

# COMPETITION POLICY FOR MOBILE BROADBAND NETWORKS

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## INTRODUCTION

Over the past decade, mobile wireless systems have changed from analog cellular technology to digital networks and have more recently been moving to higher capacity networks capable of supporting broadband services. One commentary refers to mobile broadband services as “melding two popular innovations: the Internet and mobile technologies.”<sup>1</sup> High-speed mobile services are often referred to as “3G”

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1. MARTIN BAILY, ET AL., CELLULAR TELECOMMS. & INTERNET ASS'N, AN ECONOMIC ANALYSIS OF SPECTRUM ALLOCATION AND ADVANCED WIRELESS SERVICES (Oct. 2001), available at <http://www.sbgo.com/Papers/An%20Economic%20Analysis%20of%20Spectrum%20Allocation.pdf>.

(for “3<sup>rd</sup> Generation”) or now even “4G” services.<sup>2</sup> The Federal Communications Commission (FCC or Commission) defines as “3G” those mobile services that can support data transport rates of at least 144 kilobits per second and up to 2 megabits per second; that are provided over systems with a high degree of global compatibility and interoperability; and that can support a wide range of voice and data applications.<sup>3</sup> 3G capabilities are thus comparable to current mass-market broadband technologies, like Digital Subscriber Line (DSL) and cable modem service, that meet the FCC’s definition of high-speed communications.<sup>4</sup> The race to build such high-speed mobile networks is being driven by the increasing volume of wireless data traffic, which, according to estimates in one FCC report, may overtake the volume of wireless voice traffic by 2006.<sup>5</sup>

The development of mobile broadband technology—and of wireless Internet networks generally—has implications for a variety of current issues in telecommunications policy. One particularly interesting set of issues involves variations on the question of whether regulators should require systems to be open to all users or, conversely, whether regulators should allow proprietary systems to exclude or discriminate against access by others. For example, must Internet transport networks provide a neutral, “end-to-end” conduit for all content and services or may they favor some content/service providers over others that traverse their networks to consumers? To what extent should the FCC make radio spectrum a commons open for use by all (subject to non-interference) and to what extent should it license frequencies for exclusive use and control by specified users? Should network-operating standards be open and common or should they be proprietary and competitive? The emergence of mobile broadband networks affects, and in turn will likely be affected by, the answer to each of the above questions.

Consider first the question of end-to-end requirements for Internet transport. Whether, and to what extent, owners of networks that carry Internet traffic to consumers must make their networks open on a non-discriminatory basis to content/service providers has become a hotly debated question. On one side, commentators argue that absent such

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2. *Move over 3G: here comes 4G*, ECONOMIST, May 29, 2003, available at [http://www.economist.com/business/displayStory.cfm?story\\_id=1816742](http://www.economist.com/business/displayStory.cfm?story_id=1816742).

3. FCC, THIRD GENERATION WIRELESS SYSTEMS, at <http://www.fcc.gov/3G/> (last updated Nov. 25, 2002).

4. Inquiry Concerning the Deployment of Advanced Telecomms. Capability to All Americans in a Reasonable & Timely Fashion, & Possible Steps to Accelerate Such Deployment Pursuant to § 706 of the Telecomms. Act of 1996, *Notice of Inquiry*, 19 FCC Rcd. 5136, 5139-40 ¶ 11 (2004).

5. Service Rules for Advanced Wireless Services in the 1.7GHz & 2.1 GHz Bands, *Notice of Proposed Rulemaking*, 17 FCC Rcd. 24,135, 24,138 ¶ 6 (2002).

end-to-end openness, network owners will extend their control from the transport layer to the applications layer thereby deterring the innovation that has brought consumers the enormous range of content and services they can now receive on line.<sup>6</sup> On the other side are commentators that argue such regulation is unnecessary given the economic incentives of competing networks and, moreover, that such regulation could interfere with positive vertical relationships that enhance innovation and benefit consumers.<sup>7</sup> While the end-to-end principle has important virtues, the principle's benefits will under certain conditions come with offsetting costs for consumer welfare and network innovation.

Wireless broadband is relevant to the end-to-end debate because its development will directly affect the question raised above: where should policy makers draw the line between end-to-end mandates and the potential benefits of proprietary network innovation and of vertical relationships between transport platforms and content/services? The concern about vertical discrimination by network owners in favor of some content/service providers and against others is made particularly acute by the paucity of broadband alternatives to which consumers currently have access. Most consumers can currently choose from at best two options: DSL over the local telephone network and cable-modem service over the local cable system. In such a concentrated market, content and service providers that are not favored by the DSL or cable-modem provider might have difficulty reaching consumers and gaining a foothold in the market. The more networks there are, however, the greater the opportunity for content/service providers to gain high-quality transport and the greater the ability of consumers to vote with their dollars for the content/services they want by choosing to subscribe to different systems. Thus, the growth of wireless broadband increases competition among networks and expands consumer choice, diminishing the case for mandatory, end-to-end openness.

Similarly, because mobile broadband will require consistent access to substantial amounts of spectrum but could also attract new entrants and technologies, it raises important questions about the balance between licensing and commons approaches to spectrum assignment.<sup>8</sup> In the

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6. See Mark A. Lemley & Lawrence Lessig, *The End of End-to-End: Preserving the Architecture of the Internet in the Broadband Era*, 48 UCLA L. REV. 925 (2001); Tim Wu, *Network Neutrality, Broadband Discrimination*, 2 J. ON TELECOMM. & HIGH TECH. L. 141 (2003).

7. See James B. Speta, *The Vertical Dimension of Cable Open Access*, 71 U. COLO. L. REV. 975 (2000); Philip J. Weiser, *The Internet, Innovation, and Intellectual Property Policy*, 103 COLUM. L. REV. 534 (2003); Thomas J. Tauke, *Current Regulatory Realities: Overcoming the Regulatory Quandary*, 3 MICH. ST. DCL L. REV. 609 (2003).

8. See Kevin Werbach, *Supercommons: Toward a Unified Theory of Wireless Communications*, 82 TEX. L. REV. 863 (2004); Stuart Minor Benjamin, *Spectrum*

United States, all radio spectrum is legally the property of the U.S. government.<sup>9</sup> The government then decides which frequencies will be available for non-government uses and the FCC allocates that spectrum for particular uses (e.g., TV, FM radio, and wireless telephone service) and assigns it to particular users through its licensing process. Those licensees in turn have broad and renewable property rights in their assigned frequencies that enable them to exclude other users from their spectrum, even if those other users would not interfere with the licensee's transmissions.<sup>10</sup> The more spectrum one has available, the more information can be transmitted. Incumbent wireless operators upgrading their networks to achieve broadband capabilities will thus want to preserve and expand their proprietary access rights to choice frequencies to accommodate their higher capacity systems.

New entrants into the wireless marketplace may, however, call for a commons or some other access regime under which the incumbent property rights cannot block them from operating in a non-interfering manner. Can the technologies, like spread-spectrum, that today permit simultaneous use of the same frequencies, scale to the capacity demands of wireless broadband? If not, will giving priority to certain users deter innovation by others that would allow a commons approach for mobile broadband? Again, the development of a competitive mobile broadband market will be essential to assuring that the potentially adverse consequences of entrenched spectrum rights are mitigated and that mobile broadband markets deliver both the short-run benefits of price competition and the long run benefits of innovation to consumers.

Finally, 3G raises the question of whether to have competing or common standards, an important decision for any emerging network technology. In mobile services, in particular, there has been much debate over whether the industry has developed better in Europe where there is a common GSM standard or in the United States where carriers compete as much on their underlying technologies as on their services.<sup>11</sup> As I will discuss further in this paper, the standards debate will be integral to the development of competition policy for mobile broadband services as well.

As the foregoing discussion makes clear, the development of mobile broadband networks raises a number of technological, economic, and legal questions. One challenge that lies at the intersection of those three

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*Abundance and the Choice Between Private and Public Control*, 78 N.Y.U. L. REV. 2007 (2003).

9. 47 U.S.C. § 301 (2000).

10. See Howard A. Shelanski & Peter W. Huber, *Administrative Creation of Property Rights to Radio Spectrum*, 41 J.L. & ECON. 581 (1998).

11. See Neil Gandal et al., *Standards in Wireless Telephone Networks*, 27 TELECOMM. POL'Y 325 (2003) [hereinafter *Standards in Wireless Telephone Networks*].

forces is the design of a framework for evaluating and protecting competitive performance of the mobile broadband market. Indeed, wireless broadband demonstrates how few are the degrees of separation between analogous but seemingly disconnected debates over end-to-end Internet transport rules, spectrum assignment policies, and standard setting in telecommunications. Mobile broadband services will not make those questions moot, but the development of a healthy and competitive mobile broadband market will affect where the policy cuts should be made and how, in turn, alternative policy decisions will affect consumers.

The remainder of this paper will thus discuss what, looking forward, is the appropriate competition policy framework for the mobile broadband industry. The answer will depend as a preliminary matter on which objectives policy makers choose to pursue. The various debates over deployment of advanced wireless services raise several, potentially inconsistent, goals that might affect a government's choice of antitrust regime for the industry. Consider just the following possible objectives: national leadership in the world market for wireless services; a highly competitive domestic market to maximize long-run economic benefits to subscribers; speeding deployment of mobile broadband networks; or, ensuring the development and deployment of the best possible technology for mobile broadband networks. That these goals would co-exist uneasily is evident. For example, if speed of deployment is paramount, then measures to facilitate rapid construction of networks using today's most quickly deployable technology should be taken. Yet such measures run the risk of locking in, for a period of time, a technology that is not the best one currently or imminently available. If a country deems global leadership in the sector to be a priority, then collaboration among domestic service providers might be tolerated notwithstanding its impact on domestic competition. The point, in brief, is that optimal policy depends on what one wants to maximize.

The discussion that follows will assume that the objective of competition policy for the mobile wireless Internet industry is to maximize long-run consumer welfare, which is essentially the objective of modern antitrust (or competition) law in the United States, the European Union, and increasingly in other jurisdictions.<sup>12</sup> The selection

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12. See, e.g., U.S. DEPARTMENT OF JUSTICE & FEDERAL TRADE COMMISSION, 1992 HORIZONTAL MERGER GUIDELINES, 57 Fed. Reg. 41,552 (1992), *revised*, 4 Trade Reg. Rep. (CCH) ¶ 13,104 (Apr. 8, 1997), available at [http://www.usdoj.gov/atr/public/guidelines/horiz\\_book/hmg1.html](http://www.usdoj.gov/atr/public/guidelines/horiz_book/hmg1.html) [hereinafter HORIZONTAL MERGER GUIDELINES]; EUROPEAN COMMISSION DIRECTORATE-GENERAL FOR COMPETITION, EUROPEAN COMMUNITY COMPETITION POLICY, XXXTH REPORT ON COMPETITION POLICY ¶ 1 (2001); ORGANIZATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT, COMPETITION LAW AND POLICY IN MEXICO: AN OECD PEER REVIEW (2004), available at <http://www.oecd.org/dataoecd/57/9/31430869.pdf>.

of a competition policy objective does not, however, lead inexorably to a clear and specific set of policies themselves, particularly in an emerging network industry like wireless Internet services. To see why, consider first the factors that a welfare-maximizing competition policy must encompass under existing general antitrust frameworks: (1) proper definition of the relevant market; (2) analysis of industry-specific barriers to entry; (3) determination of whether standards competition or cooperative standard-setting should be pursued; and (4) assessment of whether fostering innovation in the particular industry at issue has implications for market structure that differ from the structural assumptions for promoting short-run efficiency of prices and output in the relevant market. In addition, the administrative question of what kinds of institutions—e.g., general competition authorities or sector specific regulators—should be responsible for enforcing and implementing the policies must be decided.

This paper will discuss each of the above questions in the context of mobile broadband services. The purpose of this discussion is not to present an exhaustive or definitive set of policy prescriptions but instead to describe the central dimensions of competition policy for the mobile broadband market, to examine important and distinguishing features of the industry that affect the applicable antitrust regime, to analyze the tradeoffs among feasible policy choices and, finally, to present the important features and institutional framework that competition policy for the mobile broadband industry should incorporate. Section I of this paper will examine key aspects of competition policy for the mobile broadband market. Part A will discuss how to define the relevant market for 3G services. Part B addresses the benchmark for deciding whether the mobile broadband market, once defined, is “competitive.” Part C discusses dynamic competition and possible tradeoffs with innovation. Part D turns to the issue of cooperative versus competitive standard setting, while Part E addresses the related question of interconnection among competing wireless networks. Section II of the paper will turn briefly to the institutional question of whether antitrust agencies or sector-specific telecommunications regulators should have the leading role in setting and enforcing competition policy in the mobile broadband market.

## I. CENTRAL DIMENSIONS OF COMPETITION POLICY FOR MOBILE BROADBAND SERVICES

This section will address four important dimensions of competition policy for an evolving network industry and discuss how they apply to mobile broadband services. It will first address the conventional questions of market definition and competitive benchmarking for mobile broadband services. It will then address three issues particularly relevant to the dynamic technological environment of wireless Internet, which are the questions of tradeoffs between competition and innovation, of standard setting in the advancing wireless marketplace, and of interconnection among competing networks.

### A. Market Definition for Advanced Mobile Services

In designing competition policy for an industry, the first step conventionally is to define the relevant market(s) in which that industry operates, in order to determine market structure and assess the prospects for exercise of market power. A long-standing principle by which economists define the product scope of a market is to include two goods or services in the same relevant market if consumers view them as sufficiently close substitutes and not to include them in the same relevant market if consumers do not view them as sufficiently close substitutes.<sup>13</sup> A similar logic is used for geographic scope. When are substitutes “sufficiently” close to being included in the same market? To some extent, toothpaste competes with clothing for consumers’ dollars, but one should not conclude that toothpaste and clothes are in the same product market. To give more precision to the concept of sufficiently close substitutes, economists undertaking market delineation exercises often conduct a so-called hypothetical monopolist test. This test asks whether a hypothetical, profit-maximizing monopolist over a group of products in a given area could profitably raise prices above a specified level by a “small but significant” amount for a sustained period of time.<sup>14</sup> The group of products considered in the test is a candidate relevant market. The smallest group of products that satisfies the test constitutes a relevant market.<sup>15</sup>

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13. See George W. Stocking & William F. Mueller, *The Cellophane Case and the New Competition*, 45 AM. ECON. REV. 29, 44-48 (1955).

14. HORIZONTAL MERGER GUIDELINES, *supra* note 12, at § 1.0; *FTC v. Swedish Match*, 131 F. Supp. 2d 151, 160 (D.D.C. 2000); *California v. Sutter Health Sys.*, 130 F. Supp. 2d 1109, 1120 (N.D. Cal. 2001). See also Michael L. Katz & Carl Shapiro, *Critical Loss: Let's Tell the Whole Story*, 17 ANTITRUST 49, 53 (2003).

15. HORIZONTAL MERGER GUIDELINES, *supra* note 12, at §§ 1.0, 1.11.

A price increase will raise a hypothetical monopolist's profits unless unit sales volume falls sufficiently to offset the higher price received for the units sold. Thus, the hypothetical monopolist test indicates that a set of products constitutes a relevant market if the hypothetical monopolist could make a "small but significant and non-transitory" increase in price without causing enough consumers to switch to substitute goods that the price increase becomes unprofitable.<sup>16</sup>

So what is the product or service that mobile broadband operators will compete to provide? Third and subsequent generation wireless networks will provide voice telephony but, more importantly, high-speed data services. If one were to define the market as "mobile voice and high-speed data" services, then the relevant market structure would depend only on the number of mobile broadband networks operating in the relevant geographical territory. A difficult initial question for mobile broadband market definition is, however, whether the market definition should be limited to mobile services or include other wireless services (e.g., WiFi), or be expanded still further to include wireline voice and broadband telecommunications services.

If mobile broadband services meet performance expectations, they will provide direct competition to wireline services like cable modem and DSL connections.<sup>17</sup> This does not mean that fixed and mobile broadband services should always be considered to be in the same market, however. The reciprocal competitive effect of fixed services on mobile wireless services need not be symmetric, and in fact is unlikely to be. For, to the extent that mobility has value to consumers, wireline voice and broadband services will not substitute for mobile wireless services.

Although the existence of fixed, wireline access technologies certainly creates some competitive pressure and pricing discipline for prospective mobile broadband service providers, there are several reasons why competition policy makers might not define the mobile broadband market to include wireline service providers. First, as mentioned, mobility itself has value to consumers. There is casual yet strong evidence of this proposition in the fact that most subscribers to wireless telephony in the United States also have landline telephone service.<sup>18</sup> Thus, all other features (e.g., speed, quality, reliability) equal, mobile

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16. *Id.* at § 1.0.

17. See Jerry A. Hausman, *From 2G to 3G: Wireless Competition in Internet Related Services*, in BROADBAND: SHOULD WE REGULATE HIGH SPEED INTERNET ACCESS? 119-20 (Robert W. Crandall & James Alleman eds., 2002).

18. FCC data show that 95.1% of U.S. households subscribe to conventional local telephone service. Press Release, FCC, Federal Communications Commission Releases Study on Telephone Trends (May, 2004), available at [http://www.fcc.gov/Bureaus/Common\\_Carrier/Reports/FCC-State\\_Link/IAD/trend504.pdf](http://www.fcc.gov/Bureaus/Common_Carrier/Reports/FCC-State_Link/IAD/trend504.pdf).



broadband services would have an intrinsic advantage over wireline services that would enable mobile broadband operators to raise prices on their service without losing material numbers of customers to providers of fixed broadband services. Second, mobile and wireline broadband options might be imperfect substitutes because their distinct comparative advantages may lead them to be used for differing sets of applications in ways that limit substitutability. For example, mobile broadband services might be quite useful for businesses that involve employees in the field who have particular data and applications needs—for example the ability to relay and process order information quickly, to provide confirmation of product inventory, or to fill service orders from remote locations. Hardware and software tailored to such applications might be developed to work over mobile broadband networks but not for fixed broadband technologies. Consequently, even if mobile broadband services reach sufficient speed and reliability to substitute for wireline broadband, the reverse may not hold when antitrust issues related to mobile broadband competition are at issue.

A related question is whether less advanced forms of mobile services—i.e., narrowband PCS services—should be included in the mobile broadband market. This question may be harder to answer. On one hand, much will depend on the purposes for which consumers actually use mobile broadband networks. If consumers use mobile broadband mostly for voice and simple text messaging, then 2G networks might provide some level of substitution. A stronger reason for including 2G services in the relevant market, however, is that those networks are likely entrants into mobile broadband services. One of the accepted mobile broadband standards (the EDGE standard)<sup>19</sup> is in fact geared specifically to transitioning 2G TDMA networks to mobile broadband capability while the dominant 3G standard in the United States, CDMA2000, is designed for easy transition of CDMA-based 2G systems to 3G capabilities.<sup>20</sup> Because 2G networks might therefore become sources of supply elasticity that limit the market power of any mobile broadband networks, there is a good argument for adopting a dynamic perspective and including 2G networks in the mobile broadband market. But in the end, a careful analysis of subscriber switching costs and of the timeline for 2G conversion will have to be undertaken to make a conclusive judgment about whether the mobile broadband market should be defined to include remaining 2G networks. A weaker initial presumption might attach to restricting the market definition to existing or imminent mobile broadband providers and

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19. See *infra* note 44 and accompanying text.

20. *Standards in Wireless Telephone Networks*, *supra* note 11, at 325.

excluding 2G networks. That presumption should be rebuttable by evidence that 2G substitutes for mobile broadband services or that 2G networks could convert to mobile broadband within a reasonably short time frame.<sup>21</sup>

*B. Defining "Competitive" in the Context of the Mobile Broadband Market*

Once the market definition exercise discussed above is completed, the next step in the competitive analysis is to consider what, given the particular technological and economic characteristics of mobile broadband service, would constitute a "competitive" market. How many mobile broadband networks can potentially enter the market? What barriers to entry are likely to arise for new entrants? In this regard, the most salient aspect of mobile broadband is its need for spectrum to be allocated for the service.

At present, there are about 180 MHz of conventional commercial mobile radio service (CMRS) spectrum available to provide mobile telephone service in each geographical market nationwide. In addition to this spectrum, the FCC has been working to auction an additional 78 MHz of spectrum in the 700 MHz UHF bands and 30 MHz of spectrum in the 2GHz satellite bands, which would be available for mobile broadband providers among others.<sup>22</sup> The Commission has also, working in conjunction with the National Telecommunications and Information Administration (NTIA), allocated (but not yet assigned to users) an additional 90 MHz of spectrum in the 1710-1755 MHz and 2110-2155 MHz bands specifically for mobile broadband use.<sup>23</sup> Other efforts to increase available spectrum are also underway at the FCC.<sup>24</sup> The Commission's attention to increasing available spectrum for mobile broadband has been in response to Congress's mandate that an additional 200 MHz of spectrum be made available for advanced wireless telecommunications.<sup>25</sup>

Assuming existing CMRS spectrum, over which consumers now receive wireless telephone service, can be "re-harvested" for mobile broadband purposes and adding the prospective 200 MHz of new spectrum, a total of roughly 400 MHz may be available for mobile

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21. HORIZONTAL MERGER GUIDELINES, *supra* note 12, at § 3.2 (defining an entry that could occur within 2 years as "timely" and competitively significant).

22. Implementation of § 6002(B) of the Omnibus Reconciliation Act of 1993, *Eighth Report*, 18 FCC Rcd. 14,783, ¶¶ 26, 31 (2003).

23. *Id.* at ¶ 31.

24. *Id.* at ¶ 32.

25. Omnibus Budget Reconciliation Act of 1993 § 113(b)(1), 47 U.S.C. § 923(b)(1) (2000).

broadband and other advanced wireless services in the next few years. Although it is unclear how much spectrum a mobile broadband operator needs to provide service, the planned spectrum allocation could support a number of rival providers. The market for mobile broadband services therefore has potential to be competitive, although the substantial fixed costs of providing the services suggest the market will not approach the idealized competition among atomized, price-taking firms found in textbooks.

Economic factors like network externalities or increasing returns to scale might further limit the number of competing networks notwithstanding the number that the above discussion suggests is technologically feasible. If, for example, consumers for some reason could obtain certain services on one network but not others, or if one network could serve all users at a lower per-subscriber cost than could multiple networks, then monopoly might develop and even have theoretical benefits. But interconnection among wireless networks (to be discussed further, below) will prevent any system from closing itself to calls originating on competing systems, thus eliminating “network externalities” that could lead to monopoly. Moreover, there is no evidence that mobile broadband networks will have cost structures that approach natural monopoly or that, in the end, will be substantially different in shape from the cost curves for conventional wireless networks now in place.<sup>26</sup> To be sure, there will likely be economies of scale over a certain range of demand. Any time a firm incurs the high, up-front, fixed costs of building a network, the average cost of serving each customer will decline for some time with each new network user. The economic limits on the number of firms the mobile broadband market can efficiently support will thus depend on the ultimate market demand for mobile broadband services and the number of efficient-scale firms that such demand can support. To the extent that the feasible number of efficient firms is smaller than the number of licenses the FCC allocates, consolidation will occur in the mobile broadband industry. Before presuming against mergers among mobile broadband providers, competition officials should take account of scale efficiencies and be careful to adopt a realistic benchmark for competition in the industry.

The above discussion is not intended to suggest that competition policy should, *ex ante*, target any particular number of firms as desirable in the mobile broadband market. Nor is it meant to cast doubt on the viability of competition among providers of mobile broadband services. Indeed, the analysis presumes sufficient competitiveness in the market

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26. For a general discussion of natural monopoly conditions, see STUART MINOR BENJAMIN ET AL., TELECOMMUNICATIONS LAW AND POLICY 374 (2001).

that general antitrust principles are likely to apply meaningfully in the mobile broadband marketplace. In the past, the Commission has prejudged the minimum, acceptable level of competition in wireless telecommunications. The Commission imposed a “spectrum cap” that prohibited any single firm from holding licenses to more than 45 MHz of the 180 MHz of CMRS spectrum available in a given geographical market, thus assuring the existence of at least four competitors. The Commission in 2001 eliminated the cap effective in 2003, and raised the cap to 55 MHz in the interim.<sup>27</sup> Part of the motivation for lifting the cap was concern that it artificially constrained firms from obtaining the spectrum they might find necessary for mobile broadband services, and thereby might deter investment in developing mobile broadband networks.

Although antitrust policies such as the U.S. Department of Justice/Federal Trade Commission (FTC) Horizontal Merger Guidelines and the European Union’s Guidelines on the Assessment of Horizontal Mergers provide no rigid limits on concentration like those the spectrum cap imposed, they do provide useful presumptive limits on acceptable changes in market concentration through merger and acquisition. Application of those guidelines always depends to some extent on the specific market context and specific industry factors. In an evolving network industry like mobile broadband communications, this more flexible approach of antitrust policy has advantages over the categorical limits of rules like the spectrum cap because the benchmarks for assessing market performance can be more easily adjusted as the industry develops and competition authorities learn more about the economics of the relevant market.

### *C. Innovation and Competition in Mobile Broadband: Assessing Claims of Dynamic Tradeoffs*

Related to the above discussion of establishing the right benchmarks against which to assess economic performance of the mobile broadband market is the question of the relationship between static and dynamic market performance. Participants in regulatory and antitrust proceedings affecting telecommunications have, with increasing frequency, asserted that policy decisions designed to promote or preserve competition will have unintended, negative consequences for technological change. The perceived role of technological change in the growth of the U.S. economy during the 1990’s caused policy makers and consumers alike to pay greater attention to how innovation can increase economic welfare.

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27. 2000 Biennial Regulatory Review Spectrum Aggregation Limits For Commercial Mobile Radio Services, *Report & Order*, 16 FCC Rcd. 22,668 (2001).

One manifestation of this attention to innovation has been heightened sensitivity to whether the goals or presumptions of existing public policies might conflict with the goal of technological progress.<sup>28</sup> Whether regulators must sometimes make tradeoffs between innovation tomorrow and efficient resource allocation today has been debated in such diverse contexts as environmental regulation and antitrust policy.<sup>29</sup> The ways in which antitrust law might affect cooperative approaches to innovation has been an area of intense inquiry in recent years.<sup>30</sup>

The question of how policy affects technological innovation is especially salient in the telecommunications sector. Several kinds of policy arguments hinge on innovation. The most common form of the argument, made by participants in recent proceedings at the FCC and the Department of Justice, is that innovation may suffer if regulators focus too narrowly on preserving or improving competition in existing markets. The debate that surrounded the spectrum cap is a good example. In the FCC's 1999 proceedings on whether to retain the 45 MHz cap,<sup>31</sup> several carriers argued that consolidation of competing licenses was a necessary condition for the development of mobile broadband services.<sup>32</sup> Those carriers argued that without consolidation, they would be uncertain of having sufficient spectrum capacity for the new services and hence would find it too risky to invest in developing the new technology. As another example, in the FCC's 1999 rulemaking proceeding that limited the number of subscribers a single cable company could serve, some cable operators similarly argued that the introduction of broadband and telephone services on cable networks requires large-scale systems.<sup>33</sup>

The Commission addressed the above challenges in a case-by-case manner and, each time, at least initially maintained its emphasis on competition and static efficiency. In the 1999 spectrum cap proceeding, the Commission retained the 45 MHz limit in the interests of preserving

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28. *The Annual Report of the Council of Economic Advisors*, in ECONOMIC REPORT OF THE PRESIDENT 173-93 (1999) available at [http://www.gpoaccess.gov/usbudget/fy00/pdf/1999\\_erp.pdf](http://www.gpoaccess.gov/usbudget/fy00/pdf/1999_erp.pdf) [hereinafter ECONOMIC REPORT OF THE PRESIDENT].

29. *See id.*

30. *See, e.g.*, Christopher Pleatsokis & David Teece, *The Analysis of Market Definition and Market Power in the Context of Rapid Innovation*, 19 INT'L J. INDUST. ORG. 665 (2001); David B. Audretsch et al, *Competition Policy in Dynamic Markets*, 19 INT'L J. INDUST. ORG. 613 (2001); ANTITRUST, INNOVATION AND COMPETITIVENESS (Thomas M. Jorde & David J. Teece eds., 1992).

31. *See, e.g.*, 1998 Biennial Regulatory Review—Spectrum Aggregation Limits For Wireless Telecommunications Carriers, *Notice of Proposed Rule Making*, 13 FCC Rcd. 25,132, ¶¶ 54-58 (1998).

32. *Id.*

33. Implementation of the Cable Television Consumer Protection & Competition Act of 1992, *Report & Order*, 14 FCC Rcd. 19,014 (1999).

current competition, but it also pledged to revisit the cap in two years. In the interim, it invited waiver requests from carriers that could show they were moving forward with new services that require additional spectrum. As already discussed, when the Commission did revisit the spectrum cap in 2001, it ordered the cap to be fully repealed by 2003 and to be raised to 55 MHz during the transition period.<sup>34</sup> In the cable ownership proceedings, the Commission imposed a subscriber limit.<sup>35</sup> But the FCC also said it would not attribute to an operator's subscriber count any customers to whom it provided only telephone or broadband services, (but not conventional cable video).

The effort in both of the cases above was to preserve competition without blunting incentives to invest in the development and deployment of new technology. The balance is an important one. If regulators or enforcement officials focus too rigidly on short-run competition and the immediate benefits of lower prices and higher output, they might in some cases place at risk longer-term benefits of innovation. The spectrum cap created precisely this kind of rigidity and its elimination brings the benefits of a more flexible, case-by-case approach to wireless mergers. But, if regulators too readily exchange actual competition for promised innovation, they risk creating market power without deriving any compensating benefit. For this reason, a rigorous antitrust approach to mergers in the mobile broadband markets is warranted.

Striking the right policy balance is especially challenging where, as with wireless telecommunications, technological change is a major and ongoing factor in the industry. The wireless market may be quite susceptible to what have been described as "waves" of innovation that transform not just individual firms, but an industry as a whole.<sup>36</sup> But, although maintaining or increasing existing market competition might have costs for innovation in specific cases, it is far less clear that such costs will often be at stake, even in the dynamic environment of mobile broadband services. Indeed, the available evidence suggests that competition policy for mobile broadband should hold a rebuttable presumption against claims that competition today must be sacrificed for deployment of innovative services tomorrow. The general empirical evidence on the relationship between market structure and innovation, and between firm size and innovation, is ambiguous. The data show no systematic relationship between the degree of market power of firms in

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34. 2000 Biennial Regulatory Review, *Report and Order*, 16 FCC Rcd. 22,668 (2001).

35. Implementation of § 11 (c) of the Cable Act of 1992, *Report and Order*, 14 FCC Rcd. 19,098 (1999), *rev'd* Time Warner Entm't Co. v. FCC, 240 F.3d 1126 (D.C. Cir. 2001).

36. JAMES UTTERBACK, *MASTERING THE DYNAMICS OF INNOVATION: HOW COMPANIES CAN SEIZE OPPORTUNITIES IN THE FACE OF TECHNOLOGICAL CHANGE* (1994).

an industry and the amount of innovative activity they undertake.<sup>37</sup> One study that focused specifically on the U.S. telecommunications industry, however, suggests a positive correlation between the speed with which firms deploy new technology in their networks and the amount of competition they face.<sup>38</sup> This evidence supports at least a starting presumption against allowing otherwise anticompetitive levels of consolidation in the name of innovation in the advanced wireless services market.

It is important to recognize that the case for careful merger scrutiny in dynamic markets does not translate into a case for breaking up, regulating, or penalizing monopolies that are honestly acquired and maintained in such markets. As the Supreme Court recently phrased a long-standing antitrust principle:

The mere possession of monopoly power, and the concomitant charging of monopoly prices, is not only not unlawful; it is an important element of the free-market system. The opportunity to charge monopoly prices—at least for a short period—is what attracts “business acumen” in the first place; it induces risk taking that produces innovation and economic growth. To safeguard the incentive to innovate, the possession of monopoly power will not be found unlawful unless it is accompanied by an element of anticompetitive *conduct*.<sup>39</sup>

So long as such anticompetitive conduct does not occur, antitrust law counsels forbearance towards a firm that has worked its way to monopoly at the same time that it counsels scrutiny of two firms that try to merge their way to dominance.

#### *D. Standard Setting in the Mobile Broadband Industry: Competing versus Common Platforms*

The question of policy towards standardization in mobile broadband has several dimensions. Importantly, there is a global aspect to mobile broadband standard setting that can transcend the regulatory power of national competition policies. The European Telecommunications Standards Institute (ETSI) has made the adoption of a uniform wireless standard in Europe a principal policy goal. It was

37. See, e.g., Wesley M. Cohen & Richard C. Levin, *Empirical Studies of Innovation and Market Structure*, in HANDBOOK OF INDUSTRIAL ORGANIZATION (Richard Schmalensee & Robert Willig eds., 1989).

38. Howard A. Shelanski, *Competition and Deployment of New Technology in U.S. Telecommunications*, 2000 U. CHI. LEGAL F. 85 (2000).

39. Verizon Communications, Inc. v. Law Offices of Curtis V. Trinko, 124 S.Ct. 872, 879 (2004).

ETSI that adopted and then mandated implementation of Europe's second generation GSM standard.<sup>40</sup> ETSI has moved away from the underlying TDMA architecture of GSM for mobile broadband services, but has nonetheless backed a single W-CDMA mobile broadband standard known as the Universal Mobile Telecommunications Services (UMTS) standard.<sup>41</sup> The convergence to a single mobile broadband standard in Europe could have substantial consequences for mobile broadband standard setting elsewhere. For example, if the European market developed rapidly and a wide range of UMTS compatible handsets became available, then there might be incentives for mobile broadband providers in the United States or Asia to join the UMTS standard. To be sure, no such "tipping" towards a single network standard is necessary or inevitable, but under proper economic conditions, it is possible. The likelihood of tipping to a single standard increases if there are markets in which that standard is mandated, particularly if strong economic interests support regulatory perpetuation of the standard even as alternatives become available. Indeed, the prospect of anticompetitive results from a mandatory regional standard has been a central concern in the debate over standards policy for mobile broadband.<sup>42</sup>

At the global level, then, there is a competition policy question about the extent to which any governmental, or *de facto* governmental, body should mandate a standard. As things now stand, a variety of standards remain in global competition. The International Telecommunications Union (ITU) has accepted five standards that meet its "IMT-2000" criteria for roaming and data transport speed.<sup>43</sup> As a practical matter, three standards are viably competing in the mobile broadband market worldwide. The two major ones are UMTS, leading in Europe and Japan, and CDMA2000, which is strong in Korea and the United States. There is also a technology known as EDGE (Enhanced Data rates for Global Exchange), that will enable transition of TDMA and GSM-based 2G networks to mobile broadband capabilities.<sup>44</sup>

The fact that the mobile broadband standards race has boiled down to two or three options, and in some markets has converged to a single standard, does not signal the end of technological change in the wireless

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40. See *Standards in Wireless Telephone Networks*, *supra* note 11.

41. See *id.*

42. See Peter Grindley et al., *Standards Wars: The Uses of Standard Setting as a Means of Facilitating Cartels: Third Generation Wireless Telecommunications Standard Setting*, 3 INT'L J. COMM. L. & POL'Y 2 (1999).

43. INTERNATIONAL TELECOMMUNICATION UNION, WHAT IS IMT-2000? (2001), available at [www.itu.int/osg/imt-project/docs/What\\_is\\_IMT2000-2.pdf](http://www.itu.int/osg/imt-project/docs/What_is_IMT2000-2.pdf).

44. See ITU Strategy and Policy Unit Newslog, *EDGE is a Competitive Tool* (Apr. 19, 2004), at [www.itu.int/osg/spu/newslog/categories/mobile/2004/04/19.html](http://www.itu.int/osg/spu/newslog/categories/mobile/2004/04/19.html).



market. The question going forward for competition policy is how standards should be set as wireless telecommunications evolve within 3G and beyond. There are three principal approaches: (1) government-coordinated standard setting, as with ETSI in Europe, (2) standard setting within private organizations, or (3) standards competition among individual firms.

The first option amounts to a blocking of standards outside those approved by the centralized body. This strategy might have short-run coordination benefits in the form of faster deployment and immediate compatibility but, as already mentioned above, is subject to a variety of hazards.<sup>45</sup> In particular, if the standards body is effectively controlled by particular interests such as powerful equipment manufacturers or the owners of particular intellectual property, then the centralized process could lead to entrenchment of a suboptimal standard that is, moreover, insulated from the competitive processes that could lead to its ultimate displacement through market forces. The policy choice then reduces to the question of whether or not to allow coordinated standard setting on a private basis by firms within the wireless industry.

In principle, there is no clear economic basis for an *ex ante* presumption for or against private standard-setting coalitions. Competition among standards spurs firms to innovate, to seek more effective and efficient technologies than their rivals have. Coalition around a sub-optimal standard may be less likely when standards are set competitively rather than cooperatively because multiple standards can be tested in the marketplace. Over time, prices decline and innovation may be encouraged under a competitive standards regime.

On the other hand, coalitions can lead to faster development of effective system standards and are more likely to achieve rapid compatibility among competing systems and complementary products. Commentators have attributed such virtues to the process that led to the GSM standard for “2G” wireless networks in Europe.<sup>46</sup> When system interfaces are standardized in an industry and are openly available to all firms at all levels within the industry, consumers can benefit from the resulting “mix and match” competition.<sup>47</sup> In addition, when standards are shared among competitors, price competition is likely to be intense as the rival firms will have more similar technologies and hence cost

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45. See, e.g., Mark Lemley, *Standardizing Government Standard-Setting Policy for Electronic Commerce*, 14 BERKELEY TECH. L. J. 745 (1999).

46. See, e.g., Jacques Pelkmans, *The GSM Standard: Explaining a Success Story*, 8 J. EUR. PUB. POL'Y 432 (2001).

47. See Jeffrey K. Mackie-Mason & Janet S. Netz, *Manipulating Interface Standards as an Anti-Competitive Strategy*, in STANDARDS AND PUBLIC POLICY (Victor Stango & Shane Greenstein eds., forthcoming 2005).

structures than may be the case under competitive standard setting. Standard-setting coalitions therefore have the potential benefit of inducing rapid diffusion of service and intense price competition. At the same time, however, they have the potential to impede competition by restricting membership, limiting access to the standard, and forcing industry adoption of the standard. This will be particularly true when the coalition includes firms with sufficient market power to impose a particular standard and excludes the most notable rivals to those firms.<sup>48</sup>

At a simplified level, one can cast the policy choice for standard setting as being between the short-run, static benefits of competition over a common standard and the dynamic innovation benefits of competition among rival system standards. That tradeoff makes the welfare effects of standards coalitions versus standards competition hard to predict. Indeed, American antitrust doctrine recognizes the potential benefits and ambiguous *ex ante* competitive effects of standard-setting organizations. It thus affords them “rule-of-reason” treatment rather than *per se* illegality under the Sherman Antitrust Act.<sup>49</sup> But the “static benefit versus dynamic benefit” characterization of the standards competition question is ultimately too simplistic. Importantly, standards-based competition does not necessarily result in competing standards. Competition among different standards may end in one technology’s becoming dominant because of its objective superiority. Regulation and antitrust should not second-guess such outcomes. But a standard may also gain market power because of proprietary interfaces through which the owner can create feedback effects from complementary products and/or take advantage of network effects that deter users from switching to an alternative platform. Under certain conditions, such as where the network service provider also owns exclusive rights to the standard, the result could be the worst of all possibilities: a single standard but with only a single firm competing within that standard. This is unlikely in wireless communications where standards tend to be widely licensed by their developer(s). But where such a monopolistic outcome is possible a coalition might be preferable despite yielding only a single standard in the marketplace, because there would be several firms (the coalition members) competing within that standard.

At the same time, cooperative standard setting need not signal the end of innovation-based competition. There may be rival coalitions within the industry. New entrants may bring new standards into the market or some coalition members may defect to a superior standard.

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48. *See id.*

49. *See Allied Tube & Conduit Corp. v. Indian Head*, 486 U.S. 492 (1988).

Indeed, even in the presence of strong network effects, economic analysis has shown that standards can change and networks can tip from one dominant technology to another.<sup>50</sup> In addition, a uniform standard at the platform layer of a network can spark increased innovation and competition in the applications layer. In the end, then, the welfare effects of standard-setting coalitions compared to standards competition are even more difficult to predict than the simple static-versus-dynamic-benefits story suggests.

So what, then, should competition policy be towards standard-setting coalitions among firms that otherwise compete in the relevant market? Antitrust authorities in this market should recognize (as they do in other contexts) that private standard-setting consortia can be beneficial and hence should not presume against their legality as a matter of competition law. Enforcement authorities should, however, be vigilant that coalitions do not structure themselves so as to gain power to act anti-competitively in their markets. The likelihood of anticompetitive outcomes from standards coalitions increases where membership is restricted and existing members determine who to admit to the coalition, where the coalition excludes important actual or potential competitors, and where the members of the coalition have sufficient market power to ensure industry adoption of their standard.<sup>51</sup> Competition policy should thus not be aimed at preventing the emergence of standards coalitions. But it should be applied to prevent standards consortia from operating as covers for group boycotts against certain competitors, or from serving as mechanisms by which owners of critical patents gain market power by forcing adoption of the standard to which their intellectual property rights are relevant.

### *E. Interconnection Among Competing Networks*

An additional and related element of competition policy focuses not directly on standards, but on interconnection among rival networks. Even if competition policy does not take an initial position on how firms in the mobile broadband industry set system standards, law can have a profound effect on the competitive performance of the industry by requiring that subscribers to one system be able to trade traffic with subscribers on another, or by mandating that hardware devices used with mobile broadband be interoperable across competing technological platforms. Such interconnection policies have a notable history in the United States, sometimes more because of their absence rather than their

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50. Michael Katz & Carl Shapiro, *Systems Competition and Network Effects*, 8 J. ECON. PERSP. 93 (Spring 1994).

51. See Mackie-Mason & Netz, *supra* note 47.

presence. It has become conventional wisdom, for example, that the absence of interconnection requirements in the early twentieth century allowed AT&T to squeeze out rival telephone companies and recapture the monopoly it had lost when its patents expired in the 1890's.<sup>52</sup> AT&T accomplished this by refusing to allow the rival network's customers to reach subscribers to AT&T's network. Because AT&T had the larger number of subscribers, its network was inherently more valuable to consumers because of the greater number of people one could call as a subscriber to AT&T than as a subscriber to any other network. This in turn attracted increasing numbers of customers to AT&T, which only increased and reinforced the strength of AT&T's advantage for consumers over other networks. The phenomenon whereby a service becomes more valuable to all users with each additional user of the service is often called a "network externality." The Telecommunications Act of 1996 instituted mandatory interconnection among competing carriers,<sup>53</sup> eliminating network externality advantages for incumbent carriers over new entrants.

The FCC extended interconnection to the wireless arena, requiring not only that wireless carriers interconnect with each other, but that wireline and wireless carriers also interconnect for the exchange of customer traffic.<sup>54</sup> The benefits that flow from mandatory interconnection are enormous and the lessons from existing wireless and wireline interconnection counsel that any competition policy towards mobile broadband services include such a mandate, a point on which there appears to be little debate. Such a requirement may, however, affect how standards are chosen and, if there are limits on interoperability among potential standards, tilt the process towards cooperative rather than competitive technological development. But as discussed above, so long as the cooperative standard setting is conducted in a non-exclusive manner and is not misused for the benefit of dominant firms, there is no reason for competition policy to stand in the way of standards coalitions. Similarly, if interconnection considerations lead service providers to converge on a standard owned by a single firm, the monopoly over the intellectual property rights to the standard should not give rise to concern so long as that monopoly is not maintained through anticompetitive strategies or misused to interfere with competition at the service level of the market.

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52. See BENJAMIN ET AL., *supra* note 26, at Ch. 15.

53. See 47 U.S.C. § 251 (2000).

54. Implementation of the Local Competition Provisions of the Telecomms. Act of 1996, *First Report & Order*, 11 FCC Rcd. 15,499 (1996).

### *F. Summary*

In each of the four areas of competition policy discussed above, authorities must make difficult predictive judgments. In an evolving network industry like wireless telecommunications, factors affecting market definition, the feasible scope of competition, the relationship between market structure and innovation, and technological standards can all change rapidly. This section has attempted to anchor competition policy for mobile broadband services in fundamental antitrust principles that are responsive to the dynamic environment in which they are applied, but that retain a presumption in favor of preserving the most competitive market structure that is technologically and economically feasible. Therefore, the burden in each of the policy dimensions discussed should fall on parties seeking to engage in cooperative activity to prove that their conduct does not reduce competition or else has demonstrable efficiency or innovation benefits that offset the costs of reduced competition.

## II. INSTITUTIONAL CONSIDERATIONS: WHO SHOULD IMPLEMENT COMPETITION POLICY FOR MOBILE BROADBAND?

Once the substantive framework for competition policy in the mobile broadband market is established, the institutional question arises of what kind of agency should implement that policy. Should competitive oversight lie with a general antitrust authority like the U.S. Department of Justice or FTC, or should it lie with a sector specific regulator like the FCC? In the United States, there has been a long history of shared authority between the FCC and the antitrust agencies over competition questions. For decades, the FCC had the greater level of authority and could even exempt mergers from scrutiny by the FTC or the Department of Justice.<sup>55</sup> The 1996 Act removed that exemption authority from the FCC and restored primary antitrust jurisdiction over telecommunications to the general antitrust agencies.<sup>56</sup>

The policy outlined above in this paper does not inexorably tend towards either a sector-specific telecommunications regulator or a general antitrust agency as the correct institution to oversee competition policy for mobile broadband, although it does favor implementation by the latter. Market definition, benchmarking, assessing innovation-based arguments, and examining standard-setting are exercises with which

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55. See Howard A. Shelanski, *From Sector-Specific Regulation to Antitrust Law for U.S. Telecommunications: The Prospects for Transition*, 26 TELECOMM. POL'Y 335 (2002).

56. Communications Act of 1934, ch. 652, § 221(a), 48 Stat. 1048, 1080 (codifying the Willis-Graham Act, ch. 20, 42 Stat. 27 (1921)), *repealed by* Telecommunications Act of 1996, Pub. L. No. 104-104, § 601(b)(2), 110 Stat. 56, 143.

antitrust agencies are familiar and that they are well-equipped to handle. Indeed, each of the dimensions of competition policy discussed above is guideline-driven rather than rule-driven. There is no firm rule, like the spectrum cap, for determining the required market structure. There is instead the guideline that the market should not be allowed to concentrate to the point that firms achieve market power and cause long-run harm to consumers. Assigning competitive oversight to the Justice Department or the FTC would therefore be appropriate and in keeping with a U.S. trend towards moving competition policy for telecommunications away from the FCC and to the antitrust agencies.<sup>57</sup>

On the other hand, it is likely that some aspects of mobile broadband competition policy would be well governed by a sector-specific regulation. For example, the viability of competition among rival mobile broadband networks depends on interconnection among the networks for the purposes of exchanging calls among each other's subscribers. The oversight of interconnection and its associated pricing issues fits naturally with an agency like the FCC. Similarly, specific questions about standards or the usability of particular spectrum for entry into the mobile broadband market are also likely to be better addressed by an expert agency. Implementation of the policy framework outlined in this paper could therefore, in principal, afford a continued role to sector specific regulatory authorities. At the same time, however, this paper proposes an antitrust approach that should, for the most part, fall under the jurisdiction of general competition authorities.

## CONCLUSION

This paper has examined the central dimensions of competition policy for mobile broadband services. The healthy development of 3G and even more advanced wireless capabilities is important in its own right. But it is also important because sound competition policy that promotes efficient development of the mobile broadband market will benefit consumers and help to mitigate the potential tradeoffs and market failures that underlie the regulatory debates over end-to-end neutrality for Internet transport networks, common versus licensed spectrum assignment, and open versus proprietary technological standards.

The premise of this analysis has been that competition policy should focus on protecting and enhancing consumer welfare in the relevant market. To that end, the principal dimensions of a competitive policy framework for mobile broadband should include (1) a conservative market definition that presumes inclusion only of mobile broadband

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57. *See id.*

mobile networks, but which cautiously takes account of potential substitutes and entrants in the uncertain and changing mobile broadband marketplace; (2) careful assessment of available spectrum and economies of scale to set an appropriate market-structure benchmark against which to assess competitiveness of the mobile broadband industry; (3) a wary approach to claims that dynamic innovation requires sacrifice of static competition, with the burden of persuasion resting with parties seeking market consolidation; (4) openness to private standard-setting coalitions coupled with vigilance for, and rigorous enforcement against, features of such organizations that might harm competition and accumulate market power; and (5) continued enforcement of interconnection for the exchange of traffic among competing networks.

Each of the above policy criteria lies squarely within the traditional ambit of antitrust law, suggesting that general antitrust agencies rather than sector-specific regulators should have the principal institutional role in applying competition policy to the mobile broadband industry. The above parameters of competition policy are broad and are susceptible to change given the nascent and dynamic nature of mobile broadband markets. But they constitute sound principles that, even if they must be applied flexibly over time, should provide a framework for fostering and preserving competition and consumer welfare in the evolving wireless marketplace.

