

A National Broadband Plan for Our Future: A Customer-Centric Framework

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Congress has recently charged the Federal Communications Commission to establish a National Broadband Plan. This paper argues that a customer-centric plan, which puts the customer in control of decision-making, will yield the best broadband result for the U.S. The Federal government must establish a market infrastructure that encourages competition, requires transparency of both network providers and application providers, and includes vigorous antitrust enforcement. Competition from wireless broadband is present now and will become far more prevalent shortly, on the basis of current and announced investment plans.

Regulators must also make available far more licensed spectrum to ensure this competition is realized. Calls for regulation in the form of mandated unbundling and more unlicensed spectrum are regulatory cul-de-sacs with proven track records of failure. Calls for regulatory control of network provider practices (other than transparency), such as network neutrality, are misguided. Such decisions are best left to customers, who can very well decide for themselves which of the broadband providers offer terms that best suit the customer.

Introduction

By the American Recovery and Reinvestment Act,¹ the U.S. Congress tasked the Federal Communications Commission (FCC) to create a national broadband plan and deliver the plan to Congress

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¹ See American Recovery and Reinvestment Act (2009).

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by February 17, 2010. The FCC has initiated this process by issuing an extensive Notice of Inquiry² (NOI) outlining the scope of this ambitious task and requesting comment.

It is appropriate to develop such a plan. The FCC has traditionally adopted a careful “hands off” policy of encouraging, measuring, and giving advice from the sidelines, but it has not actively regulated the broadband³ industry, nor the Internet more generally.⁴ Over the past 15 years, this approach has resulted in the cable and telephone companies investing tens of billions of dollars to develop and build a broadband network that’s brought high-speed offerings to the consumer. Of course, the success of broadband has attracted much attention from politicians, the press, application providers, academic pundits, consumer advocates, and think tanks of all stripes, each one expressing its strong opinions about “what is wrong” with this industry and how much better we would all be if only we followed their advice. It is certainly time for some clear thinking and focused goals that should form the basis of a national broadband plan; Congress should be lauded, and the FCC should be encouraged in their efforts to bring some rationality and purpose to this enterprise.

The FCC’s NOI poses hundreds of questions and issues that it proposes to address in this proceeding, with little indication of a central or common framework for addressing the broadband industry. Yet there is a very simple and very powerful single organizing framework which can serve as a public policy touchstone for the FCC (and indeed, for all government agencies with a similar Congressional mandate): **Let the customer decide**. A customer-centric approach is particularly appropriate because there is no “average” customer. Each customer has unique preferences and “tastes” for broadband, and one-size-fits-all regulation poorly serves this diverse array of individual needs. A national broadband plan which is **customer-centric**, which puts the customer⁵ at the center of decision making, is a guarantee of a plan which is in the public interest, and which also furthers the goals of the nation in developing and deploying broadband infrastructure.⁶

² Federal Communications Commission (2009), hereinafter NOI.

³ The term “broadband” is typically used to describe high-speed, last-mile facilities which connect customer’s homes and businesses to the Internet, and that is the meaning I take in this paper. There has been recent interest in the “middle mile” problem (NOI, §17), which I address briefly here.

⁴ See, for example, FCC Chairman Michael Powell’s (2001) comments.

⁵ In the broadband market (and the Internet generally), who the customer is may not be obvious. This is a classic “two-sided market,” in which application providers use the Internet to reach retail customers, and as such, are customers themselves. A good analogy is the newspaper business, in which both readers and advertisers are customers of the newspaper, whose function is to put the two in touch with each other. The focus of this paper is primarily, but not exclusively, the retail customer.

⁶ The NOI implicitly recognizes that the companies of the private sector have been, and will continue to be, the primary developers of broadband infrastructure. While there are a few examples of successful local government-funded broadband providers (see NOI, fn 134), the rather poor performance of the much-touted municipal WiFi ventures suggests that neither local governments nor public infrastructure are likely to be the engine of broadband growth.

There are plenty of self-proclaimed candidates for helping the FCC decide issues that deeply affect customers: application providers (such as Google, Microsoft, and Amazon), government regulators and bureaucrats, competing network providers (such as AT&T, Verizon, Comcast, and Sprint), resellers, consumer advocates, assorted think tanks, law professors, even business school professors. But none of these groups, however well-intentioned, should be making the decisions about broadband that impact customers; only customers should be making such decisions. It is the role of the FCC (and government generally) to ensure that it is customers who make these decisions and, therefore, drive the process of broadband expansion, deployment, and adoption, not special interests on any of the many sides of the broadband debate. This is the FCC's opportunity to put the customer center-stage in the broadband wars: It must deliver a **choice-rich market environment** to customers.

This is by no means a call for a *laissez-faire*, let-the-market-do-it-all approach. Indeed, this concept calls instead for a vigorous but nuanced approach by the FCC and the antitrust agencies, one focused on ensuring an array of choices that are compatible with the efficient allocation of resources in the marketplace. It is not an approach that substitutes the judgment of regulators or even legislators for the judgment of customers in a choice-rich market. It is an approach that ensures that customers *have* a choice-rich marketplace in which to make choices.

There are two key elements in building a choice-rich market environment.

1. **Removing impediments to investment and competitive entry.** This includes moving much more licensed spectrum into the market via auctions to enable wireless broadband,⁷ as well as removing right-of-way, franchise, and other government restrictions on deployment of wired broadband.⁸ Vigorous public and private antitrust enforcement is required to maintain competition.
2. Ensuring that all providers (*network providers as well as application providers*) are **transparent in dealing with customers**. If customers are to make wise choices, they must be fully informed about what they are buying, how much it costs, what services are or are not included, what they have access to, what network management methods are in use, and (of course) the privacy of their information.

Key to understanding how competitive entry and investment can be encouraged is the idea that, with **any regulation, requirement, or obligation imposed on** an incumbent or entrant network (or any other), **the provider necessarily increases its costs and thus reduces its incentive to invest**

⁷ Even with the very limited spectrum available to wireless carriers, in 2007, mobile broadband lines increased by 28.7 million (46%), or 75% of total broadband net adds in that year (using the current, rather lax FCC definition of broadband), suggesting that wireless broadband is perhaps already a larger part of the broadband picture than commonly believed.

⁸ This suggestion was mooted in 2006 in Bailey, et al. (2006) (present author is a signatory).

or to competitively enter the market. No matter how well intentioned, such regulations will reduce competition; reduce investment; and therefore, reduce customers' choice.⁹

With competition comes choice; with transparency comes informed choice. The American people can decide for themselves whether they want broadband or not,¹⁰ whether they want their network provider to block viruses and manage traffic or not, and whether they want their application providers to sell their buying profiles to third parties or not. We who are regulators, providers, advocates, or various "experts" should not be making those choices for customers. We should be creating a choice-rich market environment that empowers customers to make their own decisions.¹¹

Of concern to many is that broadband may not be available in poor and/or rural communities; if so, perhaps some form of supplier subsidy (such as through the Universal Service Fund¹²) is appropriate. I believe that provider subsidies are largely ineffective and certainly inefficient. But if subsidies to rural or the poor are needed, then the subsidies should go directly to customers, not to providers. Customers in need of support could be given a monthly allotment (similar to LifeLine telephone service) which they could use only for broadband; if the demand for broadband in a rural area would not normally be sufficient to justify a broadband buildout, such a customer-direct subsidy could well boost demand sufficiently enough for suppliers to offer service. Again, the focus should be on empowering customers.

The framework espoused in this paper is straightforward: let government do what it does best, which is to create a market infrastructure that fosters competition and transparency. Let the private sector do what it does best: invest and innovate to serve customer needs better than their competitors. Let the customers do what they do best: make choices that lead to the best outcomes for them and thus for all citizens of this country. It is time to trust the American people with their own broadband.

Why Competition?

A fundamental tenet of the U.S. economy is customer choice in competitive markets, a precept that has created the greatest economy in the world. These competitive markets are virtually ubiquitous: Even though I live in rural Delaware, I have five supermarkets within five miles of my home, each offering the basics plus something different in the way of food that distinguishes it from its competitors. I get the

⁹ For an early analytic treatment of broadband market structure and the impact of regulatory obligations on carriers, see Faulhaber and Hogendorn (2000).

¹⁰ It is reasonable for government policies to consider whether there are barriers, such as digital literacy, that may be constraining consumer choices, but it should not be a national policy to make everyone take broadband services, like it or not.

¹¹ Of course, every economist knows that, while competitive markets and customer sovereignty can lead to socially desirable outcomes, this may not be the case in the presence of market failures, such as externalities or network effects. Despite the claims of some (see Crandall, Jackson, & Singer, 2003), the empirical evidence that there are direct network effects in broadband is quite thin.

¹² A much-criticized and costly subsidy program; see, for example, Thomas Hazlett (2006).

choice of where I want to shop based on my preferences and what I consider important. The same is true of computers, automobiles, real estate, clothing, restaurants . . . and on and on. No one tells me what I must buy; if I don't like cauliflower, I don't need to buy it. The customer is sovereign, and in competitive markets, this leads to efficient outcomes.¹³

Is there a role for government? Absolutely; local health departments ensure the food I buy in supermarkets and restaurants is fresh and healthy, the FDA ensures it is well-labeled, fraud laws and "lemon" laws protect me, the FTC makes sure the products I buy are appropriately labeled so I know what I'm buying, and the Department of Justice Antitrust Division (as well as private parties) safeguards against illegal monopolies.

So far, so boring. This is, after all, simply the way we all live our lives. Is there a lesson to be learned from these prosaic examples? In each case, the government provides the structure, the **market infrastructure**, in which a competitive market can develop and provide customers with the rich choices we all enjoy. In each case, it's the private sector that provides customers the choice while operating within the market infrastructure the government has established. But the government is not offering the choices, nor is it telling firms what they must and must not sell (except as noted above). The private sector is absolutely best at competing with better prices, better service, higher quality, new innovations, and exploring customers' preferences — far better than the government will ever be. But government is absolutely best at setting the rules that ensure that markets will give customers the best possible choices.

Essential to this vision is that markets really are competitive, and that customers know what they are choosing. Without these two pillars, customer choice is a sham. Note that both the government and the private sector are essential to creating and exploiting the market infrastructure for competition to work.

An example of how the FCC got this right comes from the initial allocation and auction of PCS licenses for digital cellular mobile telephony. The FCC allocated 160 MHz in each market and then held its first auction to determine which firms would get the spectrum. Prior to the initial auctions, the FCC adopted a spectrum cap so as to allow for more entry.¹⁴ As the wireless industry evolved from this start, competition took hold, and, today, the wireless marketplace is robustly competitive. In essence, the FCC established the initial market infrastructure, but the private sector provided choices to customers. This is the model upon which to build a national broadband plan.

What Have We Today?

¹³ Of course, not all markets can be competitive; in the event of market failures, efficiency may not be the outcome of customer choice. In fact, the following paragraph deals with two potential market failures: information asymmetries and "unearned" monopolies, and it notes the role of government in ensuring these market failures do not interfere with the operation of markets.

¹⁴ The spectrum cap was eliminated, effective on January 1, 2003; see Federal Registry (2002).

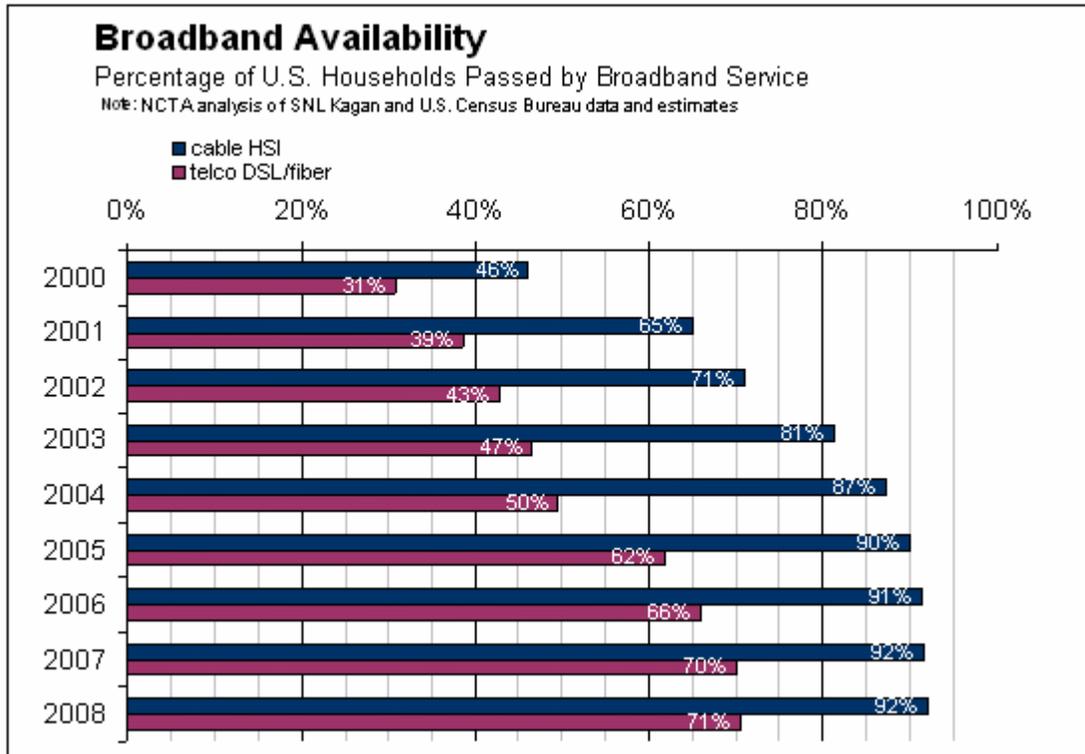
Before considering how to achieve a choice-rich broadband market environment, I first outline what the industry looks like today, because this will be the foundation upon which the national broadband plan will be built. Here are the salient features:

- As a result of the billions of dollars invested by the private sector in broadband Internet facilities, most Americans have at least two choices of wireline broadband providers,¹⁵ which are usually the local telephone company and the local cable company.¹⁶ Many who object to the practices of broadband companies focus only on the two wireline competitors, pointing to this limited competition as the root cause of their issues. Simply put, limited competition cannot deliver a choice-rich market environment to customers. This becomes the basis of calls for regulation.
- The broadband industry is about a decade old, but it has already provided quite extensive networks, as measured by *households reached (or passed)*. As a predominantly wireline network industry, this measure is particularly important, as only residential customers whose homes are passed by a broadband-capable line can buy the service. As of 2008, 92% of American households could purchase cable modem service, and 71% of American households could purchase DSL, both of which are recognized as true broadband technologies. It is possible that some small number of DSL-passed households are not passed by cable, suggesting that the total households passed by at least one wireline broadband provider is between 92% and 95%. It also suggests that the number of households that are passed by two broadband providers is between 68% and 71%. Figure 1 is a chart of wireline broadband penetration for both cable and DSL, plotted annually since 2000.

¹⁵ It is important to keep in mind that “broadband” is not synonymous with High Speed Internet (HSI) access. Broadband is simply a high bandwidth transmission facility that can be used for HSI access, but can also be used by its owner for its own information transmission, or to provide a service to customers other than HSI. For example, most cable firms use their own proprietary broadband networks to carry VoIP telephone calls rather than sending these calls over the Internet, which they believe gives them more control over the quality of service their customers receive. Of course, the VoIP calls of non-cable firms, such as Vonage, are carried over the Internet. However, the term broadband is often used to mean HSI access, and the policy concerns over broadband are really policy concerns about HSI access.

¹⁶ This is a simplification. As discussed below in detail, wireless broadband (3G) services are currently widely available. Moreover, there are municipalities that have built their own broadband, and WISPs (wireless ISPs) serve a substantial number of rural areas. Although, a few years ago, municipal WiFi was quite popular, most of these systems have shut down, although a few remain. Some satellite DBS operators provide broadband, and in many rural areas, they have a powerful presence. Verizon also markets a fiber service, FIOS, which accounts for a substantial share of broadband customers in many high-income markets.

Figure 1. U.S. Wireline Broadband Penetration.



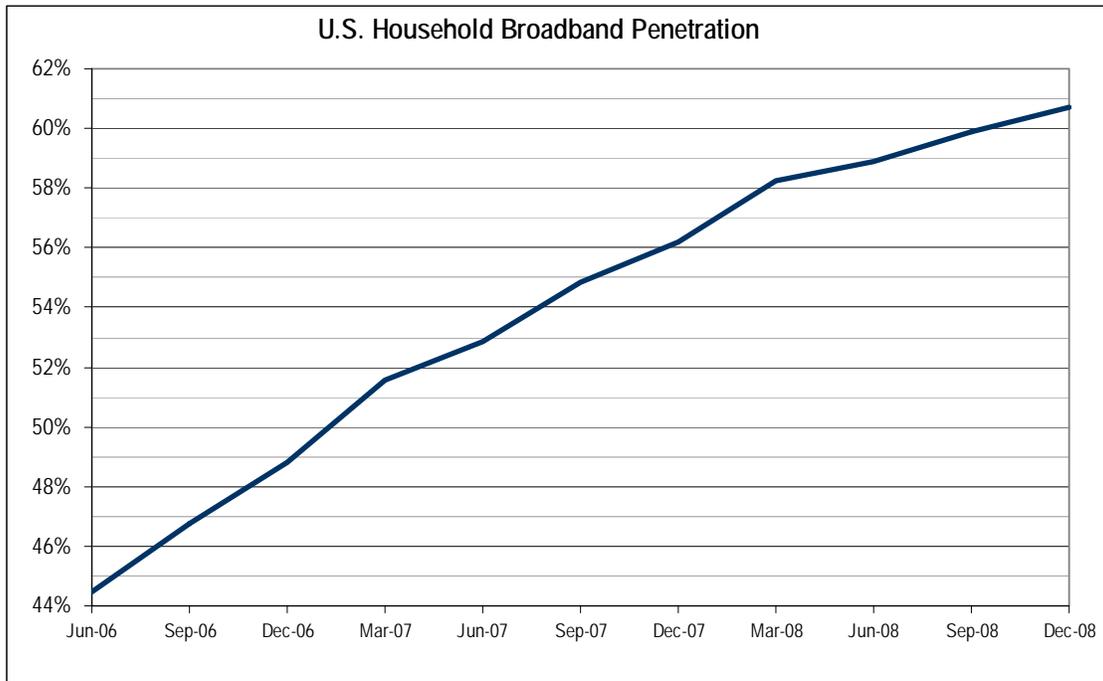
Source: SNL Kagan, *Broadband Technology*, various years

- The actual uptake of broadband is rather less impressive, which has led to calls that the U.S. has fallen behind much of the developed world in broadband penetration (usually taken to mean broadband subscribers per 100 people).¹⁷ As of December 2008, 61% of American households subscribed to a wireline broadband provider. Figure 2 is a chart of how broadband subscriptions have grown since 2000.
- Note that the growth of broadband subscriptions is declining, even though there are many households for which broadband is available that have not yet purchased it. A salient fact that helps explain this seeming anomaly is that the number of U.S. households with at least one

¹⁷ There is a veritable cottage industry in interpreting and critiquing the OECD comparison numbers, which I feel no need to review. The best of these reviews is Atkinson, et al. (2008). The authors develop a rather more sensible index of broadband development, but still find that the U.S. remains in the middle of the international pack. A more recent analysis of the OECD numbers is Cleland (2009a).

personal computer in the home is 74%;¹⁸ since a personal computer is generally a necessity for using a broadband connection, this sets an upper bound on broadband penetration. We return to this point below.

Figure 2. U.S. Broadband Subscription Growth.



Source: NCTA and SNL Kagan

- With two main players in the wireline broadband market, one might expect a relaxed view to competing with the “other” broadband provider. That does not appear to be the case; there is evidence of rather brisk, rivalrous behavior in this market:
 - Customers receive weekly (at least) notices of broadband “special deals” with discounted prices and/or increases in advertised bandwidth. Price and service rivalry appears robust.
 - The two primary broadband providers have worked to differentiate themselves; cable has (on average) somewhat higher prices but somewhat greater bandwidth than DSL,

¹⁸ See Consumer Electronics Association (2007).

which matches the capabilities of their technologies. Verizon's FiOS service has higher prices and higher speeds.

- Both providers have moved to bundle services such as "triple play" telephony, video, and high-speed Internet access, again using the strengths of their respective technologies.¹⁹
- Investment in new technologies, network engineering, software, and system architecture by both players is substantial. Verizon is aggressively rolling out FiOS, a fiber-to-the-home technology that brings substantially more bandwidth to its retail offerings than cable can currently offer. In their competitive response, cable firms are rolling out DOCSIS 3.0. Comcast, for example, reportedly plans to bring DOCSIS 3.0 to 65% of its footprint in 2009, and Cablevision has similar plans throughout 100% of its footprint²⁰ — technology introduced specifically to compete with FiOS. In turn, Verizon responded to DOCSIS 3.0 by lowering its price on 50 Mb/s service by \$20/month.
- The very rapid deployment of wireless broadband provides additional rivalry within this industry, even in its 3G incarnation. The latest FCC numbers put mobile wireless at 19% of advanced service lines (> 200 Kb/s in each direction) and 53% of 2007 adds of advanced service lines.²¹
- Although there is undoubted rivalrous behavior between the two market players and the resulting level of differentiation and choice, the national broadband plan should obviously strive for more, to the extent that it is economically justified and desired by customers. Criticism of the broadband market seems largely based on perceived market power of a market with two principal competitors. Advocate arguments that this could potentially limit the openness of the Internet that has led to great technological change and innovation, that restrictions on what Web sites can be visited or any such business arrangements violate strict non-discrimination, that network neutrality is required to counter this perceived market power, all stem from the perception that the limited competition among broadband facilities providers is potentially injurious to the American people. Further, critics contend that broadband providers have been less than forthcoming with information about performance, service and terms and conditions, and they have called for greater transparency.

While the current industry structure has laid a very solid foundation for a national broadband plan for the future, it is not without problems. As a policy issue, it is unlikely that the FCC and Congress will be willing to continue with the current, largely unregulated industry without examining how best to maintain and enhance competition with the two existing major providers in most markets. The central issue of this

¹⁹ DSL is not well-suited to the transmission of high-quality video; typically, telephone companies offer to bundle satellite DBS video programming as part of their triple play.

²⁰ See Murph (2009).

²¹ See Federal Communications Commission (2008a).

proceeding is how to fix this problem: Can the FCC create a market infrastructure that facilitates customers' choice, or must we give up on competition and resort to extensive regulation of this portion of the Internet?²²

Competition? What Competition?

Competition among broadband platform providers has always been the Holy Grail of broadband policy. If customers had, say, a half-dozen facilities-based broadband providers vying for their business, they would indeed be in a choice-rich market environment, and we could count on competition to sort out what customers really valued. Advocates of network neutrality would learn whether or not customers valued network neutrality, because if they did, then some provider would adopt net neutrality to gain customer acceptance, and other providers would be driven to do the same. If customers did not value net neutrality, it would not appear in the market. If a small portion of dedicated customers were really interested in net neutrality (possibly willing to pay a premium for it), then a niche broadband provider would enter in order to serve this profitable market.²³

But years of failed attempts to bring additional platform competition to this market has led to disappointment and disillusionment with the idea of platform competition, leading some to suggest that some form of regulatory unbundling or mandated wholesale should be adopted to provide expanded competition. Astute industry expert Robert Atkinson, in his review of broadband competition, asserts that

. . . the Washington consensus in favor of more broadband competition ignores the fact that broadband displays natural monopoly or duopoly characteristics. Because of the nature of the broadband industry, there are significant tradeoffs between more competition and the goals of efficiency, innovation, lower prices, and higher speeds and broader deployment. (Atkinson, 2009)

²² The central issue of this proceeding is *not* that the U.S. ranks 15th among OECD nations in broadband penetration. While this ranking seems to have energized public debate about broadband, there is no evidence whatsoever that this impacts or reflects either the well-being of American customers and citizens or the technical leadership of the U.S.

²³ An analogy from the wireless industry is instructive. Advocates of net neutrality have ported these ideas to wireless, demanding that wireless carriers should accept any devices (that met standards) the customer brings, rather than require the customer to buy the carriers' devices (see Wu, 2007). In fact, two wireless carriers (Sprint/Nextel and T-Mobile) have rather liberal "bring your own phone" rules, compared to Verizon Wireless (although this has changed recently). Customers therefore have choice with respect to "wireless Carterphone," and yet this has not caused a rush of customers from Verizon to either of the two (much smaller) carriers. If "wireless Carterphone" really mattered a great deal to customers, they would flock to the providers that supplied this feature, and there is no market-based evidence that they have done so. We can only conclude that, if "wireless Carterphone" matters to customers, it doesn't very much; they have the choice, and they have chosen.

In one of the earliest statements of this pessimism concerning platform competition, I co-authored a game-theoretic, empirically based analysis of the emerging broadband industry and predicted that the market equilibrium consisted of two, or at most three, broadband providers (Faulhaber & Hogendorn, op. cit.), assuming the network technologies and costs then current.

The despair of ever supporting more than two broadband pipes into the home appears justified. If this truly is a natural duopoly, is there no hope for platform competition? I assert that, in fact, not only is platform competition not dead, it is alive and well today, with actual broadband providers in the market offering service, and there are plenty of them. We have simply not focused on one of the world's most dynamic industries, mobile telecommunications, an industry which seems to have a problem being taken seriously, even though its are now the dominant electronic devices in the U.S. and the world today. There are 21 wireless carriers that serve more than 100,000 customers;²⁴ all but three offer 3G data services, such as EDGE, UMTS, and EV-DO Rev A, which offer downstream bandwidths in excess of 1-1.5 Mbps. These bandwidths are low relative to cable and fiber, but they are comparable to low-end DSL offerings, and they are far higher than traditional dial-up.

Clearly, today's wireless 3G broadband delivers mobility but lower speeds than either cable or high-end DSL. But is it *really* broadband? Don't we really want the blazing speeds of DOCSIS 3.0 or FIOS? Some have argued that, since wireless 3G broadband is slow, it really doesn't count as broadband, that it cannot substitute for wired broadband at all.²⁵ Well, if you are a gamer, or if you wish to watch HD television over the Internet, then yes, you really want the blazing speeds. But suppose you want to watch a live traffic cam video feed or a YouTube video clip, or download a colleague's 100-page paper? My personal test of an EV-DO Rev A connection confirms that yes, you really can do these tasks successfully over a 3G connection.²⁶ No, it is not a perfect substitute for a high-speed wired broadband connection, but yes, it is good enough for what most of us want to do today.

Of greater interest, however, are the current investments of wireless firms to both realize significantly higher speeds and focus greater attention on laptop computers. Upgrades to 4G protocols, such as LTE and WiMAX, are planned, some as early as 2010. For example, Verizon Wireless has committed to a commercial rollout of LTE in "the second half of 2010," with a "nationwide buildout complete in late 2013 or early 2014."²⁷ Verizon Wireless is promising peak bandwidth of 50-60 Mbps and average user speeds of 8-12 Mbps, performance comparable to today's high-end cable.²⁸ Verizon Wireless

²⁴ For a list of U.S. wireless operators, see Wikipedia (2009a), which includes technologies used, subsidiaries, number of subscribers, and company Web site.

²⁵ See Turner (2009). Note the differences in wireless broadband data quoted in this report relative to the Federal Communications Commission (2008a) data, referenced in fn 21, *supra*.

²⁶ Consider this automotive analogy: If you own a Ferrari and I own a Ford Taurus, you will certainly win any Grand Prix races we both enter. But if we are driving the family to church over well-policed highways, then your Ferrari is no better than my Taurus.

²⁷ See Segan (2009).

²⁸ Motorola's demo of LTE vs. EV-DO suggests that, in practice, LTE is over 12 times faster than EV-DO. See the demo at Motorola (2009).

sees this, initially, as “a laptop play,”²⁹ focused on personal computers rather than mobile devices; this clearly would provide direct platform competition with today’s broadband providers. Other wireless operators, such as AT&T Mobility, T-Mobile, and MetroPCS have also announced plans to deploy LTE,³⁰ though none are as advanced as Verizon Wireless. Additionally, Sprint/Nextel and its recent acquisition Clearwire are currently deploying a WiMAX 4G broadband network, now operational in Portland, OR, Atlanta, GA, and Baltimore, MD (under the Xohm brand). Current downstream speed is 2-4 Mbps; the firm is “. . . expected to reach 80 metropolitan areas and 120 million people by the end of 2009”³¹ under the brand name “Clear.”

The deployment of LTE does require some investment in antennas and hardware, but virtually all wireless companies already possess most of the infrastructure they need: cell towers, backhaul facilities, switching, and antennas. The amount of capital expenditures necessary to become full-fledged broadband operators is not trivial, but it is far less than stringing wires or fiber underground. Since most wireless carriers are already 3G capable, entry costs to higher bandwidths are likely to be relatively low. For example, Sprint expects to invest \$3 billion upgrading its existing network to accommodate WiMAX in 100 metropolitan areas with total population of 100 million (approximately 39 million households).³² By contrast, Verizon will invest \$23 billion by 2010 to bring FIOS past 18 million households.³³

Wireless is a consistently underestimated industry; many claimed, for example, that wireless voice was a complement to, rather than a substitute for, wireline voice telephony. But today, 20% of wireless subscribers do not have a wireline phone, and for them it is a substitute, regardless of what the pundits say. Let’s not make the same mistake again with wireless broadband: It’s here and it’s real.³⁴

Wireless broadband has clearly changed the economics of broadband entry since our initial analysis (see Faulhaber & Hogendorn, *op. cit.*). The existence of many wireless firms offering 3G broadband, plus the current ramp-up of 4G broadband (competitive with current wireline broadband offerings), suggests that competition in this area is not only possible, it is happening now. It is quite realistic to envision at least four national wireless firms offering broadband service across most of the nation’s metro areas in four years’ time. It is this competition, and only this competition, that can deliver the choice-rich market environment to customers that must be the objective of any public-interest-based national broadband plan.

What can be done by the FCC to encourage this new intermodal competition? What policies would speed up the process of entry and ensure adequate bandwidth for wireless to be competitive in

²⁹ See Marek (2009).

³⁰ See Wikipedia article, *op. cit.*

³¹ See Clearwire (2009).

³² See Wikipedia article, *op. cit.*

³³ See Wilen (2007). Note that “households passed” is not the same as “households that subscribe.” Currently, 24% of households passed become FIOS Internet subscribers.

³⁴ For those keeping score on how the U.S. is doing relative to other countries, Neilson Mobile (2008) reports that the U.S. leads 16 other countries in mobile Internet usage penetration.

price and service? Fortunately, the answer is both easy and obvious: *get much more licensed spectrum into the market*. Only the FCC (working with NTIA) can make this happen, and *the relative scarcity of licensed spectrum is the single greatest barrier to entry by wireless firms into the broadband market*. The need for new spectrum is evident, as is its scarcity. In Auction 73, Verizon Wireless ("Cellco") paid \$4.6 billion for 22 MHz of C-block spectrum covering the continental U.S., spectrum it intends to use for deploying LTE. Because the FCC has been parsimonious with licensed spectrum, it is unnecessarily scarce and costly. It is, quite simply, the most significant entry barrier to entry by wireless carriers into high-bandwidth, high-speed Internet access comparable to wireline broadband.

While this may seem like bad news, it is actually good news. Since the FCC is the barrier to entry, the FCC can fix it, and it can do it by itself, on its own authority! The very first step that has now been recently completed is clearing the 700 MHz band via the DTV transition, a much-delayed action now complete. Both Verizon Wireless and AT&T Mobility plan on using the 700 MHz spectrum they have already bought to offer 4G broadband services in 2010, so this action is especially timely for wireless broadband. Additionally, the FCC needs to identify the total amount of licensed spectrum needed to achieve the objective of a competitive broadband market, both now and for the future.

How much spectrum might this be? Without in any way prejudicing the outcome of a careful analysis by the Commission, the industry, and independent experts, it is worth noting that the Commission has already set aside a very large swath of *unlicensed* spectrum specifically for the purpose of broadband provision, referred to as U-NII, which provides a total of 550 MHz specifically for high speed data services. In addition, the FCC recently allocated a total of 508 MHz in the TV "whitespace" for unlicensed use, specifically intended for wireless broadband provision. ". . . we anticipate that allowing unlicensed operation in the TV bands will benefit wireless Internet service providers (WISPs) by extending the service range of their operations."³⁵ The Commission apparently believes that wireless high-speed data services are worth at least 1 GHz of unlicensed spectrum. I infer, then, that 1 GHz of licensed spectrum is a fair estimate of how much should be made available at auction at the earliest possible moment. The longer the FCC delays in removing this barrier to entry, the longer the American people will be denied the choice-rich market environment in broadband services that they need and deserve.

Wireless broadband is clearly challenging the existing cable-DSL broadband paradigm, and it looks on track to deliver multiple competitors. But this is no overnight fix; development of full competition will take the better part of five years to deliver the choice-rich market environment the American people need. No doubt, a part of that delay will be the time it takes the FCC to move a very substantial amount of spectrum to auction, so there is no time to waste. It appears that the technology of true wireless broadband is upon us, and it would be great if the spectrum were available for license now. It is not, but the FCC needs to get this spectrum to market quickly to remove this very large barrier to entry for wireless broadband. Again, this is not an overnight fix, but even that which happens during the transition to full competition is critically important, as is discussed below.

³⁵ See Federal Communications Commission (2008b).

But if the FCC moves the spectrum to market via auction, will private firms actually deploy it quickly enough to provide the needed competition? The evidence suggests that they will. The willingness of Verizon Wireless to publicly commit to an aggressive buildout of its 700 MHz spectrum for LTE broadband before it has even taken possession of the spectrum it has paid for speaks to the urgency that at least one large firm feels regarding wireless broadband. Similarly, the AWS auction in 2006, in which 90 MHz of licenses were sold to the private sector, saw the AWS winners deploy this spectrum for 3G services in a timely fashion. T-Mobile built out its 3G service using AWS spectrum to 130 U.S. cities with a total population of 107 million people by year end 2008.³⁶ MetroPCS has also deployed 3G services using AWS in four major metro markets with 13 million people.³⁷ Leap Wireless, via Cricket, is offering 3G services using AWS spectrum as a computer broadband play, and by year end 2008, it addressed markets totaling 30 million people.³⁸ This market deployment of 3G services, all within two years after the AWS auction, suggests that the smaller players are willing to deploy broadband services as the spectrum becomes available. The evidence shows that, when the FCC moves licensed spectrum for broadband, the private sector will respond.

Some argue that wireless can never achieve the blazing speeds of fiber optics to the home, and they point to Japan and Korea, with speeds of 50-100 Mbps over fiber. Can wireless ever achieve those speeds? And does it have to, in order to meet customer needs? The answer to the first question is simple: *With enough spectrum available to wireless broadband providers, any data speeds that customers demand can, and will, be provided at reasonable prices.* There are two critical parts to this statement. The first is "with enough spectrum available." The current amount of licensed spectrum that the FCC has made available to the wireless industry falls far short of what is needed to meet this goal. I predict that, when 4G services first roll out, they will be fairly expensive and targeted at corporations and mobile professionals who both need and can pay for high-bandwidth wireless. There is simply not enough spectrum presently available to wireless carriers for ultra-high speed wireless broadband (4G and beyond) to be a mass market commodity. But if the FCC is aggressive in making much more spectrum available quickly, scarcity will become abundance, prices will drop, and truly high speed wireless broadband will be possible. The second critical part is "speeds that customers demand." Under a customer-centric broadband plan, 100 Mbps service will develop only to the extent that customers actually want it and are willing to pay for it. And it is not likely that demand for this level of product will ever be large. There will be a substantial minority of gamers, video consumers, and downloaders who will consume large amounts of bandwidth, but most of us won't, and we won't want to pay for it. Very high bandwidth broadband will be a niche market, albeit a rather profitable one. We can learn a lesson from the PC industry, in which the growth through the 1990s was driven by speed: Everyone wanted a faster processor, faster video cards, faster busses, etc. Today, for most of us, computers are fast enough for what we want to do. There is still a niche market for very high-end PCs with quad processors boasting teraflop capabilities for gaming, number crunching, and other compute-intensive activities. But for most of us, mass market computers are fast enough; today's PC customer is increasingly focused on value rather than raw speed. Tomorrow's mainstream broadband customer will no doubt be the same.

³⁶ See T-Mobile (2009).

³⁷ See MetroPCS (2008).

³⁸ See Goldman Sachs (2008).

The lesson is very straightforward: if the FCC gets sufficient spectrum into the hands of carriers who can and will provide high-speed wireless broadband, then the only limit on speeds is what customers demand. And it is customers that will carry the day, not the pundits and gurus who think they know what our broadband future ought to be.

“Get sufficient spectrum into the hands of carriers who can, and will, provide high-speed wireless broadband.” This policy recommendation³⁹ puts the FCC at the center of substantially increasing competition in the broadband market, and it does it by establishing a market infrastructure (increased spectrum), but not by making choices that are rightfully within the domain of customers. A decision to increase licensed spectrum substantially is an *enabling* action, one that lets the private sector do its best to serve customers, while also ensuring that competition protects customers against anticompetitive behavior and results in substantially increased customer choice. The FCC has the critical role of enabling customers to have the widest range of private-sector broadband choices.

A Regulatory Cul-de-Sac: Unlicensed Spectrum

The Commission has been actively and publicly advocating unlicensed spectrum for broadband in both urban and rural contexts for well over a decade. It is with the best of intentions that the FCC sought to use its spectrum authority to encourage entry into the broadband market. Presumably, it is with these same best intentions that the FCC has opened the TV whitespace to unlicensed broadband. The generosity of the FCC in creating unlicensed spectrum can be seen by comparing the total amount of spectrum in the U-NII bands and the whitespace bands (1,058 MHz)⁴⁰ to the total bandwidth allocated to wireless telephony, one of the most vibrant growth industries in the world, which must operate on a mere 409.5 MHz.⁴¹ From this small amount of spectrum, U.S. wireless carriers transport 2.1 trillion minutes of voice traffic and offer 3G broadband, as well.

Given that unlicensed broadband spectrum has over twice the bandwidth of licensed CMRS spectrum, one might expect that the U.S. would be awash in wireless broadband, brought to us by Wireless ISPs (WISPs) eagerly snapping up this “free” spectrum. The U-NII spectrum has been available for over five years, and some has been available for over a decade, so WISPs certainly have had the time to learn about it. And yet, it seems to be quite difficult to find *any* WISPs operating in the U-NII band.⁴² I

³⁹ There is early evidence that Congress may direct the FCC to do just this: make more spectrum available. On July 8, 2009, the Senate Telecom Subcommittee introduced a bill requiring the FCC to conduct an inventory of existing uses of public and private airwaves, perhaps as a first step to allocating spectrum to wireless carriers for broadband services (Gallant, 2009).

⁴⁰ Nor is this the limit of unlicensed spectrum allocated by the FCC, which appears to be in excess of 1200 MHz.

⁴¹ CTIA (2009).

⁴² Belying its name Unlicensed National Information Infrastructure — U-NII and the FCC’s stated objective of encouraging wireless broadband, the actual spectrum picture is rather more complex. According to industry experts, power limits are too low to be of value to WISPs, 100 MHz of the spectrum cannot be

did find one such WISP: Etheric Networks, operating in Mountain View, CA. However, this may not be as puzzling as it might seem:

Interference caused the majority of unlicensed wireless services to have much higher error rates and interruptions than equivalent wired or licensed wireless networks This caused growth to slow, customers to cancel, and many operators to rethink their business model.

[In 2005, t]he better capitalized operators began reducing their focus on unlicensed and instead focused on licensed systems, as the constant fluctuations in signal quality caused them to have very high maintenance costs.⁴³ (Wikipedia, 2009b)

Interference, of course, is the bane of unlicensed spectrum; users of all unlicensed spectrum are warned that they must accept all interference (but cause none themselves), which severely constrains its use in such applications as, well, commercial broadband. Radio theory meets wireless broadband practice; it appears that, despite the FCC's largesse with unlicensed spectrum, experience shows that it does not work. Unlicensed spectrum is a regulatory cul-de-sac for wireless broadband. Experience clearly shows that, for wireless broadband, licensed spectrum is wildly successful, and unlicensed spectrum is wildly unsuccessful. The FCC continues to go to the well of unlicensed for wireless broadband, and it continues to come up dry. It's time to try something with a proven track record: licensed spectrum.

Again, the FCC is at the center of increasing competition by allocating its spectrum for broadband, as market experience has demonstrated is the most effective model for eliciting broadband development. Not doing the wrong thing is at least as important as doing the right thing. By switching its emphasis from unlicensed to licensed spectrum, the FCC will be following a data-driven strategy for success.

Other Means of Encouraging Platform Competition

Wireless broadband is more than simply a promising technology; it is already here and ready for deployment. But the FCC should also remove barriers to entry for other wireline platforms. In an earlier paper (Faulhaber, 2003a), I noted that municipal governments have tended to place barriers to entry for wireline broadband providers, including excessive fees for installation and ongoing revenue diversions. The FCC has the authority to mitigate any remaining barriers, and it should act to do so. Additionally, wireline broadband providers require rights of way under streets, along highways, and in conduits to physically locate their fiber or wire. Recently, Rep. Anna Eshoo (D-CA) introduced the Broadband Conduit

used outdoors, and the DFS requirements (for radar avoidance) make much of it unusable. The portion that is usable by WISPs is quite crowded and thus interference-prone. Despite the rhetoric and the name, this spectrum is not dedicated to broadband, and WISPs must contend with other devices that use the spectrum (private communication, Brett Glass, owner of LARIAT, a WISP in Laramie, WY, May 21, 2009).

⁴³ See Wikipedia (2009b).

Deployment Act (2009), which would require the Federal government to install plastic conduit suitable for housing fiber links along every Interstate highway as it is repaired or rebuilt.⁴⁴ This may well help address the “middle mile” problem, in which ISPs, particularly in rural areas, face high costs of backhaul to carry their Internet traffic to the nearest Internet POP from incumbent network carriers who may face little competition. Helping to reduce the cost of installing backhaul fiber can certainly help small-town WISPs to be viable competitors.

A few years ago, municipal WiFi was all the rage, starting in Philadelphia, PA. Suddenly, municipalities around the country wanted to jump on the WiFi bandwagon. Today, we probably have more papers discussing the failure of municipal WiFi than municipal WiFi customers. Although the technology of unlicensed WiFi has been a success in its intended use within the home and office, it was not very good at something it was not designed to do: providing last-mile broadband connectivity.

Other municipal broadband projects have been successful, but the number is small. Lafayette, LA, and Burlington, VT, appear to be success stories, as noted in the FCC’s NOI. Under special circumstances, municipal entry into broadband may succeed, but it appears this will be a rather small market niche.

Generally, I do not expect another wireline carrier to provide broadband to a significant fraction of the U.S. population. As I noted in my previous analysis,⁴⁵ the rather high fixed costs of establishing a wireline broadband network limit the number of such competitors. But this analysis does not apply to wireless broadband networks because the fixed network costs are far lower than for wireline. This is not to say that the FCC should not attend to clearing away the municipal underbrush of entry barriers to wireline carriers, but it is to say that our expectations of wireline broadband entry should not be high.

Competition by Any Other Name . . . Another Regulatory Cul-de-Sac

As discussed above, the general policy consensus regarding broadband has been that, while platform competition would be great, we can’t expect it, so we must resign ourselves to having two platforms: cable and telco (DSL for now, with more FTTH or FTTN coming to market).⁴⁶ The facts and conclusions of the previous sections demonstrate that this is false, that additional platform competition from wireless broadband is well on its way, and that this competition will lead to the choice-rich market environment that is the Holy Grail of broadband policy. But the policy discussion in some quarters has moved away from platform competition to mandated platform sharing. If there were to be only two platforms, public policy should require that these platforms must be shared by non-owner ISPs, a policy which implies mandated wholesaling of the physical platforms, sometimes called unbundling or line-sharing. In this way, advocates say, we can have robust competition at the ISP level, if not at the platform level. They point to France, Germany, and Japan as models for the success of unbundling and suggest that

⁴⁴ Described in Anderson (2009). This idea was originally brought forward by Lennett and Meinrath (2009).

⁴⁵ Faulhaber and Hogendorn, op. cit.

⁴⁶ See Atkinson et al., op. cit.

the U.S. should adopt the same approach. Countries that unbundle, it is implied, do better than the U.S. in broadband penetration, and they are therefore worthy to emulate. As it turns out, the implication is false. Some countries that mandate unbundling do better than the U.S., but some do worse, such as Italy, Spain, and Ireland, so unbundling is not the panacea it is so often claimed to be.

But there is a darker side to unbundling: the owners of the conduit may not be happy about mandated wholesaling to their retail competitors, and so regulators must step in to 1) mandate wholesaling, 2) establish a wholesale price, 3) regulate the terms and conditions of service, and 4) ensure that conduit owners do not engage in anticompetitive conduct in their vertical markets. In other words, advocates would like the FCC to regulate this portion of the Internet just like the FCC regulated the old Bell System telephone monopoly. For those of us around at the time, we know that did not go so well, and it is likely to be a really bad idea to re-apply that tactic to the Internet, no matter how pure our intentions may be.

But if it works for France and Japan,⁴⁷ why shouldn't it work for America? Why should we be afraid of a little regulation if the outcome is positive for broadband deployment? Perhaps many economists regard regulation with suspicion, but if the bottom line is more and better broadband, then too bad for the economists; bring on the regulation and mandated unbundling.

There are two reasons why mandated unbundling is a regulatory cul-de-sac, both of which are supported by strong empirical evidence: 1) it won't work in the U.S., and 2) it will inhibit investment and competitive entry into the platform market.

Mandated Unbundling . . . We've Been Here Before

The Telecom Act of 1996 instructed the FCC to open the local exchange telephone market to competition by mandating local loop unbundling (LLU) of the local access lines owned by the incumbent local exchange carriers (ILECs). The FCC spent several years and many court cases before the rules for LLU were in place, and several more years of court challenges, during which the ILECs and their competitive counterparts roamed the FCC arguing their respective cases with Commissioners and staff. As the rules settled down and the court challenges subsided, the market for competitive local exchange carriers (CLECs) using LLU peaked at about 25 million subscribers in 2005, but their numbers have been in decline (along with ILEC lines) since then, down to about 17 million subscribers today (compared to 130 million ILEC lines).

⁴⁷ See Atkinson, et al. (op. cit.) for an excellent discussion of why unbundling appears to have worked well in these countries. One reason (among many) is that the government is the largest shareholder in the telecommunications company in each of these three countries. If the highest levels of government would like to see extensive broadband deployment, the companies can simply be ordered by their bosses to provide wholesale access to their lines at extremely low rates to jump-start the market. Since these companies feel little pressure from stock markets to show a profit, such strategies can succeed. Since U.S. companies are not government-controlled, it is unlikely that this model will work in America.

The tremendous legislative and regulatory effort spanning more than a decade to obtain competition through LLU in the U.S. has resulted in a market share for CLECs using LLU of about 11% of the wireline market. This highly regulatory model for introducing competition seems to have produced a rather modest result. But we can only conclude this if we have a non-regulatory, market-based benchmark with which to compare it. Do we have any evidence that the market can do better than the regulated LLU solution at introducing competition? Does the market for platforms outperform the unbundling solution, and what evidence do we have either way?

Fortunately, there are two natural experiments that have occurred over the past few years. The first is the introduction and extraordinary growth of wireless telephony, and the second is the introduction of VoIP, a service provided through a broadband provider. It has been argued that wireless voice is a complement to wireline voice, not a substitute for it, and so it does not really act as a competitor to wireline voice. But for customers who have a wireless phone but not a wireline phone, wireless really is a competitor to wireline. It is these customers who have opted for a market solution for wireline voice competition rather than the regulated CLEC alternative. The first natural experiment is to compare the number of subscribers with wireless only with the number of CLEC lines. The second natural experiment is to compare the number of VoIP customers with the number of CLEC lines. Putting the two together, I compare the total number of subscribers using market-driven substitutes (wireless only and VoIP) for wireline voice with the number of lines using the regulatory substitute (CLEC) for wireline voice. The results are shown in Table 1.

Table 1. Line Counts for Wireless Only, VoIP, and CLECs.

Wireless Only	VoIP	Total Market-Driven Lines	CLEC LLU/resale	Ratio: Market/Regulatory
54,607,444 ⁴⁸	16,300,000 ⁴⁹	70,907,444	16,993,000 ⁵⁰	4.17

The evidence compels us to accept that, for the Holy Grail of telephony, competition in the access line market, platform competition bested the regulatory unbundling solution. Market-based competition has yielded more than four times the results in wireline voice than did regulatory unbundling. Why would we think this would be any different for the Holy Grail of broadband? As a nation, we have tried regulatory unbundling and given it our best shot; it has come up far short of platform-based market competition. Let's try to not make the same mistake twice.⁵¹

⁴⁸ Percent of wireless only from Blumberg and Luke (2009). Total wireless subscribers from Roche and O'Neill (2009).

⁴⁹ From Sleek (2009).

⁵⁰ As of 12/31/07, reported in Federal Communications Commission (2008c). Total CLEC lines were 28.7M, of which 41% were CLEC-owned facilities; the remaining 59% are LLU/resale lines.

⁵¹ In an earlier paper, I analyzed four "experiments" in telecommunications policy designed to increase competition, concluding that mandated unbundling was a failed experiment (Faulhaber, 2003b). More recently, the eminent telecommunications economist Eli Noam (2009b) is now advising Europeans to

A second model for wholesale broadband is for the government to build a broadband network which would offer no retail ISP services, but instead sell capacity wholesale to ISPs and others. Such a network has been proposed recently for Australia by Prime Minister Rudd;⁵² private parties could invest in the venture, but the government would retain at least 51% ownership. The proposed fiber network would reach 90% of Australian households at speeds of 100 Mbps and cost US\$31 billion. The basic benefit would be that, if the government owned the network, then it could support a wholesale-only model. An analogy would be the American interstate highway system, in which the government builds and maintains the highway infrastructure which any private party can access with automobiles and trucks.

Does it make sense for any government to deploy such an extensive fiber network at this time? After all, the U.S. deployed the interstate highway system, why not a Federal broadband infrastructure? A recent article by Cleland (2009) debunks the idea, at least as applied to the U.S.; I need not repeat the arguments here. But two obvious points are evident after a moment's thought: 1) We already have a broadband network that reaches at least 92% of the nation's homes. Do we really need another one that is estimated⁵³ to cost around \$430 billion? And 2) broadband is an evolving technology; locking in, say, a fiber network today could look pretty silly if in eight years 70% of households are accessing the Internet via broadband wireless. By contrast, highways were and are a mature technology that would not become obsolete after the interstate system was finished.

In fact, the experiences of France, Germany, and Japan are instructive, in that the government of each of these countries is the largest shareowner in the incumbent telecommunications firm. These countries actually entered the broadband era with a quasi-governmental facilities provider which they converted to a wholesale model by decree. Further, the platform competition between cable and telcos that we have in the U.S. is virtually non-existent in these countries. Government control of the telcos in each of these countries made below-cost, mandated wholesale virtually the only model to provide any broadband competition at all.

It does not appear that a government-owned or controlled wholesale broadband infrastructure would make much sense at the current stage of broadband development in the U.S..

This should not be taken to mean that municipalities or local citizens' groups should be discouraged from entering the broadband market. While the experiences of municipalities providing broadband have been rather disappointing, groups of citizens may well find it useful to provide broadband locally. Indeed, many WISPs began as rural cooperatives, and there is no reason that underserved areas shouldn't be expected to provide for themselves, either under the aegis of local government or not. The Federal government should not discourage this entry where customers demand it; in fact, there are programs established by the Department of Agriculture's Rural Development Telecommunications Program

abandon this approach of separation and unbundling. His recommendation is based on his empirical research reported in Noam (2009a).

⁵² As reported in *The Wall Street Journal* (2009).

⁵³ Cleland, op. cit.

to assist in local rural broadband initiatives, either privately or cooperatively owned.⁵⁴ A further discussion on support for rural broadband continues below.

Transparency . . . the Sine Qua Non of Competition

This paper has argued that a vibrant competitive market for broadband (indeed, for any product or service) ensures that customers will have a choice-rich market environment, as well as that multiple providers competing for customers' business will offer a variety of features and functions from which customers will be able to choose their preferred bundle. In such a world, I have argued that there would be no need for the FCC, application providers, network providers, pundit and academics, consumer advocates, and various other interest groups to tell customers what's good for them. In a choice-rich market environment, customers can choose for themselves, and in doing so, America will have the best possible plan: the one that people have chosen for themselves.

But having many firms competing for customers' business is not all that is needed. Customers need to know what each firm is actually offering in the way of service: terms, conditions, exactly what they are delivering. They need to know if their network provider is managing traffic and, if so, how. They need to know what the rates for service are, as well as the terms; if their provider will cut off their service if they use "too much," what exactly does "too much" mean, and how can the customer track it? They need to know if their network provider has signed special deals with certain application providers to give them better or faster service, or perhaps a prominent place on their Web site ("preferred provider").⁵⁵ And they need to know if certain Web sites are not accessible via their ISP. Blocking Web sites may be quite beneficial, such as those that are known sources of viruses and worms, or that specialize in illegal activities, such as child pornography. However, there have been instances in which a network provider blocked the Web site of a union with which the company was engaged in a labor dispute,⁵⁶ or others in which a provider blocked/delayed specific applications for asserted reasons of network management.⁵⁷

⁵⁴ See Rural Development Telecommunications Program (2009).

⁵⁵ During the period of AOL's dominance of the online dialup market, AOL made commercial agreements with firms and application providers to be featured on the AOL client and thus drive AOL's retail customers to these firms and application providers. For example, AOL signed a deal in 2000 with Charles Schwab for Schwab to be featured in AOL's financial Web channels; see McGeehan (2000).

⁵⁶ See Austen (2005).

⁵⁷ In a very high profile case in 2007, Comcast was found to have delayed some BitTorrent traffic (a P2P service primarily used for sharing video files, such as movies). Comcast claimed it did so in order to manage the capacity on its network during peak periods. The allegations garnered so much publicity that the FCC launched an investigation, as reported in Paul (2008). Eventually, the parties were able to reach a mutually satisfactory agreement; see McCullagh (2008). I have recently argued that, had Comcast been more transparent about its practices, this incident would likely have played out very differently, most likely more favorably to Comcast, BitTorrent, and most important, to their mutual customers (Faulhaber, 2009). Whether the both the procedures that the Commission followed in investigating the Comcast matter and the application of applicable policies were consistent with law is a very different question that is now before the courts.

Additionally, some application providers have demanded that network providers pay them in order to be made available to the providers' customers.⁵⁸

Only if network providers are **transparent** in their customer terms and conditions will customers be able to make informed choices. Having lots of competition does not necessarily lead to a choice-rich environment. If customers are confused because firms are not forthcoming about what it is that they are actually selling and what it is that customers are actually buying, then competitive choice is severely blunted. In order for the competitive model to work as advertised, customers must be fully informed and able to choose. Only then can we count on competition to produce customer-value-enhancing results and yield a national broadband industry that is best for America.

To some extent, the market should even be able to solve this problem. For example, if one firm has a customer-friendly practice, and its competitor's related practice is very customer-unfriendly, the first firm has an incentive to advertise this difference and so inform customers. Of course, such advertising can invite reprisal, and it can become difficult for customers to sort out the arguments. So, as a practical matter, such advertising is rather rare.

Transparency should apply not just to network providers, but to application providers as well. Recently reported events involving application providers include Web sites that have used customer data without their knowledge (much less explicit permission) for "behavioral advertising," in which a customer's online behavior is used to target advertising to that customer. The privacy problems inherent in behavioral advertising have attracted the attention of the Federal Trade Commission, which has issued guidelines regarding online behavioral advertising (2009a). In 2007, Facebook, the popular social networking site, changed its privacy policy to permit more sharing of customer information with advertisers (among other changes). There was an immediate outcry among customers, orchestrated by the political activist group MoveOn.org, and Facebook immediately backpedaled on their policy.⁵⁹

There is a role for the government in ensuring that network providers and application providers — and indeed, all other Internet service providers — are fully transparent to their customers. As a matter of public policy, transparency from all players is the *sine qua non* for competition to have its desired effect.

The Internet is not the only industry in which transparency is important for the competitive market to work well; indeed, full and accurate information is a requirement for *any* market to function well. Economists refer to this potential market failure as *information asymmetry*, a condition in which consumers may know much less about a product than do its producers, and may make ill-informed

⁵⁸ ESPN360 is a Web site that carries overseas sporting events, either live or recorded. It blocks customers of network providers that have not paid for its service; the customers themselves have no option to pay for the content directly. See Wikipedia (2009c). I tested this on Mediacom Cable High Speed Internet and was able to access ESPN360, but I was denied access when using Comcast Cable High Speed Internet (although I understand that Comcast has recently agreed to pay for ESPN360).

⁵⁹ See Story and Stone (2007).

judgments and choices as a result. This is a quite legitimate area of regulation, and virtually all industries have some form of control over how they label their products and the claims they can make. Why should the Internet industry, including both network providers and application providers, be treated differently?

There is a long history of Federal and state consumer protection, much of it involving consumer labeling. Even highly complex products can be successfully labeled so that customers are well informed. Consider prescription drugs; these are highly complex products which demand a medical degree to be fully understood (if then), and yet customers need to be aware of the risks and benefits of each drug they use. To do so, the Food and Drug Administration (FDA) has developed a customer-friendly and usable labeling system.⁶⁰ The main risks are listed in brief on the label of the drug's container, and the full list of indications, risks, and dosage are listed in an extensive package insert. Should a customer wish for more information than is on the label, it is available in full detail in the package insert. Additionally, pharmacies also provide a level of benefit/risk detail when they dispense the medication, usually with telephone numbers to call for further information. If drug customers are not informed about the effects of their medication, it is not for lack of trying on the part of the FDA.

Additionally, the FDA and the Federal Trade Commission (FTC) have developed clear and succinct nutrition labeling for all packaged food sold in the U.S., listing calories per serving, protein, carbohydrates, sugar, cholesterol, etc. in a clear, uniform format (Food and Drug Administration, 2009). If food customers are not informed about the nutritional value of the packaged food they eat, it is similarly not for lacking of trying on the part of the FDA.

The agency most directly tasked with consumer protection is the FTC, which has always been in the forefront of consumer labeling.⁶¹ The FTC is the agency that sets standards for the conditions under which firms may use "Made in USA," or "organic," or "fair trade certified." They also have required commercial Web sites to post their privacy statements online. The FTC and the FCC have successfully cooperated in creating and managing the National Do Not Call Registry, so there is institutional experience in such a cooperative effort. Ensuring transparency in dealings between network and online service providers and their customers may also be an appropriate subject for a similar cooperative effort.

What are the key attributes of transparency? First, information must be communicated clearly and succinctly to customers, in language they understand. Second, the content must be relevant and meaningful to the decisions that customers must make. That means information ought to be presented in a form more readily understandable than the software industry's notorious End User License Agreement (EULA) that is largely incomprehensible to anyone without a J.D., but to which all customers must agree before they are permitted to access the software. Privacy policies and network management practices should also be readily accessible to customers. Network operators and application providers have taken steps in this direction, but more could be done in terms of standardization and readability.

⁶⁰ For a full description of the FDA prescription drug labeling requirement, see the Food and Drug Administration Center for Drug Evaluation and Research (2008).

⁶¹ See, for example, Federal Trade Commission (2008).

For instance, it may be helpful if the government could set standards for both the content of privacy policies as well as the format, so that (like packaged food labeling) customers could know what to expect. Perhaps the FDA drug labeling model could be used: a brief and usable statement directly on a Web site of the most important privacy issues, with a link to the "package insert"-style description of the details of the policy.

Similarly, the government could consider setting standards for the content and format of network providers' policies (again, perhaps with a brief description and a link to a complete, detailed description) so that customers can quickly learn what the network providers are actually providing. Is the network provider using network management? Under what conditions? What is the pricing policy? Under what conditions will the network provider reduce a customer's bandwidth, or even bump them off the network? Are certain Web sites blocked? Which ones? Does the network provider offer faster/preferred service to some application providers? No doubt, the FCC could be very helpful in determining what items ought to be disclosed.

Specifying an appropriate government role in ensuring transparency helps the industry as well as the customers, in that each firm can be assured of a level playing field with regard to disclosure. Clearly, the industry itself must be involved in establishing the transparency standards, as well as technical experts and actual customers.

Another mechanism that could be helpful would be for the FTC/FCC to establish a list of questions (FAQs) that firms should be able to answer for their customers. Every firm could prominently link to this standard FAQ list, in which they would provide answers to these standard questions. Standardization of the FAQs would be helpful to customers' understanding; firms could add Q & As if they wished.

For the application provider market, the FTC has already directed some effort toward this (in requiring stated and public privacy policies). More needs to be done, though, as privacy issues become more salient to customers. For the network provider market, it would appear that questions generally related to net neutrality are those most in need of transparency. If customers are to decide between and among non-discrimination, blocking of certain Web sites, network management practices, and business arrangements with application providers to provide differential service and access, then they need to know exactly what the various providers' policies are.

Is there a legitimate economic role for such intervention in promoting transparency? The market failure of asymmetric information is well-known and described in basic economics textbooks. The role of the government in seeking to correct this market failure is also well-known and is institutionalized in such agencies as the FTC and the FDA, and it applies across a broad swath of industries. The call for transparency for both network providers and application providers in the broadband market is neither more nor less than what we expect our government to do to correct this market failure.

It is worth noting, yet again, that the role of the government in encouraging transparency is to solve the information asymmetry problem, so that customers can make informed choices.⁶² It is not to make those choices for them. If a particular network provider, for example, offers its customers aggressive spam, worm, and virus blocking, as well as aggressive network management, it is not up to the government to forbid it from doing so. It is the role of the government to ensure that customers are fully aware of these firm policies and can choose to accept them or move their custom to a competitor. Likewise, if an application provider collects personal information from customers and shares it with "trusted" third parties, it is not up to the government to forbid it from doing so. It is the role of the government to ensure that customers are fully aware of these firm policies and can choose to accept them or move their custom to a competitor. It is the customers' choice, not the choice of regulators, legislators, network or application providers, pundits, advocacy groups, law professors, or business school professors.

Antitrust and Regulation

Is competition plus transparency enough to ensure a choice-rich market environment for customers? Almost, but not quite. For this plan to function properly, a third component is required: antitrust and regulation.

Antitrust

In this environment, vigorous antitrust enforcement is important, particularly during the transition in the broadband network provider market from only two providers to more facilities-based providers (most likely, wireless broadband). During this period, it is of special concern that incumbents not engage in anticompetitive practices that may throttle newly emerging competition. The Obama Administration has signaled its intent to pursue vigorous antitrust enforcement. But it has been clear that the focus is not on protecting competitors, but on "the protection of consumer welfare,"⁶³ according to Christine Varney, the new head of the Department of Justice Antitrust Division. Antitrust protects the customer by protecting the competitive market; as stated on the Federal Trade Commission's (2009b) Web site, "The . . . Bureau of Competition champions the rights of American consumers by promoting and protecting free and vigorous competition." And free and vigorous competition is all about customer choice.

Antitrust principles should not deter firms from aggressively competing, but it should deter firms from undermining the competitive market. Competitors who are unable to successfully establish a market position because they are out-competed have no antitrust beef. However, network or application incumbents who attempt to monopolize the market through anticompetitive practices should expect a visit from the DoJ's Antitrust Division.⁶⁴

⁶² The new Administration is likely to be tougher on privacy issues, as reported in Hansell (2009).

⁶³ As reported in Lohr and Helft (2009). The article goes on to describe the new strategy of antitrust enforcement, with the focus on consumer welfare.

⁶⁴ In an agreement between the DoJ and FTC announced in 2002, the DoJ has clearance authority over both cable and telecommunications mergers. See Department of Justice (2002).

Additionally, there are provisions for private antitrust suits, so that a party who believes they are the victim of anticompetitive practices may sue the alleged offender, with the incentive of possible treble damages. In an industry subject to regulation, the viability of private antitrust suits has been called into question by the recent *Verizon v. Trinko* case.⁶⁵ But private antitrust suits can still be a viable means of disciplining errant incumbents in any industry.

Regulation

In an industry with platform competition on its way, full transparency enforced on all Internet industry segments, and vigorous antitrust activity to protect customers against anticompetitive actions, what role is there for regulation?

The key role for the FCC will be creating the market infrastructure in which this desired state of affairs can evolve and blossom. This certainly includes putting much more spectrum to auction, so that wireless broadband has the room to expand, as the market participants are so anxious to do. It also includes working with the FTC to establish guidelines for transparency; the FCC alone has the technical and industry expertise to know what features of broadband network providers and application providers customers are likely to need to know. It must also stand ready to assist the DoJ with technical and industry expertise in pursuit of antitrust activity.

But it is not the role of the FCC to decide for customers what they ought to want. Network Neutrality? A favorite policy of many advocates, certainly, but neither the advocates nor the FCC should decide whether or not customers want net neutrality; it is up to customers. If net neutrality turns out to be highly desired by many customers, then in a competitive market, there will be at least one firm who will offer it, and it will be successful. And if it is successful, other firms will emulate it. Similarly, if customers want non-discrimination, or spam blocking, or no network management, competition and transparency will yield this result. And they will do so, not out of the goodness of their hearts, nor out of their belief in the sacrosanct dictum of Internet openness, but rather because it is in their own commercial self-interest to do so.⁶⁶

But aren't some regulations a good idea? Absolutely. I argue above for rigorous transparency regulation and rigorous spectrum management regulation. But all regulations that effectively constrain the behavior of firms must, *of necessity*, reduce their earnings, thereby reducing their incentives to invest (for incumbents) and reducing incentives for entry (for new entrepreneurs). This is a very simple proposition; if a regulator constrains a firm to do things it otherwise would not do, or prohibits it from doing something

⁶⁵ See, for example, Phil Weiser (2005).

⁶⁶ A principle that dates back to the father of modern economics, Adam Smith:

It is not from the benevolence of the butcher, the brewer, or the baker, that we expect our dinner, but from their regard to their own self-interest. We address ourselves, not to their humanity but to their self-love, and never talk to them of our own necessities but of their advantages. (Smith, 1776)

it would like to do, then whatever beneficial result might follow, the costs of the firm are increased or the revenues of the firm are reduced, or both. Otherwise, firms would have chosen to do it without regulatory compulsion. Thus, earnings will be lower, investment will be cut back, and entry will be deterred. From a policy perspective, this means less broadband; less competition; and therefore, less choice for customers.

If the benefits which accrue from a regulation promise to outweigh the costs, then, by all means, adopt the regulation. But the test should be rigorous and experience-based. For example, I recommend above regulations regarding transparency and provision of information to customers by both network providers and application providers. These regulations no doubt have costs; it is less costly to operate a business with no disclosure requirements. But full disclosure helps solve a market failure of asymmetric information, and experience in many industries (as discussed above) suggests that these regulations create far more benefit to customers than the costs they impose.

However, imposing regulations that make customers' choices for them is costly in several ways. For example, requiring network providers to open their networks to other ISPs is certainly costly for network operators. Beyond that, establishing a regulatory standard (for "openness") freezes possible alternative architectures which may prove superior in the future. Additionally, and most important, there is the cost to the customer who no longer has the ability to choose, to make the trade-offs by which his preferences are expressed. Lastly, it increases the cost of entry into the network provider market. With such a proviso in place, would wireless broadband operators wish to enter such a market? Would they not be better staying in their current niche of the low-bandwidth mobility market? Our experience with unbundling telephone access suggests that it was a costly experiment with little benefit to customers, especially when compared with alternative means of bringing competition to market.

Two studies suggest the cost of regulations in terms of entry and investment. First, the Faulhaber-Hogendorn paper,⁶⁷ which models and estimates broadband market structure, examines the imposition of a regulatory constraint of "universal" coverage, and finds that this constraint delayed broadband rollout by several years and resulted in a monopoly broadband market, rather than the two or three providers that would occur without the regulatory constraint. The result of the regulation was marginally more broadband coverage, but with significantly higher prices and no competition.

Second, an empirical event study by Eisenach, et al.,⁶⁸ examines the impact on the stock price of incumbent telephone companies on February 20, 2003, when the FCC voted to extend unbundling requirements for telco broadband (actually, permitting the states to impose it) after expectations that the requirement would be lifted. As a result of this unfavorable ruling, Eisenach et al. find that the combined market capitalization of the incumbent telephone companies dropped by \$15 billion. This is strong empirical evidence that imposing a regulation makes the enterprise a less attractive business, both reducing incentives to invest in this now-less attractive business and reducing incentives for new entrants who may be subject to the same regulations.

⁶⁷ Faulhaber and Hogendorn, op. cit.

⁶⁸ J. Eisenach, P. Lowengrub and J. Miller (2008).

Care must be the watchword in introducing regulations: Do they enhance customer choice? At what cost? What empirical or experiential evidence do we have that benefits outweigh the costs? In crafting a broadband national plan, the FCC must have compelling evidence that the benefits outweigh the costs of imposing entry barriers and investment barriers.

Competition + Transparency + Antitrust = National Broadband Plan

Putting together the three components makes for a viable national broadband plan. It is a plan based on the choices that the American people make themselves, not choices others make for them. It is a plan that puts the power and the decision-making into the hands of customers, one that ensures they have the choices they need to make the best decisions for their own welfare. It is a plan that is firmly rooted in the American tradition of competition and individual customer choice, and it harnesses the extraordinary innovative power of the private sector to serve the public good.

But will it ensure that the U.S. moves up the league tables of the OECD to be #1? The answer to this is simple: If U.S. customers want to be #1, then this will be a natural outcome of vigorous and vibrant competition. If they don't, then it won't happen. Whether the U.S. becomes #1 in the OECD or other ranking may matter to pundits, but it may not matter much to regular Americans.⁶⁹ The value of a vigorously competitive market is that it reveals what customers actually want, not what pundits want.

Some may have difficulty accepting this. It may be argued that the rather inhibiting fact that only 74% of American homes own a home computer is a disgrace, and that we need to remedy this before we can expect more extensive broadband penetration. It has been argued that perhaps some Americans really don't know what's good for them, and that we should do everything we can to get them to buy computers and sign up for broadband. Are we doing enough to ensure computer literacy in the U.S.? Certainly our public schools are familiarizing our young with computers, and certainly computer retailers and broadband providers have every incentive to educate the non-consuming public of the value of their wares. Most interesting is the role of local not-for-profits in overcoming the digital divide by encouraging computer literacy.⁷⁰ It is not clear that the Federal government will do a better job of increasing computer/Internet literacy on its own, relative to these other mechanisms.

Other countries have used a mix of incentives and public sector supply to increase the use of computers and broadband. Robert Atkinson discussed the public policies of Sweden, France, Korea, and Japan to encourage computer and Internet literacy,⁷¹ with measurable results. Perhaps the Federal

⁶⁹ The most recent Pew Internet and American Life Project report (2008) includes an analysis of why some Americans don't buy broadband. The results suggest that bringing more citizens online may not be easy, even with financial incentives.

⁷⁰ Out of the ashes of the failed Philadelphia WiFi initiative, Wireless Philadelphia has morphed into the [Digital Impact Group](#), changing its focus from network provision to teaching computer and Internet literacy in low-income groups in Philadelphia.

⁷¹ Atkinson, et al., op. cit

government could establish a joint program with the computer and Internet industries (which have the most to gain) to increase computer/Internet literacy in the United States. Such a program would certainly not hurt competition, and it may help; at worst, it would do no harm, and at best might have a positive effect.⁷²

What about innovation? Does it ensure that the Internet will continue to generate innovation, as it has in the past? Of course, no plan can guarantee that inventors will continue to invent, but it can guarantee that the Internet market will be innovation-friendly. And there is no better guarantee of this than competition. If innovators have multiple platforms across which they can introduce new products and services, they will be as well-served as customers by competition. Network providers should welcome innovators, as they add value to the network providers' product, which is access to the entire Internet.

What about pricing? Current pricing practices of ISPs feature "all-you-can-eat" pricing for customers, generally with higher prices for faster speeds and no pricing for application providers who access their customer through terminating broadband facilities. It is unlikely that this pricing practice is sustainable in the long run; the great disparity of customer usage makes a single price regardless of usage untenable. Also, we already see application providers charging network providers in the case of ESPN360; could other application providers be far behind? And what of network providers charging some application providers? Pricing Internet services is still in its infancy and will evolve, in my view, in the near future.⁷³ In a competitive market with transparency by all, whatever pricing structure emerges will have to be acceptable to customers (on both sides of the market) and reflect the underlying costs of doing business. We must not seek to lock in an early pricing practice; let this market evolve, and with competition and transparency, customers will be well-served. They will not be well-served if regulators lock in a particular pricing practice now.

This is a national broadband plan that trusts the American people to make good choices for themselves. It is a plan that doesn't have "experts" making decisions for ordinary people, and it doesn't condescend to its citizens. It puts the information they need into their hands (transparency), it make sure they have enough choices (competition), and it protects them against anticompetitive actions (antitrust). It is a uniquely American broadband plan, in that it relies on American genius for innovation.

⁷² One might expect that, if resources are to be committed to educating the public on what's good for them, one ought to start with encouraging good nutrition, discouraging the use of alcohol, tobacco, drugs, and credit card debt, and encouraging school children to do better in math and science. Broadband education might be fairly low in this list.

⁷³ Pricing is one of many economic questions regarding Internet market structure, including vertical foreclosure, two-sided markets, "preferred provider" contracts, and network management practices, all of which I discuss in Faulhaber (2007). I conclude that the potential for anticompetitive practices requires antitrust vigilance, and that antitrust is a more suitable remedial mechanism than regulation.

Rural Broadband

If 92% or more of American households have access to at least one broadband provider, then it appears that the problem of broadband for rural America is maybe not so big. Perhaps, but also perhaps not if you happen to be *in* rural America, and you want broadband and can't get it. Is this a large proportion of rural households? We don't know. But it is for these folks that we seem to be offering subsidies to rural telephone companies and other providers (see American Recovery and Reinvestment Act, 2009). The idea seems to be that giving money to carriers to build broadband facilities will extend the reach of broadband (beyond the 92% of households that already have access to it), and that these households will actually want broadband and be willing to buy it. We are thus following in the footsteps of the traditional telephone Universal Service Fund, a fund which takes money from some carriers and gives it (generally) to rural carriers. The hope is that, somehow, this money will result in lower telephone rates to rural subscribers.⁷⁴

Is there a more efficient way to subsidize rural people who may need broadband and either can't get it or can't afford it? As it turns out, there are several options. First, wireless ISPs seem particularly well-suited to rural areas. A most interesting case involves Stelera Wireless, a firm which has 45 rural AWS spectrum licenses, and which is offering broadband service in Floresville, TX and Ploth, TX, as well as Grand Junction, CO and nearby towns. Stelera was helped by a \$35 million business loan from the Department of Agriculture's broadband loan program, and these towns now have high-speed Internet access, thanks to an enterprising entrepreneur who has a business model,⁷⁵ some spectrum to work with, and a start-up loan from the Federal government.

The second option is more unconventional, but it should be obvious once you put the customer at the center of a broadband national plan. If the problem is that customers are unable or unwilling to pay for costly broadband service, then give the money to customers, and let them make their choices. Giving money to carriers simply enriches carriers, with perhaps some small benefits redounding to customers. But giving money to customers explicitly for buying broadband puts them in the driver's seat. How might this work? Suppose we were able to give, say, \$50/month to households who 1) lived in a rural ZIP code, 2) had an adjusted gross income less than \$X, and 3) bought broadband service. Then, if a local wireless or cable company offered broadband at, say, \$70/month (because it may be expensive to serve a sparsely settled area), and if the problem has been affordability, the customer could choose to buy the service for a net of \$20/month out of pocket (or at some other amount commensurate with what their urban cousin pays). If the problem has been that the cable or wireless ISP offers no service, then the government providing broadband support to an entire unserved community makes that community an attractive market; an ISP could now sell broadband for, say, \$80/month (remember, rural service is costly to provide), with residents needing to only pay \$30/month out of pocket. Putting broadband purchasing power in the hands of customers makes them attractive customers for network providers, perhaps even enough providers to give customers competitive choices. Now, if the problem was that some customers

⁷⁴ The inefficiencies of this program are documented in detail in Hazlett, *op. cit.*

⁷⁵ Stelera's Web site includes an interview with CEO Ed Evans describing his markets and his business plan.

neither wanted nor needed it, then it would make little sense to build a network to accommodate them, which would still be the outcome of using this direct-to-customer subsidy plan.

How might the mechanics of such a subsidy work? Again, there are several options. Since the Department of Agriculture already has multiple subsidy programs aimed at rural areas, they could administer a plan in which rural customers would send their broadband bills to the Department receive a check in the mail. Alternatively, the rural broadband provider, after approval of the customers, could be directly reimbursed for a portion of each customer's monthly bill. Perhaps a more efficient subsidy scheme would be to give each customer who lives in a rural ZIP code, and whose income is below some cutoff, a Federal income tax credit. Broadband providers would issue the equivalent of a Form 1099 each year (also reported to the IRS) that would verify that the taxpayer had purchased broadband and was entitled to the tax credit. Since the IRS already manages a dizzying array of tax deductions and credits, they have the administrative skills and capacity to manage this subsidy program.

This broadband subsidy program is similar to the telephone Lifeline program, which provides a subsidy of up to \$10/month, with eligibility determined state by state. There are maximum income requirements to participate. Of course, this is an income-specific program, not a rural-specific program, but the principle can apply equally well for a rural subsidy. This program is paid for from the Universal Service Fund.

Last, the problem of the "middle mile": "Backhaul" is the transmission of data/voice from an ISP or cell tower to an Internet Point of Presence or other network gateway. In rural areas, this typically means using a facility such as fiber or microwave from a small town to a larger city, perhaps dozens of miles distant. There may only be facilities owned by an incumbent; because of very limited market size, competitive alternatives are too costly. As a result, high backhaul costs may pose a significant barrier to entry and expansion of service for rural ISPs. This problem may impact independent rural mobile providers, as well as rural ISPs.

Fortunately, the market for backhaul systems and services for both mobile providers and ISPs appears to be improving. Noteworthy is Verizon's aggressive wholesale marketing of fiber and Ethernet backhaul facilities, via its wholesale subsidiary Verizon Partner Solutions.⁷⁶ This is especially interesting, in that an incumbent telecommunications firm is offering wholesale services for good business reasons, rather than because of mandated wholesaling. Although these initial indications regarding emerging competition for backhaul in rural areas are promising, the FCC and antitrust authorities should be vigilant for anticompetitive practices in this market.

An interesting and welcome development is the introduction by Rep. Anna Eshoo (D-CA) of the Broadband Conduit Deployment Act of 2009 (op. cit.) which would require the Federal government to install plastic conduit suitable for housing fiber links along every Interstate highway as it is repaired or

⁷⁶ See Mohny (2009). This service is particularly targeted toward 4G broadband wireless, as current backhaul technologies, such as T1, do not have sufficient bandwidth to handle 4G services. Many other companies offer wireless backhaul equipment and services.

rebuilt. Should this conduit be made available at low cost to any carrier (including independent ISPs), the substantial backhaul barrier to entry in rural areas would be removed, at least where conduit is deployed.

A customer-centric rural subsidy follows directly from the principle of giving the customer the power to make his or her own decisions. It promises efficiency gains, because only customers that want to buy broadband will actually sign up for the subsidy, and it effectively targets rural areas, especially those in need. It reverses the logic of the FCC's classic supply-side subsidy model of giving money to firms in hopes that customers will benefit, substituting a demand-side subsidy model of giving money to a targeted group of Americans who we wish to help to expand their broadband purchasing power.

Conclusion

The central principle of this paper is that, for a national broadband plan to fulfill the needs of Americans, it must be **customer-centric**; the plan must put customers at its center, enabling them to make the decisions about what they want and what they need — not regulators, not legislators, not pundits, not consumer advocates, not interest groups, not legal scholars, and not even business school professors. The role of regulators is to create a **choice-rich market environment for customers**, according to these four principles:

1. Encourage broadband competition by auctioning lots of licensed spectrum, at least 1 GHz. Wireless firms have already strongly signaled their willingness to enter the broadband market in significant numbers; the most significant barrier to entry is the availability of licensed spectrum, one that it is well within the power of the FCC to remove forthwith. After large amounts of licensed spectrum are placed in the market, expect a fully competitive market to emerge within five years.
2. Establish transparency regulations for all players in the Internet market, both network providers and application providers. Full disclosure requirements are best established and administered through joint effort of the Federal Trade Commission and the FCC. Disclosure should, first and foremost, be designed to communicate the terms and conditions of service and privacy to ordinary customers clearly and completely.
3. During the transition to full competition, antitrust vigilance guarding against anticompetitive conduct is important to ensure that competition is not throttled. Antitrust is designed to protect competition, not competitors. We expect fierce competition for customers' business. Weak competitors may die as a result, and that's OK. The Department of Justice should, and will, focus on ensuring that the marketplace remains competitive.
4. Focus rural and low-income subsidies on customers who are in need of help, not on companies. This ensures that subsidies go only to those in need who actually want the service, increasing both the efficiency and the effectiveness of the rural subsidy program. While this might appear obvious, it is almost an 180° change in approach from traditional telephone subsidy programs.

Deployment of broadband access has already resulted in 92% coverage of American households, so it appears that the rural deployment issue is manageable.

Regulation needs to be focused on creating a market infrastructure in which competition among firms is the order of the day. Customers win, innovators win, and firms win. Regulators will do what they can do best, as described in the four points above. Similarly, private firms will do what they do best, which is bringing services and technologies to customers; a competitive market with transparency ensures that customers will get what they want and need.

Focusing on where America stands in international "rankings" of broadband is a fruitless distraction. What matters to this country is that Americans should get the broadband they want — not what the French want, not what the Koreans want, not what the Japanese want; what Americans want. It is up to the FCC to build a national broadband plan that lets Americans choose the broadband they want.

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