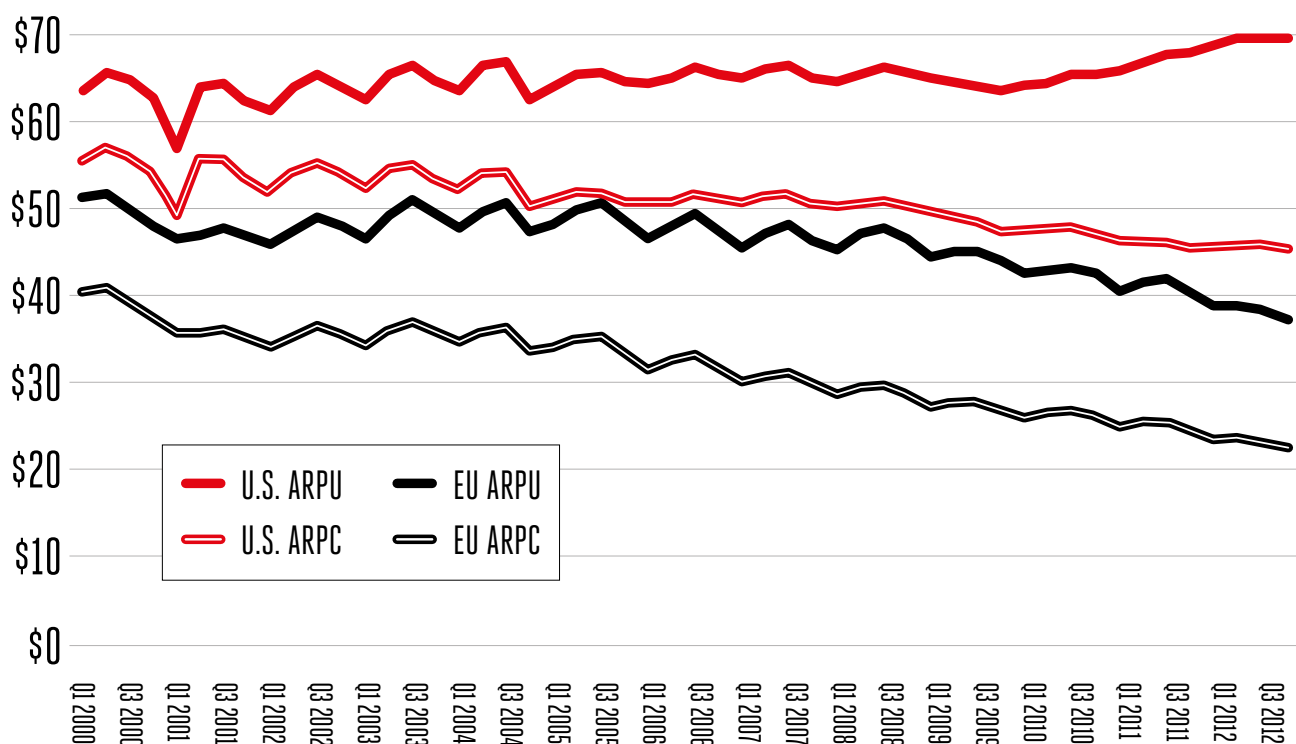
Figure 4



Both U.S. and EU consumers have experienced a long-term secular decline in cost (per connection). Average revenue per connection (ARPC) in the EU has fallen by 45 percent since 2000, from over \$40 per month to just over \$22 per month at the end of 2012, while ARPC in the U.S. fell by 18 percent, to \$45, over the same period. However, U.S. consumers tend to connect more data-intensive devices to the network per subscription than in the EU. As a result, as shown in Figure 5, revenue per subscription in the U.S. is actually increasing, while revenue per subscription in the EU continues to decline.

MONTHLY WIRELESS ARPU AND ARPC, U.S. AND EU

2000 - 2012, \$US



Source: GSMA Wireless Intelligence

Figure 5



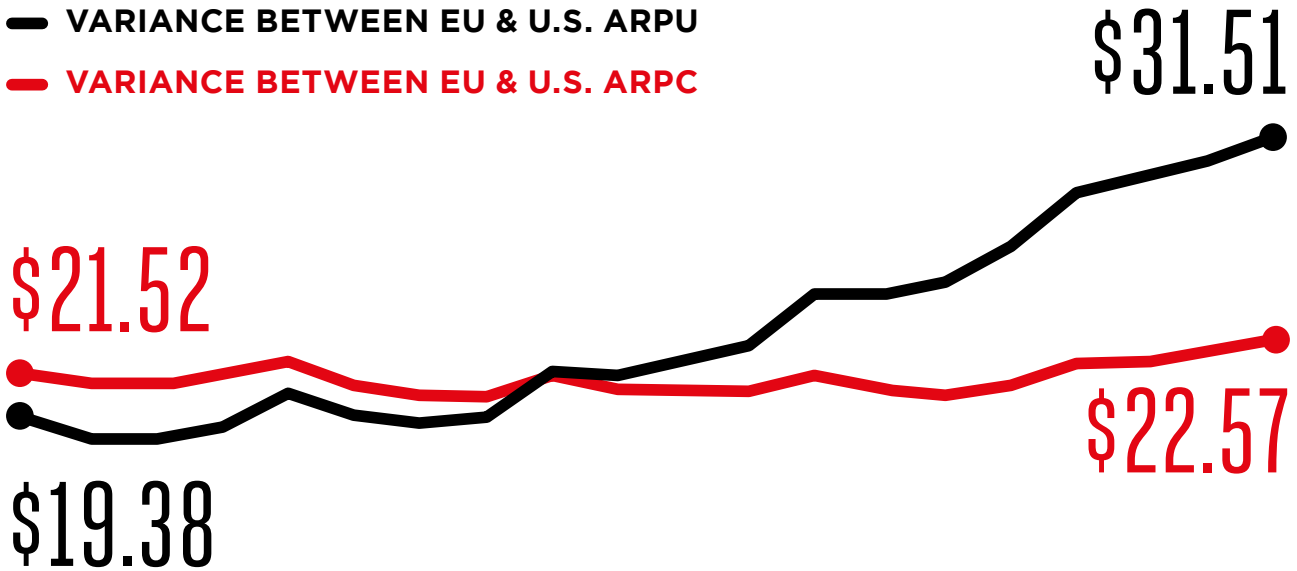
ARPU AVERAGE REVENUE PER USER
ARPC AVERAGE REVENUE PER CONNECTION

The divergence between EU and U.S. revenue performance in recent years is highlighted in Figure 6. The red line shows the difference between EU ARPC and U.S. ARPC from 2008 through the end of 2012. As Figure 6 indicates, ARPC was approximately \$22 higher in the U.S. than in the EU throughout the period. The black line shows the difference between ARPU - revenue per subscription - in the EU

and the U.S. over the same time period. As the figure shows, the gap between the EU and the U.S. was less than \$20 in 2008, but increased to over \$31 by 2012. In both cases, subscribers were spending less per connection (and far less per unit of usage) at the end of the period than the beginning, but U.S. subscribers were choosing to buy more connections.

DIFFERENCES BETWEEN EU AND U.S. MONTHLY ARPU METRICS

2008 - 2012, \$US



Source: GSMA Wireless Intelligence

Figure 6

In assessing the causes of these shifts, it is noteworthy that the widening of the gap between U.S. and EU subscriber ARPU (beginning in 2010) coincided with introduction of the first mobile enabled tablets and with the initial deployments of LTE networks (primarily in the U.S.). Analysts attribute growth in the number of connections per user to the “rapid adoption of mobile broadband devices (e.g., USB dongles, datacards, laptops, tablets),”³ and note that in the U.S. especially, “continued traffic growth from additional usage and multiple devices is encouraging users towards more expensive plans, which is resulting in consistently increasing ARPU.”⁴

They also note that U.S. markets display a relatively high level of product differentiation in terms of network technologies (3G versus WiMax versus LTE), as well as a variety of pricing plans.⁵ By contrast, analysts attribute downward pricing pressure in Europe to “increasingly commoditized service,”⁶ making it “extremely difficult to establish sustainable differentiation between the various operators, with the result that pricing has continuously deteriorated.”⁷

While there clearly are multiple causes for the higher revenues earned by U.S. carriers relative to EU carriers, the divergence between EU and U.S. performance in recent years is likely explained in part by the more rapid expansion of the mobile wireless ecosystem in the U.S., spurred by the more rapid and extensive deployment of LTE.

In sections 3 and 4, we discuss the extent to which these differences in performance may relate to differences in market structure and/or regulatory policies. Before doing so, we

first describe two other important aspects of market performance: quality and choice; and, investment and innovation.

3. See Joss Gillet, “Global Mobile Penetration – Subscribers Versus Connections,” GSMA Wireless Intelligence (October 2012) at 11.

4. Chris Nicoll, “LTE Lessons from Market Leaders in the USA,” Analysys Mason (January 25, 2013). According to Merrill Lynch, the U.S. surpassed the EU in the proportion of revenues attributable to data services in 2008. As of Q3 2012, 41 percent of U.S. service revenues were from data, compared with 35 percent for the EU-15. See Global Wireless Matrix at 93.

5. Chris Nicoll, “LTE Lessons from Market Leaders in the USA,” Analysys Mason (January 25, 2013).

6. Leila Abboud and Harro Ten Wolde, “Divide Between European and U.S. Telcos Widens,” Reuters (February 24, 2013) (quoting Bernstein analyst Robin Bienenstock).

7. HSBC, “European Mobile: A Proposal for Progressive Consolidation,” (December 7, 2012).

B.

Quality and Choice

The previous section showed that, whether measured by connection or by subscriber, EU consumers pay less per month for mobile wireless service than U.S. consumers, but they also consume less connectivity, making fewer voice calls and using less data.

In addition to prices and quantities, mobile services are differentiated along several non-price dimensions. Some of these differences are associated with the growing divergence of network capabilities between EU and U.S. networks, i.e., the more rapid deployment of LTE in the U.S. than in the EU. As one analyst firm wrote in late 2012:

Europe already has some of the cheapest telecoms services seen in the global developed peer group; the problem is rather that it is falling behind in terms of network capability.... While Americans may pay more for their services, they have access to an increasingly superior platform. U.S. prices might be higher, but this does not necessarily indicate that consumers there receive worse value for money....⁸

One important aspect of mobile wireless quality is the connection speed for mobile data services. While EU and U.S. average connection speeds have been comparable for many years, the more advanced deployment of LTE networks in the U.S. (detailed in the next section) is now beginning to create a gap, which is expected to widen in the immediate future. As seen in Figure 7, Cisco reports

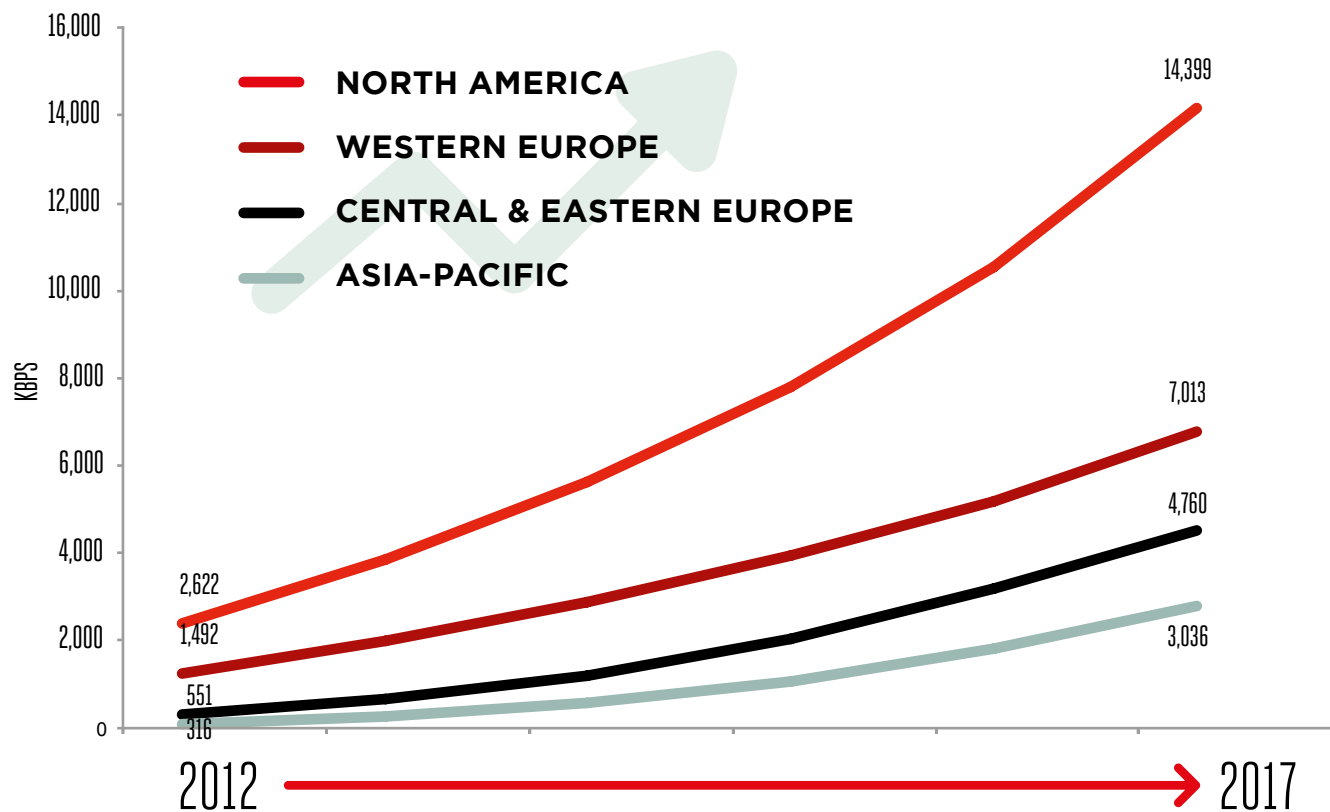
that average mobile data connection speeds in North America in 2012 were about 75 percent faster than those in Europe (2.6 Mbps versus 1.5 Mbps), and projects that the gap will expand going forward. By 2017, average mobile connection speeds are projected to exceed 14 Mbps in North America, compared to 7 Mbps in the EU.⁹

8. HSBC, (December 7, 2012).

9. While Cisco reports data only on a regional basis, other data suggest there is substantial variation in performance across both EU carriers and EU Member States. Accordingly, some EU wireless consumers undoubtedly enjoy connection speeds substantially in excess of the averages reported in Figure 7. For instance, Akamai's State of the Internet report shows that U.S. carriers rank above many (but not all) EU carriers in terms of mobile broadband delivered speeds. See Akamai, The State of the Internet (Q4 2012), at Figure 26.

MOBILE DATA AVERAGE CONNECTION SPEEDS

BY REGION, 2012 AND PROJECTED 2013-2017



Source: Cisco VNI Mobile Forecast (2013)

Figure 7

The slow deployment and limited reach of LTE networks in Europe has led some handset manufacturers to focus their device portfolios on the requirements of large-scale U.S. operators, thereby limiting the choice of LTE devices for EU consumers.¹⁰ Most notably, Apple elected not to make its 4G iPhone 5, released in September 2012, compatible with European 4G networks utilizing the 800MHz and 2.6GHz bands which are prevalent in Western Europe, including France, Italy and Spain. Similar issues have confronted the European rollout of the 4G-enabled iPad.¹¹

Apple is not alone in choosing not to incur the costs necessary to support 4G devices for the relatively small EU LTE marketplace. Thus, despite TeliaSonera's 4G network launch in late 2009, and Vodafone Germany's 4G deployment in late 2010, the first 4G-enabled European smartphones did not arrive until early 2012.¹² In contrast, customers in the larger U.S. mobile wireless ecosystem have had access to 4G-enabled smartphones since at least mid-2010,¹³ and can now choose from among dozens of different LTE-compatible devices. The U.S. Federal Communications Commission (FCC) notes that:

“In addition to competing on price and network quality, mobile wireless providers continue to compete by offering consumers a variety of different mobile wireless devices with innovative features.”¹⁴

While EU and U.S. consumers are equally likely to own smartphones,¹⁵ U.S. consumers are more likely than those in the EU to use their phones for web-related activities. As shown in Figure 8 below, a 2012 Nielsen survey of smartphone use around the world found that U.S. consumers are more likely than those in Italy and the UK to engage in web browsing, music downloading and video streaming; moreover, while nearly all U.S. smartphone owners have a data plan, one out of six Britons and more than four out of 10 Italians do not.¹⁶



10. See Paul Sandle and Leila Abboud, "Apple's iPhone 5 Puts Europe in 4G Slow Lane," Reuters (September 14, 2012); see also Zack Whittaker, "iPhone 5, Meet Europe: Where 4G Really Means 3G, LTE is Scarce," ZDNet (September 14, 2012). A number of European operators, including Deutsche Telekom in Germany and EE in the UK, have now deployed LTE in the 1.8 GHz band, which is supported by the iPhone5. (See <http://www.apple.com/iphone/LTE/>) However, these deployments have sometimes suffered regulatory delays associated with spectrum rearming. EE, for example, waited 10 months for Ofcom to approve its application to use its 1.8 GHz spectrum to support LTE. (See Ofcom, "Decision to Vary Everything Everywhere's 1800 MHz Spectrum Licenses to Allow Use of LTE and WiMax Technologies" (August 21, 2012) (available at <http://stakeholders.ofcom.org.uk/binaries/consultations/variation-900-1800mhz-lte-wimax/statement/statement.pdf>); Zack Whittaker, "Europeans, Australians: Don't Rush to Buy a 4G New iPad Just Yet," ZDNet (March 15, 2012).

11. Zack Whittaker, "Europeans, Australians: Don't Rush to Buy a 4G New iPad Just Yet," ZDNet (March 15, 2012).

12. Vodafone Germany released the HTC Velocity, Europe's first 4G smartphone, in February 2012. TeliaSonera began offering the Samsung Galaxy S II LTE in March 2012. See, e.g., Daniel Gleeson, "Vodafone Germany launches first European 4G smartphone," IHS (17 February 17, 2012) (available at http://www.screendigest.com/news/2012_02_vodafone_germany_launches_first_european_4g_smartphone/view.html).

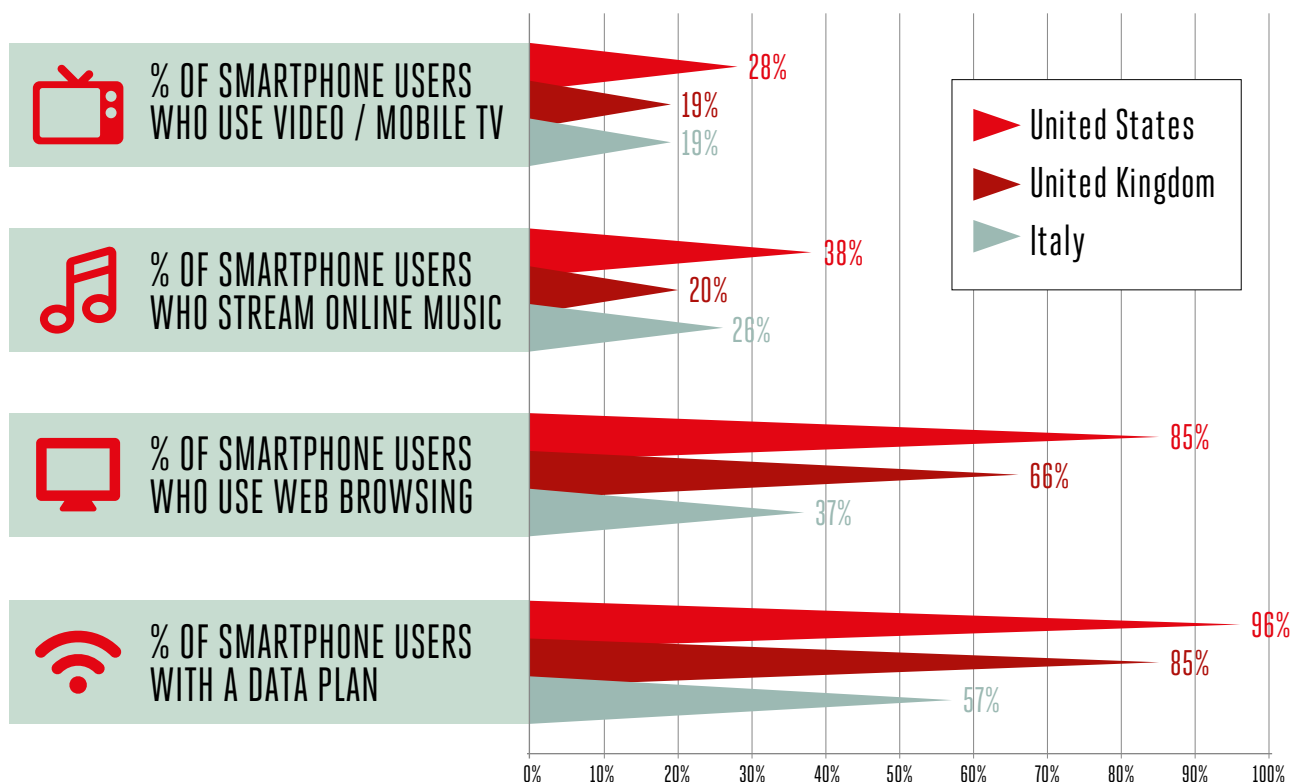
13. Sprint's Android-based HTC EVO 4G was launched June 4, 2010. See Dave Hendrick, "Sprint 4G phone to launch in June," SNL Kagan (May 13, 2010).

14. Federal Communications Commission, Annual Report and Analysis of Competitive Market Conditions With Respect to Mobile Wireless, Including Commercial Mobile Services, Sixteenth Report (March 21, 2013) at ¶220. Hereafter 16th CMRS Report.

15. According to Merrill Lynch, 39 percent of consumers own Smartphones in each region. See Global Wireless Matrix at 2.

16. Nielsen, The Mobile Consumer: A Global Snapshot (February 2013). The study surveyed ten countries, of which Italy and the UK were the only two in the EU.

INTENSITY OF SMARTPHONE USE FOR DATA CONSUMPTION



Source: Nielsen, The Mobile Consumer: A Global Snapshot (February 2013).

Figure 8

There is no single metric by which to compare the overall quality of mobile broadband services, especially since consumer tastes are themselves heterogeneous, meaning that different consumers assign different values to various product characteristics. This said, the evidence suggests that the relative performance of EU markets on some significant characteristics is deteriorating.

c.

Investment and Innovation

As the FCC noted in its most recent report on competition in the U.S. mobile wireless industry, “Network investment remains a centerpiece of service providers’ efforts to improve their customers’ mobile wireless service experience.... [A] critical way in which mobile wireless service providers differentiate themselves is with the speeds, reliability, capabilities, and coverage of their mobile broadband networks.”¹⁷ In recent years, such competition has centered on the deployment of LTE infrastructures, and U.S. deployments are now well advanced. As the evidence below indicates, EU deployments of LTE infrastructures are occurring more slowly.

We note at the outset of this section that deployment of mobile wireless networks depends on a variety of factors, including the availability of necessary spectrum. Some U.S. carriers are relying in part on spectrum made available from the “digital TV transition” – the so-called “digital dividend” – for LTE deployment. This 700MHz spectrum was made available through an auction conducted in early 2008, which produced winning bids totaling nearly \$19 billion.¹⁸ By contrast, several EU nations have lagged behind in re-allocating analog television spectrum. As a result, EU carriers have not been able to utilize some of the lower spectrum bands which are widely regarded as most favorable for LTE deployments. That said, U.S. carriers

such as Sprint and T-Mobile are making large investments to deploy widespread LTE networks in comparable spectrum bands as those currently available to many EU carriers.¹⁹ As discussed in Section 4, we believe spectrum allocation and related policies play an important part in the divergence between EU and U.S. wireless performance, but that other factors contribute as well.

17. See 16th CMRS Report at 181.

18. See Federal Communications Commission, “Auction 73” (available at http://wireless.fcc.gov/auctions/default.htm?job=auction_factsheet&id=73).

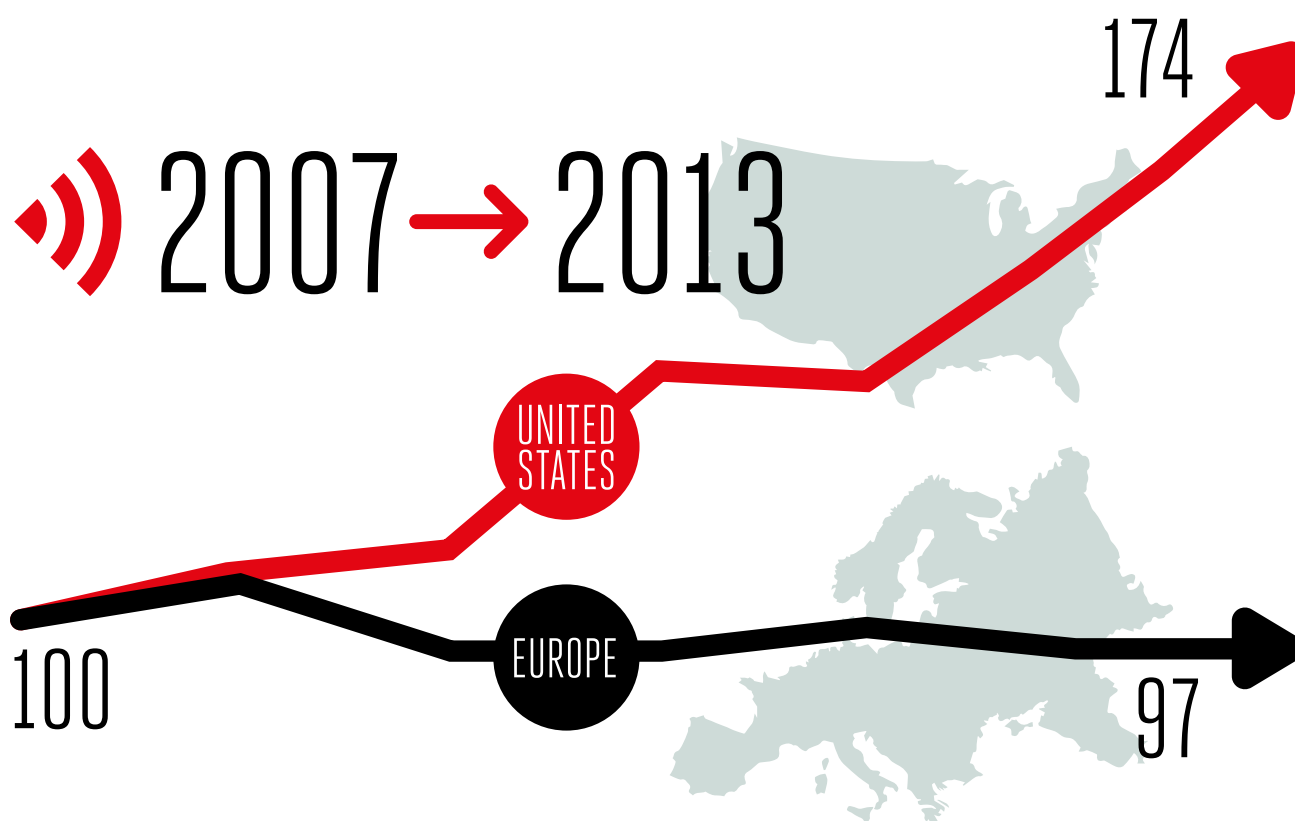
19. For example, Sprint has deployed its LTE network using its 10 MHz PCS G block licenses in the 1910-1915 MHz and 1990-1995 MHz bands. See 16th CMRS Report at 192, 197.

Ultimately, the deployment of new telecommunications infrastructures depends on investment, and the data show mobile wireless investment in the U.S. has outpaced the EU.

Figure 9 shows the divergence between the level of capital expenditures on wireless infrastructure in the EU and the U.S. as estimated by Goldman Sachs. As the figure shows, the level of wireless capex in the U.S. has grown by over 70 percent since 2007, while declining in the EU.²⁰

WIRELESS CAPEX IN EUROPE VERSUS THE U.S.

Index 2007 = 100



Source: Goldman Sachs Global Investment Research

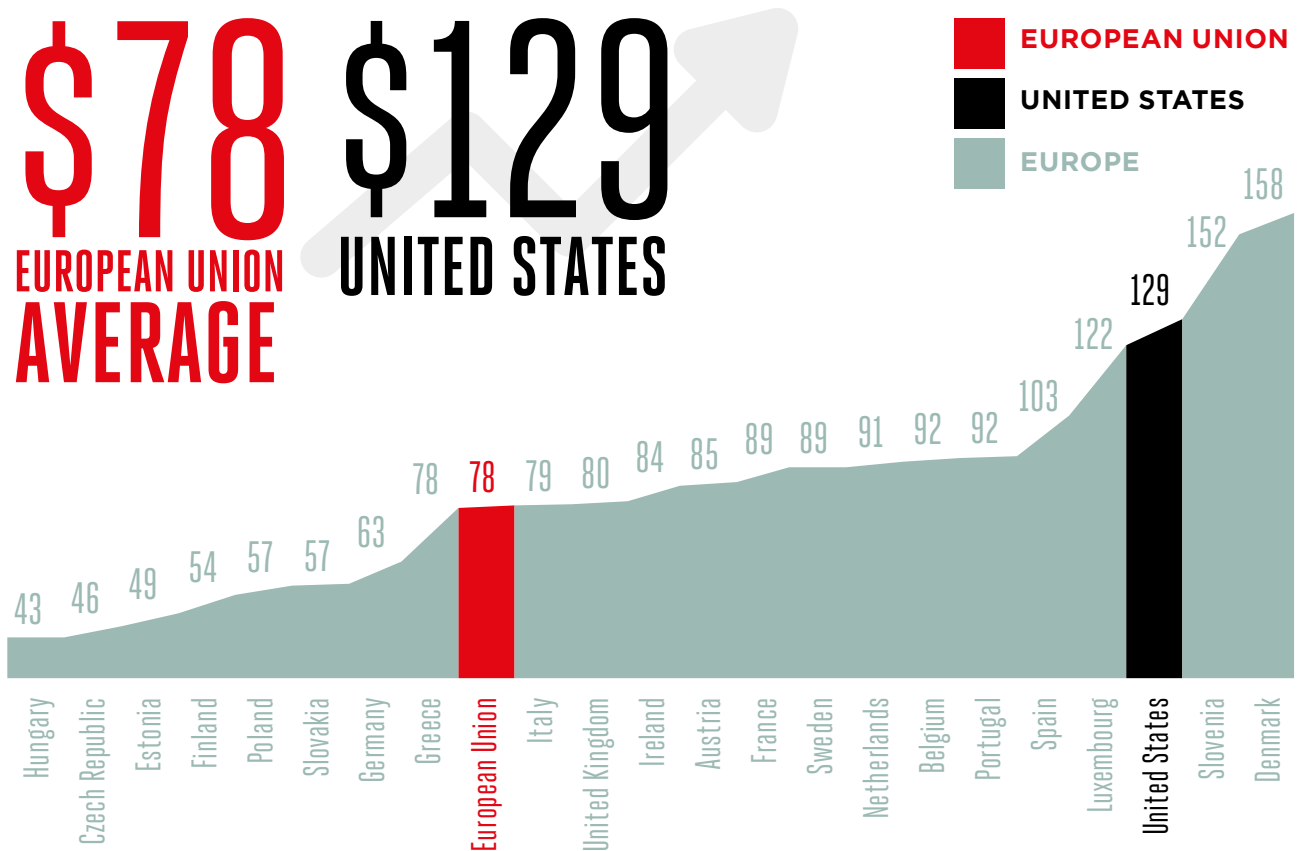
Figure 9

20. In addition to industry structure and regulatory policies, capital expenditures may be affected by several factors, including macroeconomic conditions and the underlying investment cycle.

The relative decline is all the more serious given that the evidence suggests that the EU started from a lower base: as shown in Figure 10 below, in 2007, U.S. carriers invested \$129 per access path, more than any European Union country except Denmark and Slovenia, and far higher than the EU average of \$78.²¹

ANNUAL TELECOMMUNICATIONS INVESTMENT PER COMMUNICATIONS ACCESS PATH

SELECTED COUNTRIES, 2007, \$U.S.



Source: OECD Communications Outlook, 2011

Figure 10

The divergence in network investment has directly affected the pace of LTE deployment. Deployment in the U.S. has gone forward at what some analysts have called an “unprecedented” pace.²² Since their initial deployments in December 2010 (Verizon Wireless) and September 2011 (AT&T), the two major US carriers have extended coverage to over 273 million POPs and 170 million POPs, respectively. Verizon Wireless’ LTE network now covers over 85 percent of the U.S. population, and is already carrying 50 percent of the company’s total data traffic.²³

21. The data in Figure 10 refer to capital expenditures on both fixed and mobile networks; however, there is no prima facie basis for believing that mix between fixed and mobile capex differs significantly between Europe and the U.S.
 22. Sharon Armbrust, “Race to Flood US With 4G LTE Networks in High Gear,” SNL Kagan Wireless Investor (March 19, 2012).
 23. HSBC Global Research, “European Telecoms: A Singular Vision for the Sector,” (February 18, 2013) at 11.



As shown in Table 1, even smaller U.S. players are also deploying rapidly: Sprint, U.S. Cellular, Leap Wireless and MetroPCS/T-Mobile (now merged) are all in the process of large-scale deployments.²⁴

U.S. LTE NETWORK COVERAGE AND SUBSCRIBERSHIP

AS OF Q4 2012

OPERATOR	LAUNCH DATE	COVERED POPS	POPULATION COVERAGE	LTE CONNECTIONS AS % OF TOTAL
VERIZON WIRELESS	December 2010	273 million	86%	18.9%
AT&T MOBILITY	September 2011	>170 million	53%	7.5%
METROPCS	September 2010	~100 million	~31%	24.8%
SPRINT (SPRINT NEXTEL)	July 2012	88 cities	n/a	7.3%
US CELLULAR (TDS)	March 2012	57 million	18%	13.2%
CRICKET COMMUNICATIONS (LEAP WIRELESS)	December 2011	21 million	7%	1.1%

Source: GSMA Wireless Intelligence

Table 1

24. As discussed below, one of the rationales offered by the FCC for approving the merger of T-Mobile and MetroPCS (the fourth and fifth largest U.S. carriers) was the ability of the combined firm to capture economies of scale and scope and thus enhance and accelerate LTE deployment.

In contrast, although operators in some EU nations launched LTE services relatively early, deployment has proceeded slowly, and LTE coverage and uptake has remained quite limited. As shown in Table 2, although several EU nations deployed LTE in 2009 and 2010, 16 out of 27 had not launched as of the end of 2011, and several have not done so yet.

EU LTE LAUNCH DATES AND SUBSCRIBERSHIP

AS OF 2012 Q4

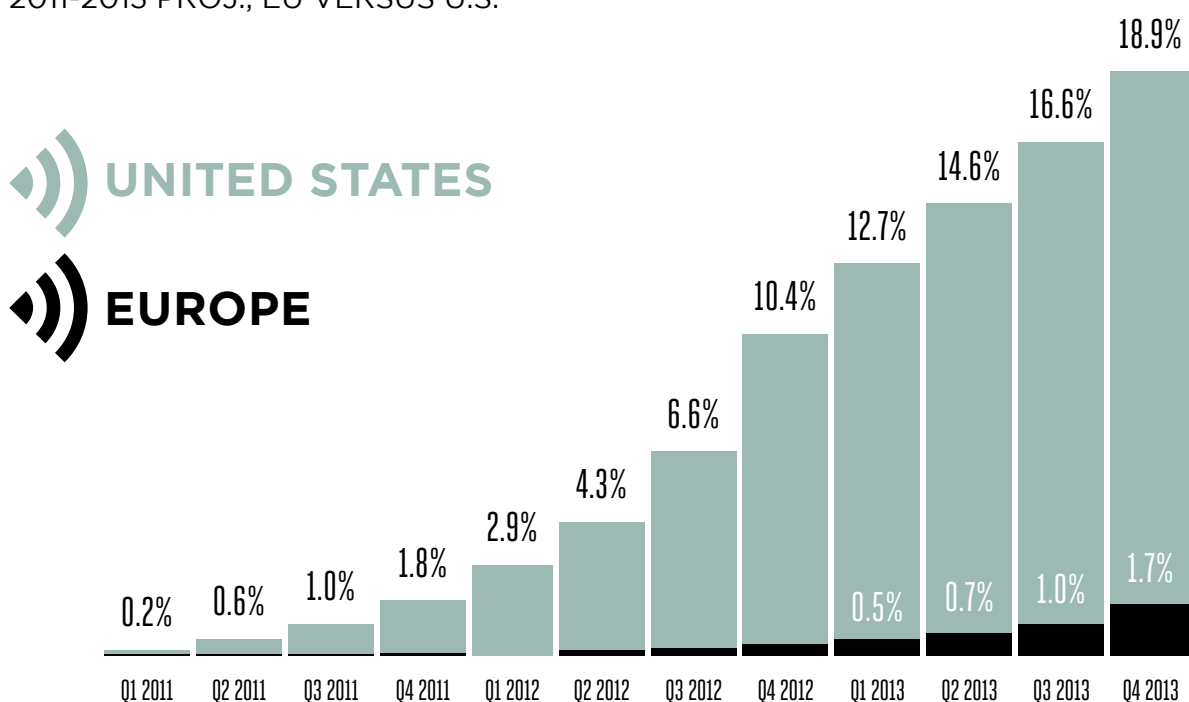
COUNTRY	LAUNCH DATE	PERCENTAGE OF CONNECTIONS USING LTE
EUROPEAN UNION	Q4 2009	0.30%
SWEDEN	Q4 2009	4.70%
POLAND	Q3 2010	0.10%
GERMANY	Q4 2010	0.60%
FINLAND	Q4 2010	1.60%
DENMARK	Q4 2010	1.10%
ESTONIA	Q4 2010	0.60%
AUSTRIA	Q4 2010	0.00%
LITHUANIA	Q2 2011	0.20%
LATVIA	Q2 2011	0.20%
PORTUGAL	Q1 2012	0.60%
HUNGARY	Q1 2012	0.10%
NETHERLANDS	Q2 2012	0.00%
CZECH REPUBLIC	Q2 2012	0.00%
SLOVENIA	Q3 2012	0.00%
UNITED KINGDOM	Q4 2012	0.10%
ITALY	Q4 2012	0.00%
FRANCE	Q4 2012	0.00%
LUXEMBOURG	Q4 2012	0.10%
GREECE	Q4 2012	0.00%
BELGIUM	Q4 2012	0.00%
ROMANIA	Q4 2012	0.00%
SPAIN	Q2 2013 (est.)	n/a
IRELAND	Q3 2013 (est.)	n/a
SLOVAKIA	Q3 2013 (est.)	n/a
BULGARIA	Q1 2014 (est.)	n/a

Source: GSMA Wireless Intelligence

Table 2

Not surprisingly, uptake of LTE services in the U.S. is outpacing uptake in the EU. As depicted in Figure 11, by late 2012 more than 10 percent of U.S. wireless connections were on LTE networks, compared with less than one percent in the EU. Moreover, U.S. carriers are moving quickly to transition customers to the new networks: by year-end 2013, nearly 20 percent of U.S. connections are expected to be on LTE networks, compared to less than two percent in the EU; Verizon has announced it intends to phase out its 2G and 3G networks entirely by 2021.²⁵ By contrast, even in EU countries where LTE has been deployed, uptake is very low and projected to remain far below U.S. levels. As shown in Table 2 above, even Sweden has migrated less than five percent of its subscriber base. The extreme case is Austria, where, despite LTE deployments by three different wireless carriers in 2010 and 2011, one Austrian carrier recorded fewer than three hundred LTE subscribers during the first half of 2012, and uptake remains minimal overall. The lack of demand is explained at least partially by limited network coverage.²⁶

LTE CONNECTIONS AS PERCENTAGE OF TOTAL 2011-2013 PROJ., EU VERSUS U.S.



Source: GSMA Wireless Intelligence

Figure 11

To summarize the material presented in this section, mobile wireless markets in the EU are characterized by lower prices, lower intensity of use, lower revenues, lower quality (at least along some significant dimensions), less product differentiation and consumer choice, a slower pace of innovation, and lower rates of capital investment than the mobile wireless market in the U.S. The next sections assess the extent to which these differences may be related to market structure and/or regulatory policies.

25. See Mike Dano, "Verizon Wireless to Sunset 2G and 3G CDMA Networks by 2021," FierceWireless (October 10, 2012).

26. Joss Gillet, "European LTE Rollouts Halted by Lack of Digital Dividend Spectrum," GSMA Wireless Intelligence (February 15, 2013) ("Austria is a good example of this. Both T-Mobile (Deutsche Telekom) and A1 (Telekom Austria) launched their respective LTE networks in Q4 2010, followed by 3 (Hutchison) in Q4 2011. All three operators deployed LTE in the 2600 MHz band which is only economically viable to cover Vienna and a limited number of other cities, resulting in only a quarter of the Austrian population being covered by LTE networks to date. This phenomenon has in turn led to low adoption of LTE services by end users; the local regulator (RTR) reported that LTE connections stood at a mere 223 in Q1 2012 and 287 in Q2 2012 for one 'unnamed' Austrian operator.");

Structural Determinants of Market Performance

Mobile wireless markets are dynamic and benefit from economies of scale and scope. The relationship between market structure and performance in these markets is more complex than in traditional “textbook” markets, and policies designed to “promote competition” can have unintended consequences. National markets in the EU are both smaller and more concentrated than the U.S. market. The fragmentation of the EU market deprives EU carriers of economies of scale and scope, raising costs and hampering innovation in the mobile wireless ecosystem.

The relative performance of U.S. and EU mobile wireless markets is determined by a variety of factors, including macroeconomic conditions (which in recent years have favored the U.S.), differences in culture and demographics, and so forth. In addition to these differences, **one factor which is known to affect market performance is market structure.**

In traditional markets, it is generally believed that less concentrated market structures are associated with lower prices and better performance.²⁷ In markets with high rates of innovation and other characteristics usually associated with the Internet ecosystem (“dynamic markets”), the relationship between structure and performance is more complex.²⁸ In the first subsection below, we discuss the ways market structure can affect performance in dynamic markets. In the second subsection we describe differences in mobile wireless market structure between the EU and the U.S.

27. While the relationship between concentration and performance is widely assumed, many economists question its empirical foundations. See e.g., See Dennis W. Carlton and Jeffrey M. Perloff, *Modern Industrial Organization* (Addison Wesley 2005), at 281 (“The empirical relationship between measures of performance, such as price-cost margins, and market structure, such as concentration and entry barriers, is not clear.”).

28. See e.g., Timothy J. Tardiff and Dennis L. Weisman, “The Dominant Firm Revisited,” *Journal of Competition Law and Economics* 5(3) (2009) 517-536 at 530 (“In telecommunications markets, in particular, where demand complementarities, multi-market participation, and high price/cost margins are the norm, traditional, single-market measures of market power are likely to seriously overstate extant market power.”)

A.

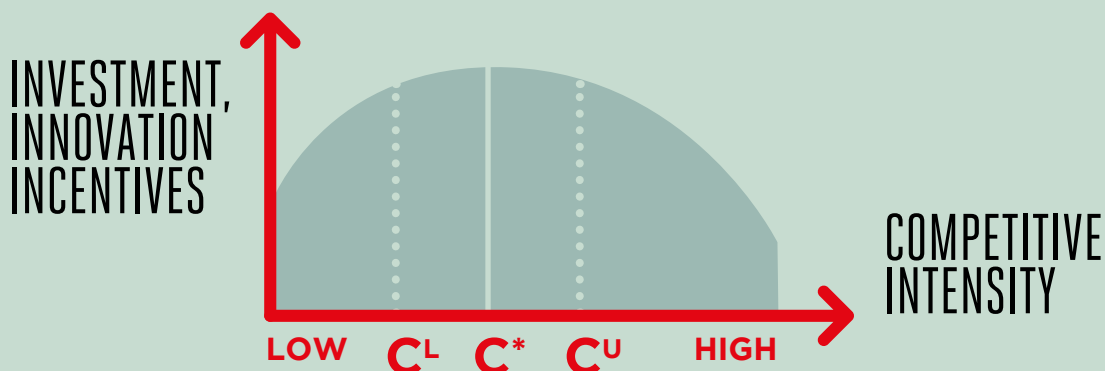
Dynamic Markets and the Economics of Mobile Wireless

Like other markets in the Internet ecosystem, mobile wireless markets are characterized by dynamism, product differentiation, economies of scale and scope, network effects, multi-sidedness, and modularity.²⁹ Competition in such dynamic markets differs from the standard textbook model of static competition, which assumes the existence of many suppliers selling a commoditized (homogeneous) product that does not change over time.

Mobile wireless markets are subject to rapid innovation, with new generations of mobile wireless technology being introduced approximately every five years.³⁰ Firms in such markets engage in “Schumpeterian” competition, vying to offer consumers products with new and more valuable features, a process which includes making large, risky investments.³¹ In contrast to static textbook markets, where lower levels of concentration are thought – other things equal – to be

associated with higher consumer welfare, there is no consistent relationship between market concentration and innovation.³² To the contrary, as illustrated in Figure 12 below, increasing the number of competitors in dynamic markets can lower consumer welfare by reducing the incentives of all firms in the market to innovate and invest.³³ Thus, competition regulation of such markets must take into account the effect on incentives for ongoing innovation and investment.³⁴

TRADE-OFF BETWEEN COMPETITIVE INTENSITY AND INNOVATION



Source: Bauer (2010)

Figure 12

29. See generally Jeffrey A. Eisenach, *Theories of Broadband Competition* (Washington: American Enterprise Institute, 2012).

30. See Federal Communications Commission, Omnibus Broadband Initiative, Technical Paper No. 6: Mobile Broadband (October 2010) at 15. See also Robert Hahn and Hal J. Singer, “Why the iPhone Won’t Last Forever and What the Government Should do to Promote Its Successor,” *Journal on Telecommunications and High Technology Law* 8 (2010) 313-350, esp. at 317-330.

31. See e.g., Michael L. Katz and Howard A. Shelanski, “Schumpeterian’ Competition and Antitrust Policy in High-Tech Markets,” *Competition* 14 (2005).

32. See Katz and Shelanski at 19 (“[A] proper understanding of innovation-based competition means that, in some markets, antitrust enforcement cannot rely on its long-established presumptions that increased concentration or market power will reduce innovation or harm consumer welfare.”) (available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=925707). See also Carl Shapiro, *Antitrust, Innovation, and Intellectual Property*, Testimony before the Antitrust Modernization Commission, November 8, 2005 at 11-12 (“[T]here is no consensus among industrial organization economists about the general relationship between concentration and innovation competition.”).

33. See e.g., Johannes M. Bauer, “Regulation, Public Policy and Investment in Communications Infrastructure,” *Telecommunications Policy* 34 (2010) 65-79.

34. See e.g., Johannes M. Bauer and Erik Bohlin, “From Static to Dynamic Regulation,” *Intereconomics* (January/February 2008) 38-50.

Mobile wireless markets are also characterized by modularity (or “platform competition”), meaning that sellers compete to differentiate their products by assembling the most attractive packages of complementary products and services – that is, combinations of communications services, handsets and other devices, and content and applications – that best meet consumers’ needs.³⁵ In such markets, the success of the entire ecosystem is dependent upon advances (or shortcomings) in each of its complementary elements. Thus, for example, the failure of mobile carriers operating in a certain spectrum band to achieve sufficient scale may make it uneconomic for equipment producers to create compatible handsets, resulting in feedback effects that further retard the growth of the entire system.

In the same sense, high-tech markets are typically multi-sided, meaning that mobile wireless providers must not only compete for the favor of “downstream” consumers, but also for the cooperation of “upstream” producers of complementary inputs. The ability to do so depends on both economies of scale and scope and on the ability to engage successfully in product differentiation.³⁶ Thus, policies that inhibit product differentiation, e.g., by encouraging commoditization around lowest-price offerings, may tip the competitive scales against the commoditized firm or industry, lowering its returns while raising the returns of its platform competitors.³⁷ More broadly, holding prices below market levels in differentiated product markets will generally limit consumer choice and result in suboptimal levels of product quality.³⁸

To put these concepts in more concrete terms, consumers have demonstrated through their purchasing decisions that they value the improved functionalities – such as faster speeds, more capable handsets, access to music and video content, and a multitude of mobile apps – that have been enabled by mobile wireless innovation.

From a consumer welfare perspective, continuing improvements in product quality effectively increase the value consumers attach to mobile wireless services, and thus increase consumer surplus. To accurately assess the impact of policy on consumer welfare, it is necessary to balance these qualitative, dynamic forms of value creation against the static, short-term benefits of lower prices.

Innovation accounts for the largest share of improvement in consumer welfare.³⁹ Policies that sacrifice long-term dynamic efficiency for short-term gains in static efficiency (e.g., by pursuing policies that set prices at or near short-term marginal costs) risk being penny-wise and pound foolish. Similarly, regulatory policies that prevent firms from achieving optimal scale, or result in below-market prices, can create the illusion of greater competition

or enhanced consumer welfare while in fact detracting from both objectives. In markets characterized by network effects, policies that limit firms’ ability to capture economies of scale and scope may be particularly pernicious, as they may prevent new products and services from reaching the “tipping point” at which positive network effects lead to rapid increases in adoption (and accompanying consumer welfare benefits).

As we explain in the next section, the observed shortfalls in the performance of European mobile wireless markets are consistent with the hypothesis that fragmented market structures are hindering carriers’ ability to achieve economies of scale and scope, and thus limiting the exploitation of beneficial network effects throughout the mobile wireless ecosystem.

35. See e.g. Thomas Hazlett, David Teece and Leonard Waverman, “Walled Garden Rivalry: Creation of Mobile Network Ecosystems,” George Mason University Law and Economics Research Paper Series (November 2011).

36. See Eisenach (2012).

37. See e.g., Everett M. Ehrlich, Jeffrey A. Eisenach and Wayne A. Leighton, “The Impact of Regulation on Innovation and Choice in Wireless Communications,” *Review of Network Economics* 9:1 (2010).

38. For a more complete discussion, see Sherwin Rosen, “Hedonic Prices and Implicit Markets: Product Differentiation in Pure Competition,” *The Journal of Political Economy* 82, 1. (January - February 1974) 34-55.

39. The seminal work is Robert Solow, “Technical Change and the Aggregate Production Function,” *Review of Economic Studies* 39 (August 1957) 312-320 at 320 (finding that 87.5 percent of the increase in non-farm output in the U.S. between 1909 and 1949 was due to technological progress). See also Robert D. Atkinson and David B. Audretsch, “Economic Doctrines and Approaches to Antitrust,” *Information Technology & Innovation Foundation* (January 2011) at 13-14.

B.

Comparing Market Structures

In an effort to promote low retail prices for wireless consumers, regulators in the EU have emphasized policies designed to maintain low levels of concentration in retail wireless markets. At the same time, the lack of a single market in mobile wireless services has resulted in market fragmentation: each national market has unique regulatory characteristics and, crucially, distinct spectrum licensing regimes. As a result, EU carriers are forced to operate in smaller markets and are less able to capture economies of scale and scope that would come with efficient consolidation.

The obvious consequence of market fragmentation is that national EU markets are each much smaller than the U.S. market: Merrill Lynch estimates there were 341 million wireless subscriptions in the U.S. at year-end 2012, while the largest EU market – Germany, with 115 million subscriptions – was only a third as large.⁴⁰

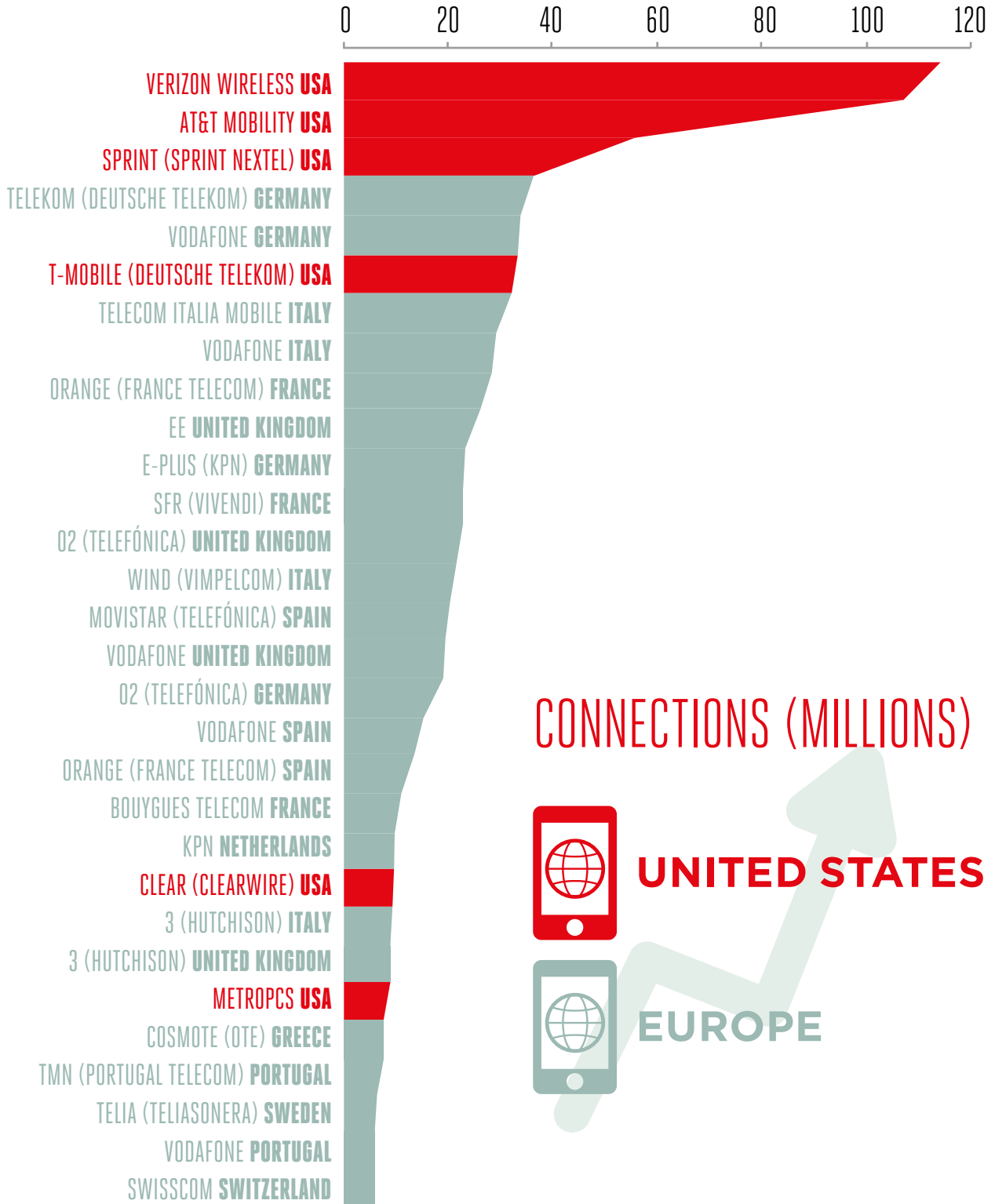
As shown in Figure 13, based on national counts, each U.S. carrier serves far more connections than their EU counterparts. Indeed, America's two largest carriers are each larger than the three largest EU carriers

combined. With the completion of the merger between T-Mobile and MetroPCS, the four largest U.S. carriers are each larger than the largest EU national carrier (Deutsche Telekom).

40. Merrill Lynch also estimates the EU-15 in total was significantly larger than the U.S., with 533 million subscriptions in the EU-15 alone. See Global Wireless Matrix at 62.

MOBILE CONNECTIONS BY CARRIER, NATIONAL MARKETS

Selected Carriers, Q4 2012



Source: GSMA Wireless Intelligence

Figure 13

The data in Figure 13 are relevant for assessing firm-level, market-specific economies of scale, which are only one of several types of scale and scope economies present in mobile wireless markets. For example, some firm-specific scale economies presumably are not limited by market, and thus would be better reflected in firm-wide measures of scale (rather than market-specific data like what is reported above). Economies of scale are also present at the industry level, based (for example) on the compatibility of common technology platforms (e.g., GSM, LTE) or spectrum bands.⁴¹ Further, there are likely significant economies of scope (for example, between the provision of fixed and mobile services) that are not captured in mobile subscriber counts alone, but which may be affected by market fragmentation.

While the relationship between scale and efficiency is admittedly multidimensional, it is certainly reasonable to hypothesize that the fragmented nature of EU markets impedes performance and harms consumer welfare in both static and dynamic terms. In static terms, national markets limit the exploitation of economies of scale and hence lead to higher levels of concentration, which may, in turn, spur even more stringent regulatory efforts to subsidize entry and deter consolidation.

A potentially more costly effect of regulatory fragmentation is to hamper dynamic efficiency. Because each of the 27 EU regulatory regimes is distinct, each poses a separate layer of regulatory risk for any proposed innovation or change that requires regulatory approval or facilitation. Especially for changes such as the transition to LTE, in which economies of scope and scale cross geographic borders (e.g., efficiencies associated with homogenous band plans, equipment availability, and consumer expectations about cross-border compatibility) are important, the lack of predictability, homogeneity and synchronicity implied by multiple regulatory regimes has the potential to inhibit beneficial innovation.

The recently consummated merger between U.S. carriers T-Mobile (33 million connections) and MetroPCS (nine million connections) provides a good example of the positive dynamic effects of efficient consolidation. In fact, the FCC justified its decision to approve the merger in part on its finding that the merger will “enable the deployment of a substantial LTE network nationally”:

“[T]he combination of T-Mobile USA and MetroPCS would enable the deployment of a substantial LTE network nationally that would enhance competition and provide important benefits for consumers. By merging the two companies, and their network assets and spectrum, we find that the resulting Newco would provide for a broader, deeper, and faster LTE deployment than either company could accomplish on its own.”⁴²

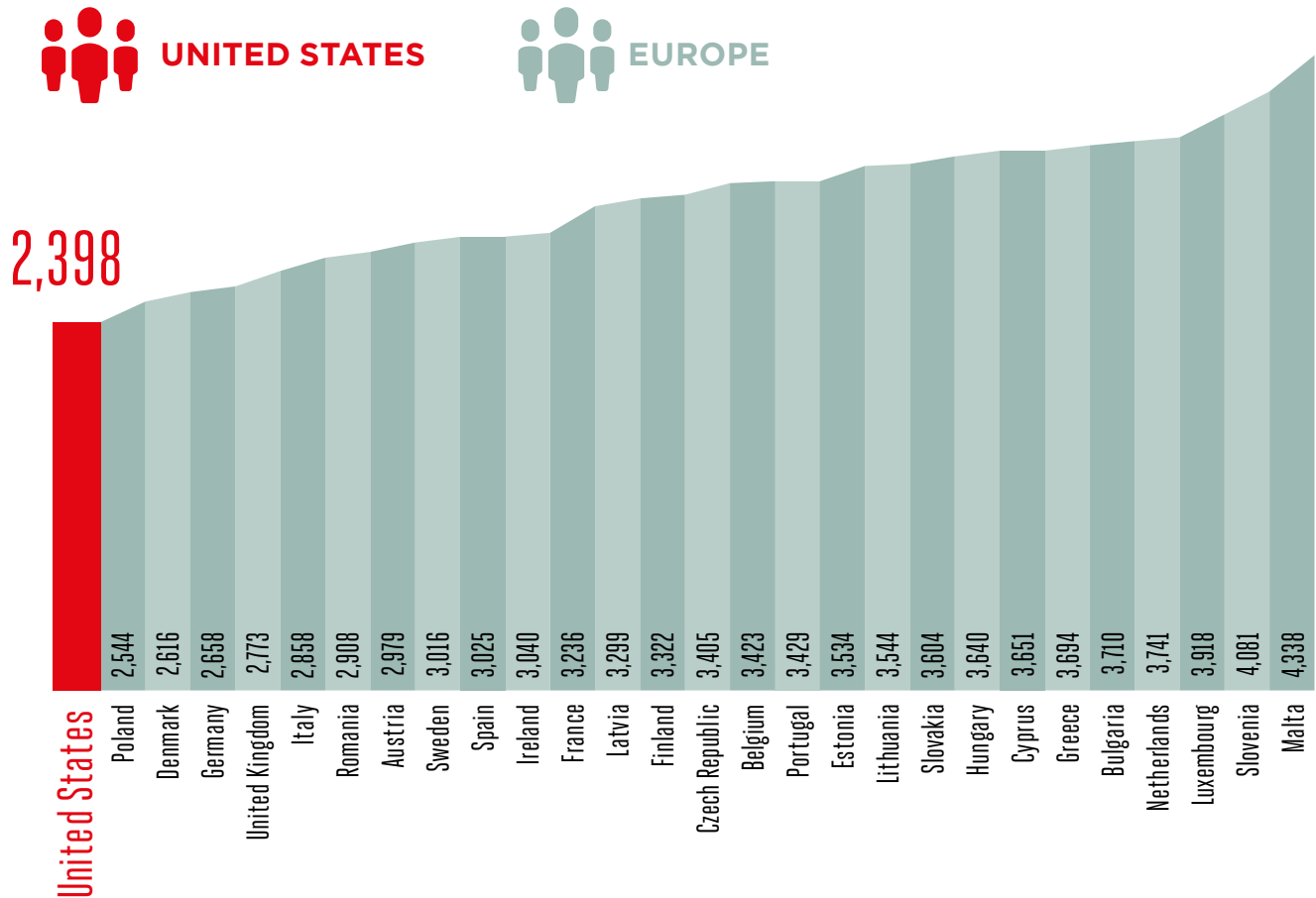
Finally, it is not surprising that market fragmentation results in higher levels of concentration as measured on a national level, as shown in Figure 14, which shows the Herfindahl-Hirschman Indices for EU countries as well as for the U.S.

41. See e.g., 16th CMRS Report at 184 (“When competing mobile wireless service providers deploy compatible network technologies, greater economies of scale in the production of both end-user devices and network infrastructure equipment can result...”).

42. See Federal Communications Commission, In the Matter of Applications of Deutsche Telekom AG, T-Mobile USA, Inc., and MetroPCS Communications, Inc. for Consent to Transfer of Control of Licenses and Authorizations, Memorandum Opinion and Order and Declaratory Ruling, WT Docket No. 12-301 (March 12, 2013) (available at http://transition.fcc.gov/Daily_Releases/Daily_Business/2013/db0312/DA-13-384A1.pdf) (emphasis added).

MARKET CONCENTRATION

HERFINDAHL-HIRSCHMAN INDEX (HHI) INDICES, EU VERSUS U.S., 2012



Source: GSMA Wireless Intelligence

Figure 14

As discussed above, however, in dynamic markets such as mobile wireless, economics does not predict a negative relationship between concentration and performance. Indeed, as shown in Figure 15, we compared market concentration (as measured by the HHI) with price levels in EU Member States. As the trend line and regression results reported in the figure indicate, there is no statistically significant relationship between market concentration and prices. Indeed, as indicated by the negative slope of the regression line, higher levels of concentration are (very weakly) correlated with lower prices, not higher ones.⁴³

43. In addition to comparing HHI to average revenue per connection (shown in Figure 15), we also examined the relationship between HHI levels and both average revenue per subscriber and average revenue per minute of voice usage. None of the three measures showed a statistically significant relationship.

HHI INDICES VERSUS AVERAGE REVENUES PER CONNECTION

EU MEMBER STATES, Q4 2012

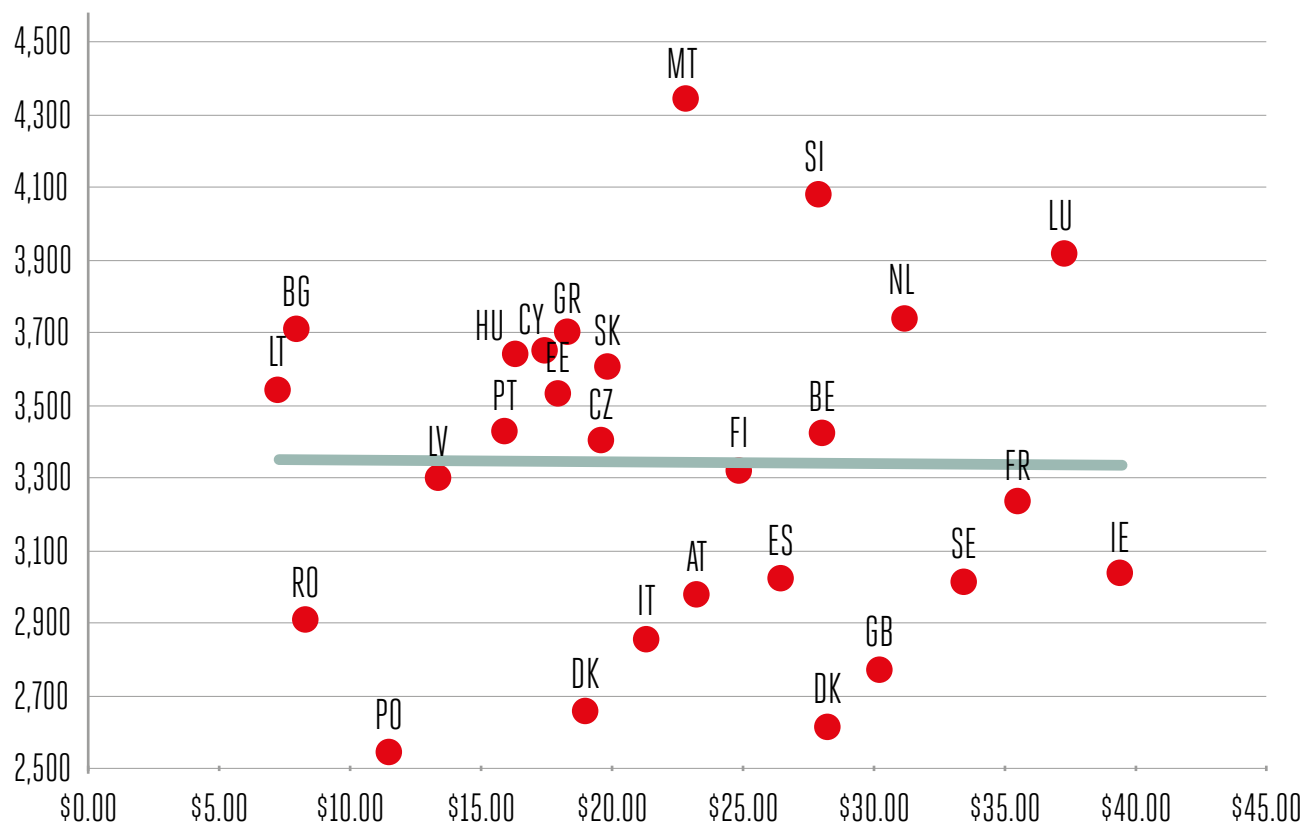


Figure 15

To summarize, the fragmentation of EU national wireless markets, including the divergent regulatory policies and distinct spectrum regimes of 27 national regulatory authorities, creates, at a minimum, a prima facie concern that market performance in the EU is being hampered by the inability of carriers and other firms in the mobile wireless ecosystem to exploit economies of scale and scope, thereby slowing network deployment, impeding innovation, and harming consumer welfare.

The Role of Policy: Options for Reform

Policy reforms can help restore the growth of the EU mobile wireless industry by removing barriers to the rationalization of market structures and by focusing on facilitating investment and innovation. Spectrum policy changes are needed to achieve harmonization and create certainty, while competition policy should be reformed to reduce barriers to efficient consolidation. Overall, regulators should shift their focus from short-term static objectives to achieving medium term dynamic efficiency gains that will enhance consumer welfare.

The evidence presented above suggests that the performance of EU mobile wireless markets would be improved – that is, that consumer welfare would be increased – by reducing fragmentation among suppliers, thereby allowing them to capture economies of scale and scope; and, by increasing incentives for investment and innovation, thereby speeding the deployment of next generation wireless broadband infrastructures and accelerating the growth of the mobile wireless ecosystem.⁴⁴

Simply put, reforms must seek to remove barriers to efficient restructuring and to facilitate, rather than impede, rapid innovation.

Key regulators appear to share these conclusions, at least in broad terms. For example, Commissioner Kroes has stressed the need to create an investment environment that is “open, competitive, and transparent,” and to offer the “incentives, certainty, and confidence [companies] need to invest.”⁴⁵ And while Commissioner Almunia has defended the

EC’s merger control policies, he has also said he “fully share[s] the call for a Single Market in telecommunications,” and also indicated that “The [mobile] industry would do well to consolidate across national borders, if that meant lower prices and new and better services.”⁴⁶

In this section we discuss three areas of policy reform designed to achieve these goals. Specifically, we recommend (A) harmonizing and simplifying spectrum allocation and licensing policies, (B) permitting efficient consolidation among wireless carriers, and (C) refocusing regulatory policy on investment and innovation rather than static efficiencies.

44. It should be noted that accelerating the deployment of NGA wireless infrastructures generates an external benefit in the form of increased competition for wireline. See e.g., Robert Litan and Hal J. Singer, *The Need for Speed* (Brookings Institution, 2013).

45. Nellie Kroes, “Incentives to invest in the future: creating an open, competitive telecoms market,” Speech to European Competitive Telecommunications Association (Brussels, 28 Nov. 2011).

46. See Joaquin Almunia, “Relying on the Single Market for the Future of Europe,” European Competition Forum (February 28, 2013) (available at http://europa.eu/rapid/press-release_SPEECH-13-168_en.htm).

A.

Spectrum Allocation, Assignment and Refarming

Spectrum is a critical input in the provision of mobile wireless services. Two decades of liberalization, beginning with the first spectrum license auctions in 1993, have created relatively efficient spectrum allocation schemes in the U.S., including a robust secondary market in which license holders are able to engage in routine leasing and transference of mobile wireless licenses with minimal oversight and delay, as well as to provide the services and deploy the technologies of their choice. While spectrum licenses are (by necessity) specific to particular geographies, band plans, reallocation programs and other aspects of spectrum regulation are national in scope.⁴⁷ Thus, several carriers have been able to acquire the spectrum necessary to build out an integrated national mobile infrastructure.

The spectrum reform consensus that led to the liberalization of U.S. spectrum policy was by no means limited to the U.S.: EU nations have not only adopted important reforms, but, in important respects, led the way.⁴⁸ That said, spectrum reform remains a work in progress, and the EU remains hampered, especially by the market fragmentation inherent in placing control over spectrum resources under the purview of 27 independent national regulatory authorities, as well as by relatively restrictive

policies regarding spectrum license renewals, limitations on license flexibility, and a pattern of discriminating in favor of new entrants in the allocation of spectrum rights. We discuss each issue below and suggest reforms we believe would enhance competition and increase consumer welfare.

47. For a history of the liberalization of U.S. spectrum policy, see Jeffrey A. Eisenach, "Spectrum Reallocation and the National Broadband Plan," *Federal Communications Law Journal* 64:1 (December 2011) 88-135.

48. See e.g., Martin Cave, "Remarks at the Improving Spectrum Management through Economic or Other Incentives Workshop: International Experiences in Market-Based Approaches" (March 1, 2006) (available at www.ntia.doc.gov/files/ntia/publications/spectrumworkshop_030106.pdf).

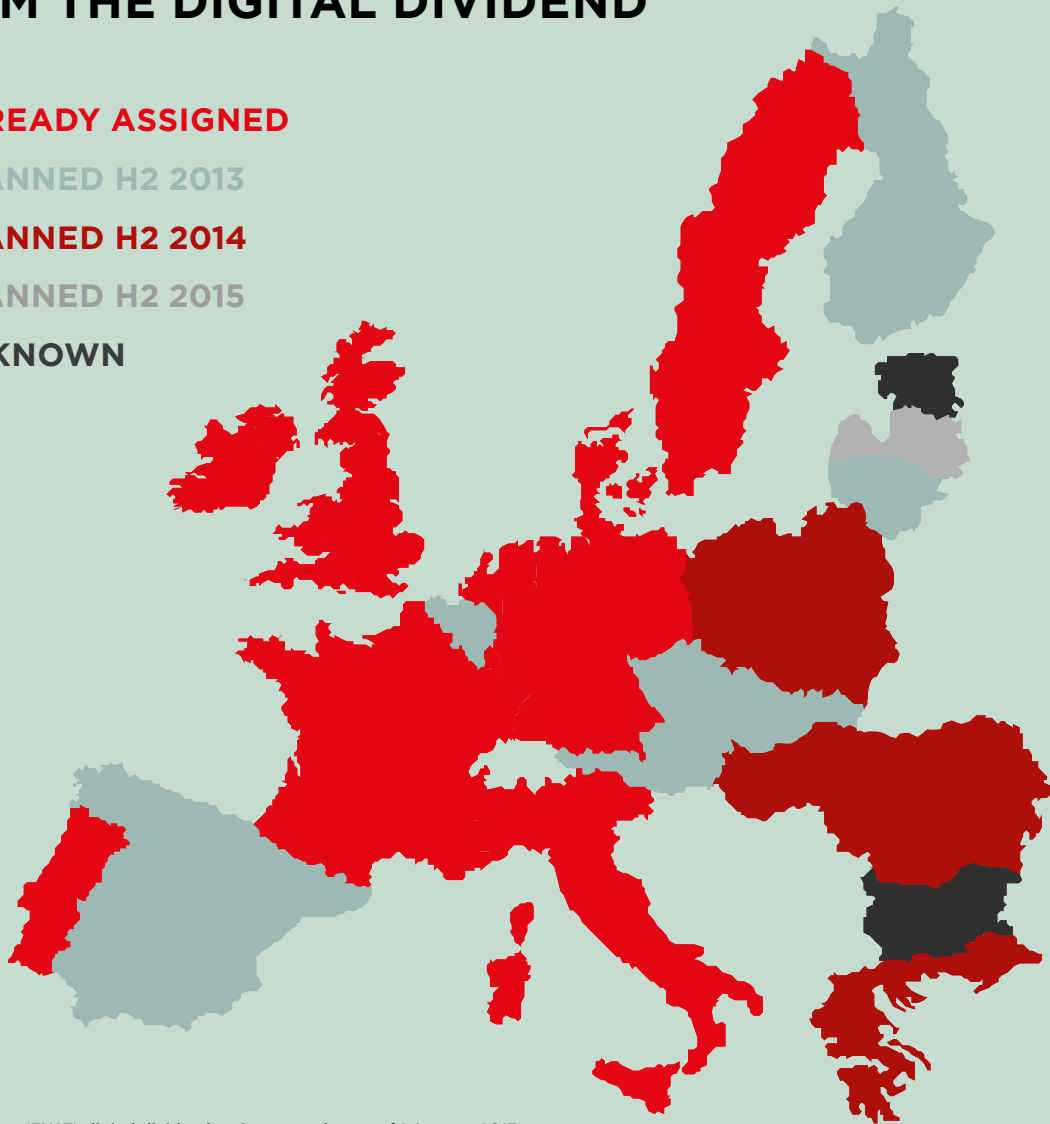
RELEASE OF SPECTRUM FROM THE DIGITAL DIVIDEND SHOULD BE ACCELERATED:

As discussed previously, technical and bureaucratic delays in the allocation of 800MHz “digital dividend” spectrum (obtained from phasing out analog TV services and refarming the spectrum for mobile wireless usage) have hampered the rollout of LTE infrastructures. Under the European Commission’s Radio Spectrum

Policy Programme (RSPP), all 27 EU Member States committed to make the 800 MHz band available for mobile broadband services by the beginning of 2013. Yet as shown in Figure 16, as of February 2013, only nine countries had confirmed digital dividend spectrum assignments, while the remaining 18 Member States announced that they would fail to meet the deadline.⁴⁹ Thus, the EC’s goal of making at least 1,200MHz of spectrum available for mobile broadband by 2015 appears to be in jeopardy.⁵⁰

STATUS OF SPECTRUM ASSIGNMENT FROM THE DIGITAL DIVIDEND

- **ALREADY ASSIGNED**
- **PLANNED H2 2013**
- **PLANNED H2 2014**
- **PLANNED H2 2015**
- **UNKNOWN**



European Union (EU27) digital dividend assignment plan, as of 1 January 2013. Source: European Commission, GSMA Wireless Intelligence.

Figure 16

49. See Neelie Kroes (February 13, 2013) (“Our success or failure in wireless does not happen by chance; it depends on the policy decisions we take. Fragmented spectrum availability means a fragmented market. Yet the digital dividend spectrum – offering cheap network roll-out and wide coverage – is currently only being used in just a few Member States. And, on average, national governments have only awarded 65% of the spectrum we harmonised in the EU.”). See also Joss Gillet, “European LTE Rollouts Hampered by Lack of Digital Dividend Spectrum,” GSMA Wireless Intelligence (February 15, 2013); see also Joss Gillet, “The Impact of European Spectrum Harmonisation on LTE Network Deployments,” GSMA Wireless Intelligence (February 15 2013).
50. Caroline Gabriel, “Red Tape Threatens Digital Dividend Returns,” Wireless Watch (June 20, 2012).

In addition to accelerating deployment of new infrastructure, timely release of digital dividend spectrum would have beneficial effects from a competition perspective.

For example, the European Commission (EC) explained the need to impose spectrum divestiture requirements on the UK's Orange-T-Mobile merger in part on the basis of uncertainties about the availability of additional spectrum: "The [merging] parties will also have a significant time advantage [in deploying LTE] due to the uncertain timing of the auction and the time needed to clear the sub 1GHz spectrum."⁵¹ In other words, the Commission determined that delays in making additional spectrum available created sustainable market power and the need, ultimately, to impose conditions on an important merger which would not have been necessary had spectrum reallocation been proceeding at a more rapid pace and on a less uncertain path.

As a leading group of spectrum experts recently concluded, "Perhaps the most important step the government can take to enhance competition is making more spectrum available and making the spectrum available sooner rather than later."⁵²

CO-ORDINATED RELEASE OF SPECTRUM BY ALL EU MEMBER STATES IN A NARROW WINDOW:

As discussed above, the inability of EU carriers to capture the economies of scale possible under a single market regime imposes significant costs on EU consumers. Thus, while making additional spectrum available is in itself a laudable goal, the ability of carriers to capitalize on additional spectrum, and of consumers to benefit thereby, depends on also increasing the level of harmonization. A co-ordinated release of harmonized spectrum bands and allocations by Member States within a similar time frame would be beneficial to consumers. Both academic⁵³ and

private⁵⁴ experts believe such a step would be beneficial, and the evidence presented above supports the same conclusion.

SPECTRUM LICENSES SHOULD BE ROUTINELY RENEWED RATHER THAN REPOSSESSED AND RE-AUCTIONED:

Problems also exist with respect to spectrum that has already been deployed, but for which license terms are nearing expiration. Little formal guidance exists for GSM licenses reaching the end of 15-year terms, but which remain key inputs to wireless carriers, giving rise to uncertainty with respect to the future assignment of these rights.⁵⁵ Furthermore, the EU's electronic communications regulatory framework requires National Regulatory Authorities (NRAs) to conduct 'competition reviews' of spectrum currently in use, creating considerable uncertainty by presenting several divergent legal standards that could potentially be applied to any given matter.⁵⁶ This could lead to inconsistency in spectrum management policies across (and even within) EU Member States, with carriers running the risk that existing license terms could be altered, spectrum could be reassigned, or that access to new spectrum could be constrained.⁵⁷

More broadly, arbitrary limitations on the terms of spectrum licenses are a direct disincentive to long-term investments in mobile broadband ecosystems. Such investments depend on the ability of producers of complementary inputs, including carriers, to make long-term commitments to support platform innovations, commitments which are both risky and may have long payback periods. Limited license renewal terms truncate the ability of carriers to earn returns on such investments.

51. See European Commission, Case No Comp/M.5650 - T-Mobile/ Orange, Regulation (EC) No 139/2004 Merger Procedure, Article 6(1)(b) in Conjunction with Art 6(2) (March 1, 2010) at 128 (available at http://ec.europa.eu/competition/mergers/cases/decisions/M5650_20100301_20212_247214_EN.pdf) (hereafter T-Mobile Decision.).

52. See Peter Cramton, Evan Kwereil, Gregory Rosston and Andrzej Skrzypacz, "Using Spectrum Auctions to Enhance Competition in Wireless Services," *Journal of Law and Economics* 54 (November 2011) S167-S188 at S168 (available at <http://www.cramton.umd.edu/papers2010-2014/cramton-kwereal-rosston-skrzypacz-spectrum-auctions-and-competition.pdf>).

53. Arnd Weber, Michael Haas and Daniel Scuka, "Mobile Service Innovation: A European Failure," *Telecommunications Policy* 35 (2011) 469-480 at 479.

54. See e.g., HSBC, (December 7, 2012).

55. Vodafone, "Spectrum: Renewal and Pricing in Europe," *The Policy Paper Series* 14 (May 2012) at Introduction.

56. Vodafone (2012) at 7.

57. Vodafone (2012) at Introduction.

SPECTRUM RIGHTS SHOULD BE FLEXIBLE WITH RESPECT TO TECHNOLOGIES AND SERVICE OFFERINGS:

As noted above, when Everything Everywhere decided to redeploy spectrum in the 1.8GHz band from 2G to 4G services, it applied for permission to Ofcom, which took 10 months to come to a decision. The EC's Digital Agenda Progress Report, issued in June 2012, makes clear that the combination of insufficient flexibility and multiple licensing regimes impedes spectrum reallocation:

Notwithstanding the changes in the plans in all Member States, however, the implementation of the refarming process, i.e. the process of changing the allowed uses of specific rights of use of frequencies, remains a complex exercise where several factors are involved and where the heterogeneity of conditions at national level does not allow for one-size-fits all approach.⁵⁸

The report also highlighted the discretion currently afforded to NRAs to block or condition license transfers. The EC report finds, for example, that:

Depending on the timing, the balance of spectrum holdings, the duration of existing rights of use and the financial conditions attached to these rights, the refarming process can lead to different regulatory actions by Member States, including changes in the terms of the individual licenses, trading among operators, reshuffling of current holdings, additional payments.⁵⁹

Ultimately, the solution to regulatory impediments to spectrum reallocation is to adopt spectrum flexibility, whether through harmonization of NRA policies, or, if necessary, through a pan-European mandate.

SPECTRUM AUCTIONS SHOULD NOT DISCRIMINATE IN FAVOR OF NEW ENTRANTS:

Member States have actively used spectrum auctions to favor new entrants, either setting aside spectrum specifically for new entrants or providing them with advantageous terms. Yet even academics who express concerns about wireless market concentration agree that attempts to reengineer market structures through spectrum allocation risks doing more harm than good. In a recent article, Cramton, Kwerel, Rosston and Skrzypacs examine the use of set asides and similar tools designed to advantage entrants.

They find that “experience with these instruments has been mixed,” and that their use has sometimes resulted in “lengthy delay in the use of the spectrum.”⁶⁰ Thus, they write, “[o]ur conclusion is that these instruments must be used with care. The phrase attributed to the Hippocratic Oath very much applies: first, do no harm.”⁶¹

58. European Commission, Digital Agenda Progress Report (June 2012) at 28-29.

59. Progress Report (June 2012) at 29-30.

60. Cramton et al at S187.

61. Id. On this point, see e.g., RSPG BEREK Report on Competition: Transitional Issues in the Mobile Sector in Europe (February 2011) at 17 (“[A] greater number of MNOs can help to increase competition but the benefits of such increased competition may need to be balanced against any potential downsides, such as inadequate spectrum block sizes for broadband technologies.”)(available at [http://www.erg.eu/streaming/BoR%20\(11\)%2007%20Transitional%20Issues_final.pdf?contentId=547147&field=ATTACHED_FILE](http://www.erg.eu/streaming/BoR%20(11)%2007%20Transitional%20Issues_final.pdf?contentId=547147&field=ATTACHED_FILE)).

B.

Competition Policy and Merger Control

While U.S. regulatory authorities have not taken a laissez faire approach to merger control and consolidation, they have permitted a substantial degree of both geographic and economic consolidation.

As shown in Table 3, between 2003 and 2012, the FCC approved 20 significant mergers and other major mobile wireless license transactions totaling over \$288 billion. While many of these transactions were approved

subject to various conditions, including required divestitures, for the most part these conditions have not served as a significant deterrent to efficient consolidation nor imposed undue costs on the merging parties.

2003 → 2012

**FCC APPROVED 20 SIGNIFICANT
MERGERS AND OTHER MAJOR
MOBILE WIRELESS LICENSE
TRANSACTIONS**

\$288 BILLION

MAJOR U.S. MOBILE WIRELESS MERGERS AND SPECTRUM TRANSACTIONS

2003-2012

APPLICATION DATE	ASIGNEE	ASSIGNOR	DESCRIPTION	VALUATION (\$000)
9/26/2003	Cingular	Nextwave	Purchase of NextWave spectrum licenses by Cingular (34 markets)	\$1,400,000
3/18/2004	Cingular	AT&T	Acquisition of AT&T Wireless by Cingular	\$41,000,000
1/24/2005	Alltel	Western Wireless	Acquisition of Western Wireless Alltel (1.4 million customers in 19 states)	\$6,000,000
2/8/2005	Sprint	Nextel	Merger between Sprint and Nextel (40 million subscribers)	\$70,000,000
12/2/2005	Alltel	Midwest Wireless	Acquisition of Midwest Wireless by Alltel (400,000 subscribers)	\$1,075,000
3/31/2006	AT&T	Bellsouth	Acquisition of BellSouth by AT&T, including consolidation of Cingular Wireless JV	\$86,000,000
6/25/2007	Atlantis	Alltel	Acquisition of Alltel announced by TPG Capital and GS Capital Partners ("GSCP")	\$27,500,000
7/13/2007	AT&T	Dobson	Acquisition of Dobson Communications Corporation by AT&T (1.7 million subscribers)	\$2,800,000
10/1/2007	T-Mobile	Suncom	Acquisition of SunCom by T-Mobile Inc.	\$2,400,000
6/10/2008	Verizon Wireless	Alltel	Acquisition of Alltel by Verizon	\$28,100,000
10/29/2007	AT&T	Aloha	Purchase of Aloha 700 MHz licenses by AT&T (12 MHz covering 196 million people)	\$2,500,000
6/6/2008	Clearwire	Sprint-Nextel	Combination of Sprint Nextel spectrum with Clearwire spectrum in new Clearwire JV	\$3,300,000
9/4/2007	Verizon Wireless	Rural Cellular	Acquisition of Rural Cellular Corp. by Verizon Wireless (-716,000 subscribers in 5 regions)	\$2,670,000
11/21/2008	AT&T	Centennial	Acquisition of Centennial Communications Corp. by AT&T (-1,100,000 subscribers)	\$945,000
5/22/2009	AT&T	Verizon Wireless	Divestiture of Alltel spectrum from Verizon-Alltel acquisition	\$2,350,000
6/16/2009	Atlantic Tele-Network	Verizon Wireless	Divestiture of Alltel spectrum from Verizon-Alltel acquisition	\$200,000
1/13/2011	AT&T	Qualcomm	Purchase of Qualcomm spectrum licenses by AT&T	\$1,930,000
12/21/2011	Verizon	SpectrumCo	Purchase by Verizon of spectrum from Cox and SpectrumCo (a joint venture among other cable companies); a swap between Verizon and Leap wireless, and Verizon's assignment of licenses to T-Mobile, among other transactions	\$3,900,000
8/1/2012	AT&T	Comcast, Horizon Wi-Com, Nextwave Wireless	Purchase of WCS and AWS spectrum licenses from Comcast, Horizon Wi-Com, and Nextwave Wireless	\$2,000,000
10/18/2012	T-Mobile	MetroPCS	Acquisition of MetroPCS by T-Mobile	\$2,250,000

Source: Jeffrey A. Eisenach and Hal J. Singer, "Avoiding Rent-Seeking in Secondary Market Spectrum Transactions," *Federal Communications Law Journal* (forthcoming 2013).

Table 3

Consolidation in the mobile sector has been comparatively rare in the EU; indeed, Curwin and Whalley, studying the history of proposed mergers among incumbent mobile operators in Europe over a period of two decades, conclude that "in virtually every case, the proposals [for mobile consolidation] failed to come to fruition."⁶² Although there exist myriad factors that may determine the success or failure of any given proposal,⁶³

policymakers' influence is obviously confined to policy-driven factors. In this regard, both the EC and the EU national regulators have frequently discouraged wireless consolidation comparable to that which has occurred in the U.S., either by blocking mergers⁶⁴ or by imposing remedies designed explicitly to protect competitors, making consolidation less attractive ex ante.

62. Peter Curwin and Jason Whalley, "Merging Incumbent European Mobile Operators: Veni, Vidi, non Vici," *Info: The Journal of Policy, Regulation and Strategy for Telecommunications* 11(4) (2009) 34-52, at 34.

63. See Curwin and Whalley (2009) at 46 ("[There are] too many groups involved with quite different agendas, most obviously governments, the financial markets and company boards.")

64. For example, in 2010, the Swiss Competition Commission (ComCo) blocked a proposed merger of France Telecom's Orange Switzerland with Sunrise (owned by Denmark's TDC). ComCo prohibited the merger, arguing that competition among the remaining operators would have been insufficient, and that appropriate remedies could not be identified. See press release, ComCo, "WEKO untersagt Zusammenschluss von Orange und Sunrise" (available in German, French and Italian at <http://www.news.admin.ch/message/index.html?lang=de&msg-id=32758>); see also ABA Section of International Law, 2010 Year in Review (available at http://www.cms-veh.com/Hubbard.FileSystem/files/Publication/b2a96da9-473e-4aa1-a4f3-014cac82c60f/Presentation/PublicationAttachment/12ee75af-elf8-457d-b14f-01ca48b0aafe/ABA%202010%20Antitrust%20Year-In-Review_Swiss%20Part.pdf).

For example, in the course of the 2010 merger of Orange and T-Mobile (which created Everything Everywhere, the largest mobile network operator in the UK), the UK's Office of Fair Trading (OFT) requested a partial referral of the transaction from the EC to the OFT, asserting that the merger threatened to "significantly affect competition" in UK mobile communications markets in two ways.⁶⁵ First, the OFT expressed concern that 3UK – the smallest carrier in the UK, which, lacking its own 2G/GSM network, relied on national roaming agreements with Orange to provide voice service – could be "significantly weakened as a competitor or exit the UK mobile market."⁶⁶ Second, the OFT raised the possibility that, by further concentrating spectrum rights on the 1800MHz band, the merger "might result in just one mobile network operator offering [LTE] services."⁶⁷ The merger was approved only after the parties committed to (1) a revised commercial agreement with 3UK covering post-merger infrastructure sharing, including a fast-track dispute resolution process; and (2) divestiture(s) totaling one quarter of the parties' combined spectrum in the 1800MHz band.⁶⁸

In Austria, the 2012 acquisition of Orange's mobile telephony business by Hutchison 3G was approved only after the parties agreed to a package of commitments designed to "facilitate the entry of new players into the Austrian mobile telecommunications market."⁶⁹ Specifically, the combined entity agreed to "divest radio spectrum and additional rights to an interested new entrant;"⁷⁰ the new entrant is also to be granted reserved spectrum in a 2013 auction to facilitate construction of its network, and will "benefit from privileged conditions for the purchase of sites for building up its own network."⁷¹ In addition, HG3 committed to provide "wholesale access to its network for up to 30% of its capacity to up to 16 mobile virtual network operators (MVNOs) in the coming 10 years."⁷² HG3 was also obligated to enter into a wholesale access agreement with at least one MVNO before completing the acquisition.⁷³

Even when consolidation is allowed to proceed without the imposition of ex ante constraints, regulators have adopted ex post policies designed, in effect, to reverse the effects of mergers by increasing the number of market participants. For example, in 2007 France Telecom sold Orange, its Dutch mobile business, to Deutsche Telekom. The EC allowed the transaction to proceed without conditions, despite the fact that it reduced the number of carriers in the Netherlands from four to three.⁷⁴ Yet the Dutch regulator subsequently orchestrated new entry into the mobile market by setting aside three spectrum blocks for new entrants in auctions held in 2012.⁷⁵ Other national regulators have taken similar steps to facilitate entry: French regulators utilized discounted license and roaming arrangements to introduce a fourth mobile competitor (Iliad), substantially increasing pricing pressure in the industry; and, the Belgian communications regulator (BIPT) set aside 2.1GHz spectrum for new entrants in a 2011 auction.⁷⁶

Recent remarks by EU regulators suggest an understanding of the need to permit pan-European consolidation. Commissioner Kroes, for example, recently noted that "[h]aving a few pan-European operators that are strong in the cross-border market would not necessarily be bad for competition... It can make sense... and be good for investment and innovation."⁷⁷ Given the importance of economies of scale and scope in the industry, removing barriers to entry and permitting efficient consolidation is a logical step towards facilitating future investment and innovation. In particular, efforts to facilitate the emergence of pan-European operators should place less emphasis on protecting competitors, and more on promoting competition. In addition, it would be desirable to streamline the review process to eliminate what has been called a "minefield" of multijurisdictional reviews.⁷⁸

65. See T-Mobile Decision at 14-18.

66. T-Mobile Decision.

67. T-Mobile Decision.

68. See <http://www.ictregulationtoolkit.org/en/Section.3552.html>; T-Mobile Decision at 206-238.

69. European Commission, "Mergers: Commission Clears Acquisition of Austrian Mobile Phone Operator Orange by H3G, Subject to Conditions," (Dec. 12, 2012) (available at http://europa.eu/rapid/press-release_IP-12-1361_en.htm) (hereafter Austria Decision).

70. See Austria Decision.

71. See Austria Decision.

72. See Austria Decision.

73. See Austria Decision.

74. See T-Mobile Decision at 1-2.

75. See HSBC, "European Mobile: A Proposal for Progressive Consolidation," (December 7, 2012) at 9; see also Paul Rasmussen, KPN, Vodafone and T-Mobile Likely to Bid in Dutch Spectrum Auction," *Fierce Wireless Europe* (September 7, 2012) (available at <http://www.fiercewireless.com/europe/story/kpn-vodafone-and-t-mobile-likely-bid-dutch-spectrum-auction/2012-09-07>); see also Leila Abboud and Robert-Jan Bartunek, Analysis: Dutch Mobile Market Faces French-Style Price War," *Reuters* (September 14, 2012) (available at <http://www.reuters.com/article/2012/09/14/us-dutch-telco-idUSBRE88D0KJ20120914>).

76. See e.g., HSBC (2012) at 9.

77. See e.g., Leila Abboud and Claire Davenport, "M&A Could Help Telcos Close Europe's Network Gap: Kroes," *Reuters* (June 11, 2012) (available at <http://www.reuters.com/article/2012/06/11/us-media-tech-summit-kroes-idUSBRE85A12A20120611>); see also Kevin J. O'Brien, "Mergers of European Mobile Carriers Expected to Grow," *New York Times* (June 17, 2012) (available at http://www.nytimes.com/2012/06/18/business/global/mergers-of-european-mobile-carriers-expected-to-grow.html?pagewanted=all&_r=0).

78. Michael Rosenthal, "Mergers in the Telecommunications Sector: An Overview of EU and National Case Law," *Institute of Competition Law* (April 6, 2012) (noting that, while telecom is generally less problematic for merger reviews than other sectors, "the major challenge that businesses face, especially where there is pressure to close a deal quickly, is to navigate the jurisdictional minefield that sees cases referred by the Commission to national competition authorities or vice versa, with the associated – and unwelcome – delays. Besides the delays, merger statistics show that merging parties also have reason to worry about a possibly stricter review of their deals by the national authorities under their national merger control rules compared to a review carried out by the European Commission under the EU Merger Regulation.").

c.

Dynamic Regulation and Creating Incentives for Innovation

Beyond rationalizing spectrum policy and permitting efficient consolidation, we believe there is a third aspect of reform which falls under the general heading of designing regulation in such a way as to facilitate dynamic competition rather than preserve static competition.⁷⁹

In broad terms, we recommend that regulatory policy strike a proper balance, paying attention to the need for preserving incentives for investment and innovation rather than focusing primarily or exclusively on the pursuit of static efficiency through the promotion of commoditized competition and ever lower prices.⁸⁰ This means acknowledging the uncertainty inherent in dynamic markets such as those at issue here, and recognizing that innovation and investment in such markets result from firms' decisions to exploit (or, through innovation, to create) market disequilibria. It also means accepting that successful innovators will capture large market shares and earn positive returns, at least temporarily, and allowing them to do so. Further, effective regulation of dynamic markets requires regulatory certainty; thus, regulations should be designed to be durable and consistent over time in order to enhance the ability of market players to engage in long-term and risky investments. Moreover, the regulatory approach should be sufficiently 'hands-off' (non-interventionist) to encourage innovations, new business models and market

experiments. In order for dynamic markets to develop, regulators need to apply a predictable, transparent and non-intrusive framework.

The previous sections above have emphasized the need for a more harmonized spectrum management framework, and more room for market consolidation and for enabling a more integrated mobile wireless ecosystem throughout the EU. Beyond these specific policy areas, regulators should strive for a more unified regulatory framework across all Member States. By doing so, they can effectively enlarge the potential market, moving in the direction of a single digital market not just for wireless operators but for the entire mobile wireless ecosystem. Two examples help to illustrate our point.

First, one potential area of increased regulatory harmonization is conditions relating to MVNOs. MVNOs are present throughout the EU, but there is substantial cross-country variation in the degree and scope of regulation, as well as entry conditions.⁸¹

79. See generally Johannes M. Bauer and Erik Bohlin, "From Static to Dynamic Regulation: Recent Developments in US Telecommunications Policy," *Intereconomics* (January/February 2008) 38-50.

80. For a similar view, see CRA, "The Competition/Investment Trade-Off Revisited?" (April 2013) (available at http://www.crai.co.uk/ecp/assets/The_Competition_Investment_Trade-Off_Revisited-Hutchison_3G_Orange_Austria.pdf).

81. See Livio Cricelli, Michele Grimaldi and Nathan Ghiron, "The Impact of Regulating Mobile Termination Rates and MNO-MVNO Relationships on Retail Prices," *Telecommunications Policy* 36 (2012) 1-12.

Recent spectrum licenses in several Member States have included requirements for license holders to negotiate with MVNOs and engage in other forms of spectrum sharing. As a result of these differing conditions, MVNOs have been more successful in some countries than in others. For instance, in France the MVNO market share in 2011 was 10 percent, while in the EU overall it was only four percent.⁸²

The second example is international roaming, which demonstrates how market fragmentation can contribute to market failures and ultimately lead to direct retail pricing regulation and price caps. Arguably, reducing market fragmentation and enhancing pan-European competition could have ameliorated the concerns about the adequacy of price competition that led regulators to apply a retail pricing scheme for international roaming, both in voice and data (including unbundling requirements).⁸³

By contrast, when the FCC imposed a limited data roaming mandate in April 2011, it chose not to regulate roaming rates directly, and instead adopted “a general requirement of commercial reasonableness....[which] preserves incentives to invest....”⁸⁴ For Europe to move towards a U.S. approach in data roaming, cross-border competition and pan-European markets must develop, which in turn requires that Member States be more willing to coordinate license conditions, spectrum management policies and other aspects of their regulatory regimes.

Our point is not to propose specific changes in either the MVNO or international roaming rules, but to urge regulators to take a more far-sighted and dynamic view – to focus their attention on creating incentives for innovation that would dramatically increase consumer welfare, and on taking steps toward an more integrated mobile wireless ecosystem, including consistent spectrum allocation and assignment conditions.⁸⁵

82. GSMA Europe Response to the European Commission Public Consultation on the Revision of the Recommendation on Relevant Markets (January 8, 2013) (available at <https://ec.europa.eu/digital-agenda/en/news/results-public-consultation-revision-recommendation-relevant-markets>).

83. Data roaming rules adopted by the EC in 2012 lowered existing retail and wholesale caps on the price per MB that carriers are permitted to charge. The data roaming rules call for a roaming unbundling requirement to take effect in mid-2014, forcing carriers to allow subscribers to purchase their roaming service from a separate (presumably local) provider when traveling abroad. See Ben Woods, “Cut-price Data Roaming Gets All-Clear for July,” ZDNet (May 30, 2012) (available at <http://www.zdnet.com/why-data-roaming-costs-too-much-3040092266/>); see also European Communications, “Opinion: EU Roaming Regulation – What Next for Operators?” (July 13, 2012) (available at www.eurocomms.com/features/opinion/8413-opinion-eu-roaming-regulation--what-next-for-operators-); and, David Meyer, “Europe Agrees on Changes for Cheaper Roaming,” ZDNet (March 28 2012).

84. See Federal Communications Commission, Reexamination of Roaming Obligations of Commercial Mobile Radio Service Providers and Other Providers of Mobile Data Services, Second Report at Order, WT Docket No. 05-265 (April 7, 2011) at 21-23.

85. Bauer and Bohlin suggest the U.S.’ success since 2008 has been at least partly due to its decision to embrace a dynamic approach to regulation. See Bauer and Bohlin (2008) at 50 (“U.S. policy is again diverging from the approaches in other nations. It is taking a new step in favor of dynamic market based competition. In mobile markets this approach is paying off after the U.S. initially lost ground compared to peer nations.”)

6.

Conclusion

As noted above, concerns about the progress of EU mobile wireless markets are not new; Commissioner Reding's warning about the slow pace of growth, for example, came almost exactly five years ago, in May 2008. Looking ahead, as Commissioner Kroes recently said,

"SUCCESS OR FAILURE IN WIRELESS DOES NOT HAPPEN BY CHANCE: IT DEPENDS ON THE POLICY DECISIONS WE TAKE."⁸⁶

The evidence presented here suggests that the performance of EU markets continues to lag, and that the cause lies at least in part in policies that have placed too much emphasis on static measures of competitiveness and lower short-term prices and too little on innovation, investment, and the realization of economies of scale and scope.

Rationalizing and harmonizing spectrum policies, permitting efficient consolidation, and refocusing regulation on investment and innovation are three steps authorities should consider to return the EU mobile wireless ecosystem to economic health and provide EU consumers with the advanced and innovative mobile wireless services they demand.

86. Neelie Kroes (February 20, 2013).



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