

# Mobile Wireless Performance in the EU and the US: Implications for Policy (\*)

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**Abstract:** 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, especially with respect to the deployment of next generation LTE networks. We assess the divergence in performance, analyze its causes, and suggest policy changes that would improve the performance of mobile wireless markets going forward. These include regulatory harmonization of spectrum management, achieving efficient levels of consolidation, and promoting investment and innovation through a focus on dynamic competition.

**Key words:** spectrum management, performance, ecosystem, dynamic competition, wireless markets.

There is broad agreement that the EU is lagging well behind the U.S. in deployment of next generation wireless infrastructures (see e.g. KROES, 2013a; GENACHOWSKI, 2012).<sup>1</sup> This paper evaluates the divergence in performance, analyzes its causes, and suggests

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<sup>1</sup> "Once, Europe led the world in wireless communication: now we have fallen behind. Europe needs to regain that lead." (KROES, 2013a); "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." (GENACHOWSKI, 2012).

policy changes that would improve performance going forward. It concludes that EU regulatory policies have resulted in a fragmented market structure, which is one of the factors that prevent carriers from capturing beneficial economies of scale and scope and reduce the growth of the mobile wireless ecosystem. The reforms suggested include improving coordination and harmonization of spectrum management policies, permitting efficient levels of consolidation, and incentivizing investment to promote infrastructure-based competition.

## ■ The diverging performance of EU and U.S. mobile wireless markets

### Prices and output

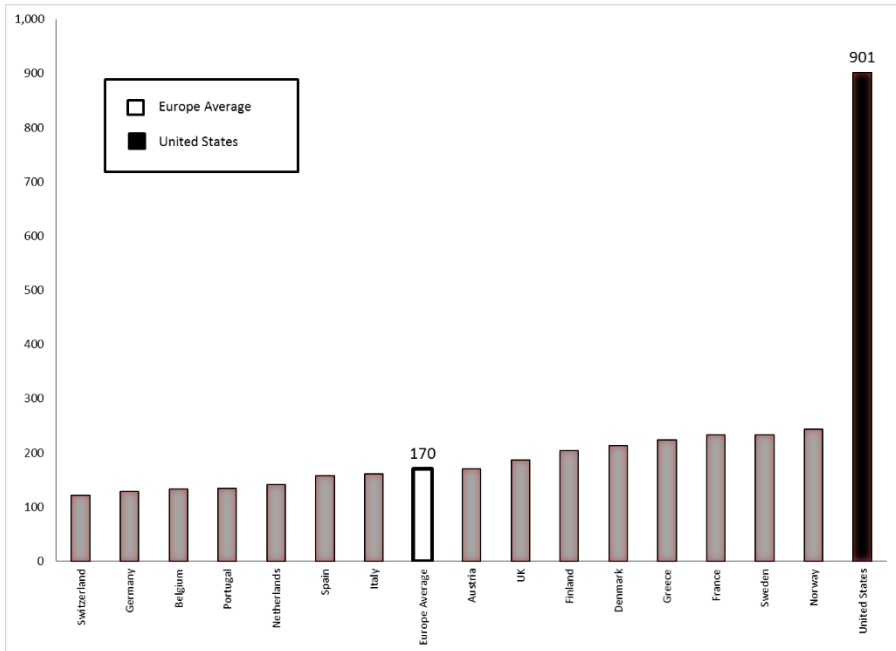
Data on prices and output shows that, on average, consumers in the EU pay less per month for mobile wireless services than consumers in the U.S.. 2012 average revenue per user (ARPU) in the U.S. is higher than in any EU country: \$69 per month compared with an EU average of \$38.

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 1, U.S. consumers use 901 voice minutes per month, more than five times the European average of 170 minutes.

Similarly, CISCO (2013) reports that mobile wireless data use per connection in the U.S. is significantly higher than in the EU and projects U.S. customers will use more than twice as much data per connection as customers in the EU in 2013.

Thus, while U.S. consumers pay more per month than those in the EU, they pay less per unit of usage. For example, MERRILL LYNCH (2012) 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.

**Figure 1 – Voice minutes of use per subscriber (2012)**



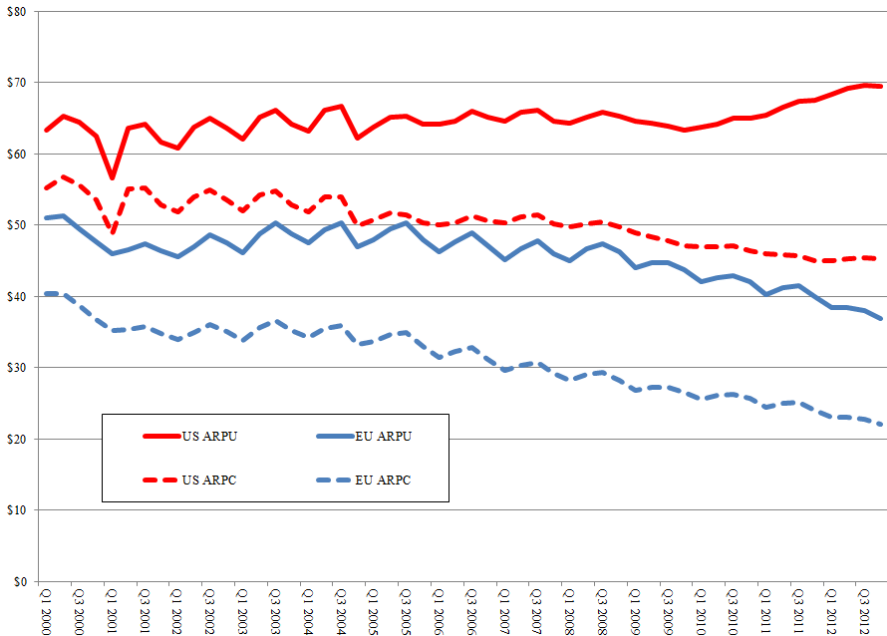
Source: Merrill Lynch Global Wireless Matrix 4Q12 (hereafter, "Global Wireless Matrix")

Both U.S. and EU consumers have experienced a long-run secular decline in revenue 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 devices to the network per subscription than in the EU. As a result, as shown in Figure 2, ARPU in the U.S. is actually increasing, while revenue per subscriber in the EU continues to decline.

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. The widening of the gap between U.S. and EU ARPU (beginning in 2010) coincided with introduction of the first 3G enabled iPad and with the initial deployments of LTE networks (primarily in the U.S.). Analysts 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" (NICOLL, 2013).<sup>2</sup> They also note that U.S. markets display a relatively high level of product differentiation in terms of network technologies (3G vs. WiMax vs. LTE), as well as a variety of pricing plans (NICOLL, 2013). By contrast, analysts attribute downward pricing pressure in Europe to "increasingly commoditized service" (ABBOUD & TEN WOLDE, 2013), making it "extremely difficult to establish sustainable differentiation between the various operators, with the result that pricing has continuously deteriorated" (HSBC, 2012).

**Figure 2 – Monthly average revenue per subscriber and per connection U.S. AND EU (2000-2012, \$US)**



Source: Wireless Intelligence.

<sup>2</sup> According to MERRILL LYNCH (2012) 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.

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## Quality and choice

One important aspect of mobile wireless quality is the connection speed for mobile data services. Connection speeds on U.S. data networks have surpassed those in the EU. Deployment of LTE networks in the U.S. is beginning to create a gap, which is expected to widen in the immediate future. CISCO (2013) reports that average mobile data connection speeds in North America in 2012 were about 75 percent faster than those in Europe (2.6 Mbps vs. 1.5 Mbps), and projects that average mobile connection speeds will exceed 14 Mbps in North America, compared to 7 Mbps in the EU by 2017.<sup>3</sup>

The limited extent of European LTE deployments has led device manufacturers to limit the availability of compatible devices. For instance, Apple elected not to make its 4G iPhone 5 compatible with European 4G services utilizing the 800MHz and 2.6GHz bands, which are prevalent in Western Europe.<sup>4</sup> Similar issues have confronted the European rollout of the 4G-enabled iPad (WHITTAKER, 2012).

There is no single metric by which to compare the overall quality of mobile broadband services, especially since different consumers assign different values to various product characteristics. This said, data suggests that while EU and U.S. consumers are equally likely to own smartphones,<sup>5</sup> U.S. consumers are more likely to use their phones for web-related activities and usually have a data plan, while a significant number of EU smart phone users rely on Wi-Fi networks or do not use data services on their phones at all (NIELSEN, 2013).

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<sup>3</sup> While CISCO (2013) reports data only on a regional basis, other data suggests there is substantial variation in performance across both EU carriers and EU member states. 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 (*Akamai Faster forward*, Q4 2012 at figure 26).

<sup>4</sup> Everything Everywhere, which waited 10 months for Ofcom to approve its application to use its 1.8 GHz spectrum to support LTE, is now deploying iPhone 5-compatible coverage (OFCOM, 2012); see also T-MOBILE WEBSITE: <http://www.t-mobile.co.uk/shop/iphone/>. The iPhone 5 is also compatible with the 4G network now being deployed by Everything Everywhere in the UK.

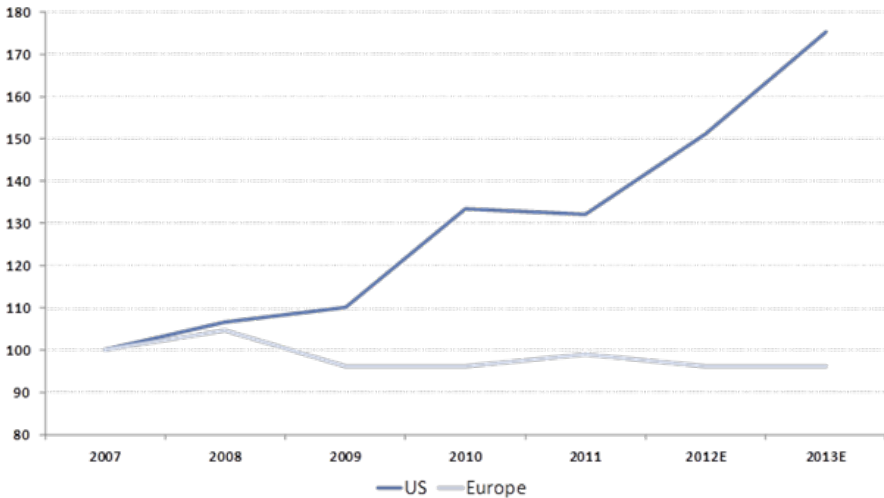
<sup>5</sup> According to MERRILL LYNCH (2012), 39 percent of consumers own smart phones in each region. See *Global Wireless Matrix* at 2.

## Investment and innovation

Among other factors, deployment of mobile wireless networks depends on the availability of necessary spectrum. Some U.S. carriers are relying in part on the 700 MHz spectrum band made available from the "digital TV transition" – the so-called "digital dividend" – for LTE deployment. By contrast, several EU nations have lagged behind in re-allocating analogue 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, data on investment shows that the EU is deploying LTE more slowly than the U.S: U.S. carriers such as Sprint and T-Mobile are making large investments to deploy widespread LTE networks in the same or comparable spectrum bands as those currently available to many EU carriers (FCC, 2013).<sup>6</sup> Moreover, 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.

Figure 3 – Wireless CAPEX in Europe vs. the U.S. (2007 = 100)



Source: Goldman Sachs Global Investment Research

<sup>6</sup> 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 (FCC, 2013).

As Figure 3 shows, the level of wireless capex in the U.S. has grown by over 70 percent since 2007, while declining in the EU (Goldman Sachs, 2012).<sup>7</sup>

The relative decline is all the more serious given that that the EU started from a lower base: in 2007, U.S. carriers invested \$129 per access path, more than any European country except Denmark and Switzerland, and far higher than the European average of \$78.

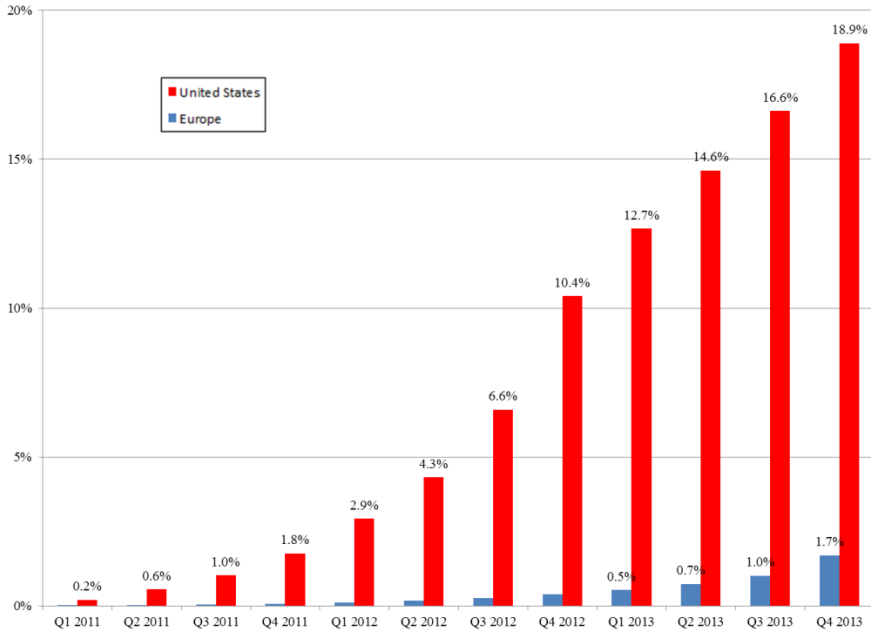
The divergence in network investment has directly affected the pace of LTE deployment. Since their initial deployments in December 2010 (Verizon Wireless) and September 2011 (AT&T), the two major US carriers have extended coverage to over 273 million people (POPs) and 170 million POPs, respectively. 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 (HSBC, 2013). Even smaller U.S. players are also deploying rapidly: Sprint, US Cellular, Leap Wireless and MetroPCS/T-Mobile (now merged) are all in the process of large-scale deployments.<sup>8</sup> In contrast, 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.

Not surprisingly, uptake of LTE services in the U.S. is outpacing uptake in the EU. As depicted in Figure 4, 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. 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 intends to phase out its 2G and 3G networks entirely by 2021 (DANO, 2012); by contrast, even in EU countries where LTE has been deployed, uptake is very low and projected to remain far below U.S. levels.

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<sup>7</sup> In addition to industry structure and regulatory policies, capital expenditures may be affected by several factors, including macroeconomic conditions and the underlying investment cycle.

<sup>8</sup> As discussed below, one of the rationales offered by the FCC (2013) 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.

**Figure 4 - LTE connections as percentage of total (2011-2013 proj. EU vs. U.S.)**

Source: Wireless Intelligence

To summarize, 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.

## ■ Structural determinants of market performance

In traditional markets, it is generally believed that less concentrated market structures are associated with lower prices and better performance.<sup>9</sup>

<sup>9</sup> While the relationship between concentration and performance is widely assumed, many economists question its empirical foundations: "The empirical relationship between measures of performance, such as price-cost margins, and market structure, such as concentration and entry barriers, is not clear" (CARLTON & PERLOFF, 2005).



In dynamic markets, the relationship between structure and performance is more complex.<sup>10</sup> 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.

### **Dynamic markets and the economics of mobile wireless**

Mobile wireless markets are characterized by dynamism and subject to rapid innovation, with new generations of mobile wireless technology being introduced approximately every five years (FCC, 2010; HAHN & SINGER, 2010). 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 (See e.g. KATZ & SHELANSKI, 2005). In contrast to static textbook markets, where lower levels of concentration are thought – all things being equal – to be associated with higher consumer welfare, there is no consistent relationship between market concentration and innovation (KATZ & SHELANSKI, 2005; SHAPIRO, 2005).<sup>11</sup> To the contrary, 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 (See e.g. BAUER, 2010). Thus, competition regulation of such markets must take into account the effect on incentives for ongoing innovation and investment (See e.g. BAUER & BOHLIN, 2008).

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 best meet consumers' needs (See e.g. HAZLETT, TEECE & WAVERMAN, 2011). In such markets, the success of the entire ecosystem is dependent upon advances (or shortcomings) in each

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<sup>10</sup> "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" (TARDIFF & WEISMAN, 2009).

<sup>11</sup> "[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" (KATZ & SHELANSKI, 2005). "[T]here is no consensus among industrial organization economists about the general relationship between concentration and innovation competition" (SHAPIRO, 2005).

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 (EISENACH, 2012). Thus, policies that inhibit product differentiation may tip the competitive scales against the commoditized firm or industry, lowering its returns while raising the returns of its platform competitors (See e.g. EHRLICH, EISENACH & LEIGHTON, 2010).

From a consumer welfare perspective, continuing improvements in product quality (e.g. faster speeds) effectively increase the value consumers attach to mobile wireless services, and thus increase consumer surplus. Innovation accounts for the largest share of improvement in consumer welfare (SOLOW, 1957; ATKINSON & AUDRETSCH, 2011).<sup>12</sup> Policies that sacrifice long-run dynamic efficiency for short-run gains in static efficiency (e.g., by pursuing policies that set prices at or near short-run 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 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).

### **Comparing market structures**

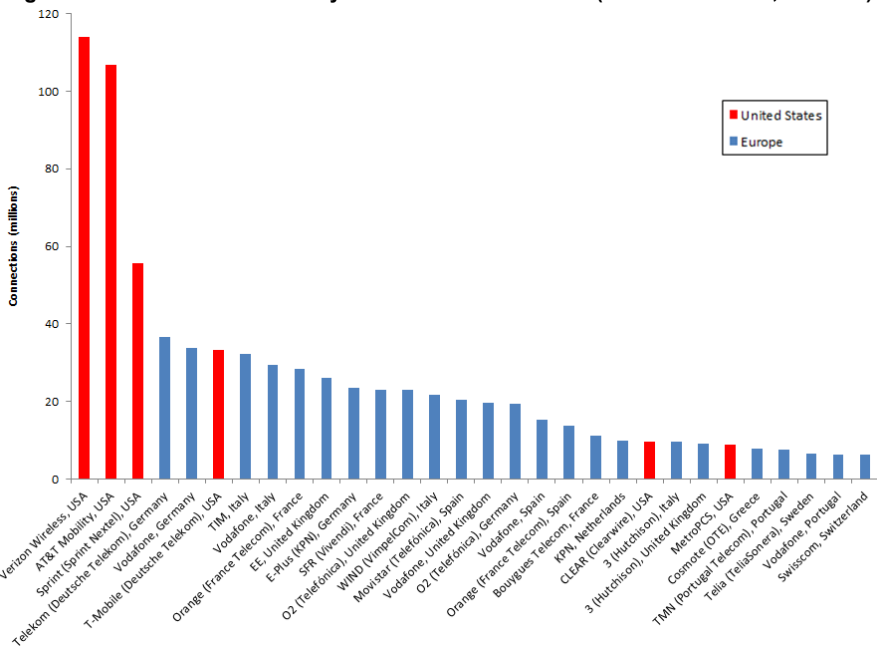
In an effort to promote low retail prices for wireless consumers, regulators in the EU have emphasized policies designed to maintain low levels of concentration in retail wireless markets. At the same time, the lack of a single market in mobile wireless services has resulted in market

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<sup>12</sup> The seminal work is "Technical Change and the Aggregate Production Function" (SOLOW, 1957) (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).

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 (2012) estimates there were 341 million wireless subscribers in the U.S. at year-end 2012, while the largest EU market – Germany, with 115 million subscribers – was only a third as large.<sup>13</sup> As shown in Figure 5, 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).

**Figure 5 – Mobile connections by carrier national markets (selected carriers, Q4 2012)**



Source: Wireless Intelligence

<sup>13</sup> MERRILL LYNCH (2012) also estimates the EU-15 in total was significantly larger than the U.S., with 533 million subscribers in the EU-15 alone. See *Global Wireless Matrix* at 62.

The data in Figure 5 is 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 (FCC, 2013).<sup>14</sup> 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 reduce 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, the lack of predictability, homogeneity and synchronicity implied by multiple regulatory regimes has the potential to inhibit beneficial innovation.

Finally, it is not surprising that market fragmentation results in higher levels of concentration as measured on a national level. As discussed above, however, in dynamic markets such as mobile wireless, economics does not predict a negative relationship between concentration and performance. There is no statistically significant relationship between market concentration and prices. Indeed, higher levels of concentration are (very weakly) correlated with lower prices, not higher ones.

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<sup>14</sup> "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..." (FCC, 2013).

To summarize, the fragmentation of EU national wireless markets 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

The evidence presented above suggests that the performance of EU mobile wireless markets would be improved and the consumer welfare increased by reducing fragmentation among suppliers, thereby allowing them to capture economies of scale and scope; and, by removing barriers and 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 (See e.g. LITAN & SINGER, 2013).<sup>15</sup> Key regulators appear to share these conclusions, at least in broad terms (KROES, 2011; ALUMNIA, 2013).

### **Spectrum allocation, assignment and "refarming"**

*Release of spectrum from the digital dividend should be accelerated:* technical and bureaucratic delays in the allocation of 800MHz "digital dividend" spectrum have hampered the rollout of LTE infrastructures. Under the European Commission's Radio Spectrum Policy Program (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 of February 2013, 18 member states announced that they would fail to meet the deadline (KROES, 2013b; GILLET, 2013a; GILLET, 2013b).<sup>16</sup> Thus, the EC's goal of making at least 1,200MHz of spectrum available for mobile broadband by 2015 appears to be in jeopardy (GABRIEL, 2012).

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<sup>15</sup> It should be noted that accelerating the deployment of NGA wireless infrastructures generates an external benefit in the form of increased competition for wireline.

<sup>16</sup> "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" (KROES, 2013b).

Timely release of digital dividend spectrum would have beneficial effects from a competition perspective. For example, the 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 (EC, 2010).

*Co-ordinated release of spectrum by all EU Member States in a narrow window:* the inability of EU carriers to capture the economies of scale possible under single market regime imposes significant costs on EU consumers, for example most EU subscribers today are unable to utilize the 4G capabilities of the Apple iPhone 5 or of current model iPads. Both academic (WEBER, HAAS & SCUKA, 2011) and private (HSBC, 2012) experts believe that a co-ordinated release of harmonized spectrum bands and allocations by Member States within a similar time frame would be beneficial to carriers which could capitalize on additional spectrum, and to consumers who could benefit thereby.

*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, giving rise to uncertainty with respect to the future assignment of these rights. Furthermore, the EU's electronic communications regulatory framework requires national regulatory authorities 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. 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 (VODAFONE, 2012).

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 risky and long-term commitments to support platform innovations. Limited license renewal terms truncate the ability of carriers to earn returns on such investments.

*Spectrum rights should be flexible with respect to technologies and service offerings:* when Everything Everywhere decided to redeploy spectrum in the 1.8 GHz 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 it clear that regulatory harmonization of spectrum policies remains insufficient and highlights the discretion currently afforded to NRAs to block or condition license transfers (EC, 2012a).

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. Yet even academics agree that attempts to reengineer market structures through spectrum allocation risks doing more harm than good (CRAMTON *et al.*, 2011).<sup>17</sup>

### **Competition policy and merger control**

While U.S. regulatory authorities have permitted a substantial degree of both geographic and economic consolidation, in the EU, consolidation in the mobile sector has been comparatively rare. As shown in Table 1, between 2003 and 2012, the FCC approved 20 significant mergers and other major mobile wireless license transactions totaling over \$288 billion.

Instead, CURWEN & WHALLEY (2009), 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". Both the EC and the EU national regulators have frequently discouraged wireless consolidation (See e.g. COMCO, 2010; ABA Section of International Law, 2010).<sup>18</sup>

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<sup>17</sup> "[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." (RSPG, 2011).

<sup>18</sup> 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 (COMCO, 2010).

**Table 1 – Major mobile wireless mergers and spectrum transactions, 2003-2012**

Application Date	Assignee	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, and 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 & Hal J. SINGER (2013). "Avoiding Rent-Seeking in Secondary Market Spectrum Transactions," Federal Communications Law Journal

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" (EC, 2012b).

Even when consolidation is allowed without 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 (EC, 2010), but 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 (HSBC, 2012; RASMUSSEN 2012; ABBOUD & BARTUNEK, 2012). Other national regulators have taken similar steps to facilitate entry (HSBC, 2012).

Recent remarks by EU regulators suggest an understanding of the need to permit pan-European consolidation (See e.g. ABBOUD & DAVENPORT, 2012; O'BRIEN, 2012). 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 (ROSENTHAL, 2012).<sup>19</sup>

### **Dynamic regulation and creating incentives for innovation**

A third aspect of reform falls under the general heading of designing regulation in such a way as to facilitate dynamic competition rather than preserve static competition (BAUER & BOHLIN, 2008).

Here, regulatory policy is recommended to 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.<sup>20</sup> 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

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<sup>19</sup> 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" (ROSENTHAL, 2012).

<sup>20</sup> For a similar view see *CRA Competition Memo* (2013).

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-run and risky investments. Moreover, the regulatory approach should be sufficiently 'hands-off' (non-interventionist) to encourage innovation, new business models and market experiments.

Beyond the specific policy areas emphasized above, regulators should strive for a more unified regulatory framework across all Member States, moving in the direction of a single digital market 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, present throughout the EU, but with substantial cross-country variation in the degree and scope of regulation, as well as entry conditions (CRICELLI, GRIMALDI & GHIRON, 2012). As a result of 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 (GSMA, 2013).

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) (WOODS, 2012; European Communications, 2012; MEYER, 2012).<sup>21</sup> 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..." (FCC, 2011). For Europe to move towards a U.S. approach in data roaming, cross-border competition and pan-European markets must develop, which in

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<sup>21</sup> 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 (WOODS, 2012; European Communications, 2012; MEYER, 2012).

turn requires that Member States coordinate license conditions, spectrum management policies and other aspects of their regulatory regimes.

Our point is not to propose specific changes but to urge regulators to focus their attention on creating incentives for innovation that would dramatically increase consumer welfare, and on taking steps toward a more integrated mobile wireless ecosystem, including consistent spectrum allocation and assignment conditions (BAUER & BOHLIN, 2008).<sup>22</sup>

## ■ Conclusion

This paper has compared the performance of EU and U.S. mobile wireless markets and concluded that EU has fallen behind U.S. with respect to the deployment of next generation LTE networks. Moreover, it has also discussed the relationship between industry structure and market performance in dynamic markets such as mobile broadband, and suggested that at least some of the differences in performance can be traced to differences in industry structures.

Europe, once leading the mobile wireless ecosystem is now falling behind the U.S. as regards next generation LTE networks and the advanced services they make possible. National markets in the EU are both smaller and more concentrated than the U.S. market and this fragmented structure deprives EU carriers of economies of scale and scope, raising costs and hampering innovation in the mobile wireless ecosystem.

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 (2013b) recently said, "success or failure in wireless does not happen by chance: it depends on the policy decisions we take".

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

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<sup>22</sup> 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. "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" (BAUER & BOHLIN, 2008).

that have placed too much emphasis on static measures of competitiveness and lower short-run prices and too little on innovation, investment, and the realization of economies of scale and scope. 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.

Thus, three key policy areas – spectrum allocation, competition policy, and policies towards investment and infrastructure-based competition – may affect mobile wireless market performance, and present recommendations for beneficial reforms.

The mobile wireless marketplace is extremely dynamic and characterized by network effects, and benefits from economies of scale and scope. Policies designed to promote competition can help restore the growth of the EU mobile wireless industry by removing barriers to efficient consolidation and by focusing on facilitating investment and innovation. Spectrum policy changes are needed to achieve harmonization and create certainty, foregoing discrimination in favor of new entrants, and creating a presumption of license renewal with flexible ownership rights.

To summarize, rationalizing and harmonizing spectrum policies, achieving efficient consolidation, and refocusing regulation on investment and innovation are three steps authorities should consider to make the EU mobile wireless ecosystem more vibrant.

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