

Achieving Bandwidth Abundance: The Three Policy Levers for Intensifying Broadband Competition

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I. INTRODUCTION

Broadband competition generates many discussions and speeches. In the last couple years, the three most important speeches were by current Federal Communications Commission (FCC) Chairman Tom Wheeler,¹ then-FCC General Counsel Jon Sallet,² and then-Assistant Attorney General Bill Baer for the Department of Justice's Antitrust Division.³ All three made policy pronouncements on regulatory approaches and merger analysis consistent with their official positions and actions.⁴

This Article represents a progress report from the field, deriving its data from game theory and lessons learned while working in the government on both the Telecommunications Act of 1996 and the National Broadband Plan,⁵ as well as broadband competition initiatives such as Gig.U and Republic Wireless.⁶ While my thoughts are consistent with those speeches,⁷ they are in conflict with a great deal of what others have said about competition and broadband.

Two illustrations of that conflict:

1. Techdirt blogger Karl Bode's article argued that Google Fiber proved the worthlessness of the National Broadband Plan,⁸

1. Tom Wheeler, Chairman, FCC, Prepared Remarks at 1776 Headquarters: The Facts and Future of Broadband Competition (Sep. 4, 2014), https://apps.fcc.gov/edocs_public/attachmatch/DOC-329161A1.pdf.

2. Jon Sallet, General Counsel, FCC, Remarks at the Telecommunications Policy Research Conference: The Federal Communications Commission and Lessons of Recent Mergers & Acquisitions Reviews (Sept. 25, 2015), https://apps.fcc.gov/edocs_public/attachmatch/DOC-335494A1.pdf.

3. Bill Baer, Assistant Attorney General, Keynote Address at the Future of Video Competition and Regulation Conference Hosted by Duke Law School: Video Competition: Opportunities and Challenges (Oct. 9, 2015), <http://www.justice.gov/opa/speech/assistant-attorney-general-bill-baer-delivers-keynote-address-future-video-competition>.

4. See generally Wheeler, *supra* note 1; Sallet, *supra* note 2; Baer, *supra* note 3.

5. Telecommunications Act of 1996, Pub L. No. 104-110, 110 Stat. 56 (codified in scattered sections of 47 U.S.C.); FCC, CONNECTING AMERICA: THE NATIONAL BROADBAND PLAN (2010), <http://download.broadband.gov/plan/national-broadband-plan.pdf> [hereinafter NATIONAL BROADBAND PLAN].

6. Gig.U refers to the University Community Next Generation Innovation Project, which is intended to allow research universities, in partnership with their local communities, to "create a critical mass of next generation test beds by accelerating the offering of ultra high speed network services and applications." *About, GIG.U*, <http://www.gig-u.org/about/> (last visited July 12, 2016). Republic Wireless is a "hybrid phone service [that] mostly uses Wi-Fi as its primary network with cellular service as a backup." David Ranii, *Raleigh-Based Republic Adds Cellular Network, New Phones*, NEWS & OBSERVER (May 11, 2016, 3:47 PM), <http://www.newsobserver.com/news/business/article77009072.html>. Its goal is to "make enjoying the features of a smartphone more affordable and accessible for everyone." *How to Use the Online Store*, REPUBLIC WIRELESS, <https://republicwireless.com/faqs/> (last visited July 12, 2016).

7. Wheeler, *supra* note 1; Sallet, *supra* note 2; Baer, *supra* note 3.

8. See Karl Bode, *Google Fiber Has Accomplished More for Broadband Than Our National Broadband Plan Ever Did*, TECHDIRT (July 9, 2015, 6:23 AM), <https://www.techdirt.com/articles/20150628/13060131486/google-fiber-has-accomplished-more-broadband-than-our-national-broadband-plan-ever-did.shtml>.

ignoring how the Plan stimulated the Google's Fiber effort, how both Google and the Plan made similar recommendations for policy changes, and most of all, how his own proposal—unbundling—would have killed Google Fiber;⁹ and

2. Former FCC chairman Julius Genachowski's speech articulated the need for Gigabit networks,¹⁰ but did not offer any analysis as to why these networks nor any strategy for getting them deployed are in place, other than to "challenge" cities and states to build them,¹¹ as if the only thing preventing such development was his personal failure to challenge cities or the only power the FCC had was to request such action.

There are critiques on the substance of these pieces elsewhere,¹² but in short, what Mr. Bode and Chairman Genachowski have in common is a belief in the magic of words, as if the incantation of the word "competition" or "gigabit," if said enough, or loudly enough, is a substitute for a realistic plan followed by concrete steps to achieve it.¹³

Sadly, much of the commentary on the topic suffers from a similar flaw.¹⁴ This fundamental aspiration error¹⁵—the mere statement of aspiration correlates to the desired change—affects much of the debate about broadband. Those who commit this error only wish to own a narrative, instead of owning the problem.

9. *Id.*

10. See News Release, FCC, FCC Chairman Julius Genachowski Issues Gigabit City Challenge to Providers, Local, and State Governments to Bring at Least One Ultra-Fast Gigabit Internet Community to Every State in U.S. by 2015: FCC's Broadband Acceleration Initiative to Foster Gigabit Goal (Jan. 18, 2013), https://apps.fcc.gov/edocs_public/attachmatch/DOC-318489A1.pdf [hereinafter *FCC's Broadband Acceleration Initiative*].

11. *Id.*

12. See Blair Levin, *What Have We Learned from Google Fiber?*, CNET (July 31, 2015, 9:55 AM PDT), <http://www.cnet.com/news/what-have-we-learned-from-google-fiber/>; see also Blair Levin, *Why It's Time for the U.S. to Get Serious About Its Broadband Problem*, GIGAOM (Jan. 17, 2014, 3:50 PM PDT), <https://gigaom.com/2014/01/17/why-its-time-for-the-u-s-to-get-serious-about-its-broadband-problem/>.

13. See Bode, *supra* note 8; *FCC's Broadband Acceleration Initiative*, *supra* note 10.

14. See James Surowiecki, *The Wait-for-Google-to-Do-It Strategy*, MIT TECH. REV. (June 23, 2015), <https://www.technologyreview.com/s/538411/the-wait-for-google-to-do-it-strategy/>; John Cassidy, *We Need Real Competition, Not a Cable-Internet Monopoly*, NEW YORKER (Feb. 13, 2014), <http://www.newyorker.com/news/daily-comment/we-need-real-competition-not-a-cable-internet-monopoly>; Kevin Drum, *What the Broadband Industry Really Needs Isn't Net Neutrality. It Needs Competition*, MOTHER JONES (Feb. 24, 2015, 12:20 PM), <http://www.motherjones.com/kevin-drum/2015/02/what-broadband-industry-really-needs-isnt-net-neutrality-it-needs-competition>; Kate Cox, *Here's What the Lack of Broadband Competition Looks Like on a Map*, CONSUMERIST (Mar. 7, 2014), <https://consumerist.com/2014/03/07/heres-what-lack-of-broadband-competition-looks-like-in-map-form/>.

15. This is different than a fundamental attribution error, where "social perceivers attribute other people's behavior primarily to dispositional causes, rather than to situational causes." Glenn D. Reeder, *Fundamental Attribution Error / Correspondence Bias*, OXFORD BIBLIOGRAPHIES (Mar. 19, 2013), <http://www.oxfordbibliographies.com/view/document/obo-9780199828340/obo-9780199828340-0114.xml>.

Actual change starts with owning a problem, which requires starting with a framework, engaging in action, allowing for experimentation and course correcting in light of evidence.

The trial and many errors of my own work have led me to believe in the following bottom line: the *highest* priority for government broadband competition policy ought to be to lower input costs for adjacent market competition and network upgrades.¹⁶ The greatest opportunity to do so is to create a virtuous cycle of upgraded mobile stimulating low-end broadband to upgrade, which in turn stimulates an upgrade of high-end broadband, which uses its assets to enter mobile and accelerates the need for mobile to further upgrade.

II. THREE QUESTIONS TO UNDERSTAND THE POLICY LEVERS FOR INTENSIFYING BROADBAND COMPETITION

My purpose in this Article is to move the broadband competition discussion away from aspirational statements to focus on the reality of how to create incentives for enterprises to invest in the faster, cheaper, better delivery of bits. In order to address this reality, this Article will focus on the following three questions:

1. What do we want broadband competition to accomplish?
2. Where does broadband competition come from?
3. Given the current market, what are the appropriate government levers to intensify competition at this part of the cycle?

A. *What Do We Want Broadband Competition to Accomplish?*

Competition is generally thought of as the means, not the ends, of improving consumer welfare.¹⁷ That is, competition is the most likely means to deliver the optimal goods and services.¹⁸

In the debate leading up to and in the implementation of the Telecommunications Act of 1996, the vision was of increased competition in

16. Some could argue that closing the adoption gap, sometimes referred to as the digital divide, should be a higher priority for broadband policy. See Press Release, General Assembly, 2d Comm., Closing Digital Divide Critical to Social, Economic Development, Delegates Say At Second Committee Debate on Information and Communications Technologies, U.N. Press Release GA/EF/3432 (Oct. 28, 2015); Letter from Calvin Smyre, President, Nat'l Black Caucus of State Legislators, to David Honig, Gen. Counsel, Broadband Opportunity Council (Nov. 8, 2009), <https://www.scribd.com/document/22825832/Black-Elected-Officials-Urge-FCC-to-Keep-the-Digital-Divide-in-Mind>. Although I agree that it ought to be a high priority for the policy, I am focused here on competition. While bringing more customers to the market will help with the competition issues, it will not, in and of itself, drive the network upgrades that I believe are necessary.

17. See COUNCIL OF ECON. ADVISERS, BENEFITS OF COMPETITION AND INDICATORS OF MARKET POWER 2 (2016), https://www.whitehouse.gov/sites/default/files/page/files/20160414_cea_competition_issue_brief.pdf.

18. *Id.*

all communications markets, but most of the debate focused on the voice market.¹⁹ The outcome sought was clear: lower prices.²⁰

Broadband is different. There are a number of variables competition should deliver.²¹ The two most prominent are lower prices and improved performance.²² However, ubiquity, security, privacy protection, and providing a platform for free and diverse speech, among others, are also desired outcomes.²³

Optimizing broadband for multiple factors complicates its policy decision making than when aiming for a single goal.²⁴ Different policies can deliver better outcomes on some metrics and worse outcomes on others, requiring decisions about priorities and trade-offs for which there may be no “right” answer.²⁵ This makes competition more important as competition can optimize for multiple factors according to what customers want more adroitly than a policy process.

19. See Nicholas Economides, *Telecommunications Regulation: An Introduction*, in THE LIMITS AND COMPLEXITY OF ORGANIZATIONS 48, 50-51 (Richard R. Nelson ed., 2005); see also 47 U.S.C. §§ 251-261 (2012).

20. In both vision and specifics it succeeded, but not necessarily in a way that reflected the most heavily-debated provisions: the 14-point checklist for local exchange entry into long distance. Telecommunications Act of 1996 § 151, 47 U.S.C. § 271(c)(2)(B). Wireless and Voice over Internet Protocol (VoIP) entry, as discussed below, turned out to be bigger factors. See Kevin Werbach, *Using VoIP to Compete*, HARV. BUS. REV., Sept. 2015, at 140 <https://hbr.org/2005/09/using-voip-to-compete>.

21. See *Strategic Plan of the FCC*, FCC, <https://www.fcc.gov/general/strategic-plan-fcc> (last visited Aug. 8, 2016) [hereinafter *Strategic Plan of the FCC*].

22. This is generally expressed in terms of greater bandwidth. See *Speedtest Market Report – United States*, SPEEDTEST (Aug. 3, 2016), <http://www.speedtest.net/reports/united-states/>; *Measuring Broadband America – February 2013*, FCC, <https://www.fcc.gov/reports-research/reports/measuring-broadband-america/measuring-broadband-america-february-2013> (last updated Apr. 16, 2013). History will probably regard this as the least important use of next-generation networks, recalling Henry Ford’s alleged comment that before he produced his cars, his customers, if asked, would have said they wanted “faster horses.” *Henry Ford: Quotable Quote*, GOODREADS, <http://www.goodreads.com/quotes/15297-if-i-had-asked-people-what-they-wanted-they-would> (last visited July 12, 2016).

23. See *Strategic Plan of the FCC*, *supra* note 21; NATIONAL BROADBAND PLAN, *supra* note 5, at xii.

24. I personally encountered this when I was involved in cable rate regulation, as called for in the 1992 Cable Act. See Cable Television Consumer Protection and Competition Act of 1992 § 19, 47 U.S.C. § 548. To the extent the law sought to lower prices, that was relatively easy, and the February 1994 decision did so initially. See generally Implementation of Sections of the Cable TV Consumer Prot. & Competition Act of 1992, *Third Order on Reconsideration*, 9 FCC Rcd 4316 (1994). But the law also, correctly in my view, wanted the cable industry to be able to continue to invest in more and better programming. The initial price cuts were then reversed by the “going forward” rules, which allowed such investments. Optimizing for both proved difficult, if not impossible, for rate regulation of a dynamic product. See generally REED HUNDT, YOU SAY YOU WANT A REVOLUTION: A STORY OF INFORMATION AGE POLITICS (2011).

25. See *Tradeoff*, BUSINESSDICTIONARY.COM, <http://www.businessdictionary.com/definition/tradeoff.html> (last visited Aug. 8, 2016); *Conflicts of Objectives*, ECON. ONLINE, http://www.economicsonline.co.uk/Global_economics/Conflicts_of_objectives.html (last visited Aug. 8, 2016).

At this point, competition should deliver the elimination of bandwidth as a constraint to innovation, economic growth, and social progress.²⁶ As the global economy moves from being primarily about the manipulation and transportation of atoms to knowledge exchange, bandwidth becomes our commons of collaboration and bandwidth constraints would present a major obstacle to economic and social progress.²⁷

That goal is likely to be achieved when there are at least two next-generation networks with viable upgrade paths capable of answering all foreseeable needs for the next decade. With only one network, economic forces would price the marginal use of bandwidth at a level that constrains growth and progress. Thus, multiple networks are needed to upgrade to next generation networks.

In short, competition can help move us from today's world, where the dominant business model focuses on how to allocate bandwidth scarcity, to the world we need, where there is competition over who can best deploy bandwidth abundance.²⁸

B. Where Does Broadband Competition Come from?

There are two potential and related origins of broadband competition.²⁹ The first goes to the nature of the competitive enterprise, and the second involves an economic equation.

26. Expressed this way, the vision captures a number of different variables, including affordability, ubiquity, performance and others.

27. There are a number of important government initiatives, including the reform of the E-Rate and Lifeline programs and ConnectHome, which are part of the effort to remove bandwidth constraints. See Tom Wheeler, *If You Reform It, They Will Come*, FCC BLOG (May 11, 2015, 3:10 PM), <https://www.fcc.gov/news-events/blog/2015/05/11/if-you-reform-it-they-will-come>; Lifeline and Link Up Reform and Modernization, *Second Further Notice of Proposed Rulemaking, Order on Reconsideration*, 30 FCC Rcd 7818, para. 1 (2015); Don Reisinger, *Obama Unveils ConnectHome to Get Low-Income Households Online*, CNET (July 15, 2015, 8:01 AM PDT), <http://www.cnet.com/news/obama-unveils-connecthome-to-get-low-income-households-online/>. As they are not directed toward changing the current mass-market competitive market structure, they are beyond the scope of this paper. Nonetheless, issues of adoption and anchor institution connectivity are critical to the vision that animates the framework I present here.

28. A more complete discussion of the transition from moving from bandwidth scarcity to bandwidth abundance can be found elsewhere. See Blair Levin, Exec. Dir., Gig.U, Remarks at the SHLB Conference: The North Star of Bandwidth Abundance 2 (May 2, 2013), <http://www.gig-u.org/the-north-star-of-bandwidth-abundance/>. I should note that the goal of bandwidth abundance might strike an economist as encouraging an overproduction of bandwidth, not justified by actual consumer demand, and that that goal could lead to stranded investment. In my view, this is unlikely for a variety of reasons. The principal point is that given the transition to the information economy, abundance is a good in and of itself because it drives new use and consumer surplus. Unlike cyclical industries where demand goes up and down, the use of bandwidth only seems to continue to go up. Although the timing of such investments can lead to financial losses, as occurred in the early years of this century, assets produced were not abandoned but were rather picked up by a number of enterprises like Google to accelerate their own network operations.

29. I am consciously relying on my own experience rather than the Michael Porter's "How Competitive Forces Shape Strategy," which lays out five forces that determine competition in a market. See generally Michael Porter, *How Competitive Forces Shape*

Both existing competitors and new entrants are capable of intensifying competition in an industry. New entrants typically come in three varieties:

1. Greenfield entrants, constituting new ventures;
2. Adjacent market entrants, constituting existing ventures who bring asymmetric assets and interests into the market;³⁰ and
3. Resale entrants who depend on inputs sold on a wholesale basis, which may include regulated access to unbundled elements.³¹

The competition that emerges from all of these enterprises follow similar economic patterns.

First, intensified competition always requires a new capital allocation decision by one of those four kinds of enterprises. Every time a company shifts its capital allocation from one purpose to the purpose of providing or upgrading a communications service, the result is intensified competition.³²

Second, the new capital allocation decision follows a change in the same formula. The reason that greater competition has not occurred yet in the broadband industry is because the new or incremental capital (C) and operating expenses (O) of a network capable of intensifying competition are greater than the total of risk adjusted $(1-r)$ new or incremental revenues (R),

Strategy, HARV. BUS. REV., Mar. 1979, at 137, <https://hbr.org/1979/03/how-competitive-forces-shape-strategy> (1979). Porter's work was updated for the digital era in *Unleashing the Killer App*, which lays out how digitalization, globalization, and regulation/deregulation are overshadowing Porter's five forces. See generally LARRY DOWNES & CHUNKA MUI, UNLEASHING THE KILLER APP: DIGITAL STRATEGIES FOR MARKET DOMINANCE (2000). My purpose here is not to fit what I have seen into either framework but to try to describe how policy has—and could in the future—intensified competition.

30. Adjacent markets are “markets that are close in proximity to what [a business] already do[es].” *Growth Through Adjacent Markets*, INSIDE BOX (May 9, 2016), http://www.innovationinpractice.com/innovation_in_practice/2016/05/growth-through-adjacent-markets.html.

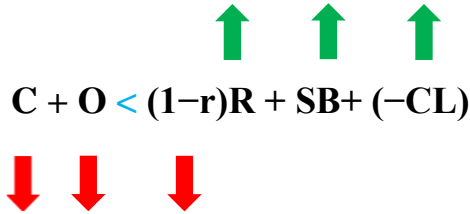
31. Resale is “the ability of a firm to purchase a service on a wholesale basis, for the purpose of reselling that same service, either alone or in combination with other services or features, to end users in direct competition with the original service provider.” Alexander C. Larson, *Resale Issues in Telecommunications Regulation: An Economic Perspective*, 2 MICH. TELECOMM. & TECH. L. REV. 57, 57 (1996).

32. See BAIN & CO., NEXT GENERATION COMPETITION: DRIVING INNOVATION IN TELECOMMUNICATIONS 1 (2009), http://www.bain.com/Images/2009_10_02_LGI_REPORT.pdf.

the benefits to the system (SB),³³ and the risk of lost revenues due to competition (CL).³⁴ These variables represented in an equation are:

$$C + O > (1-r)R + SB + (-CL)$$

Thus, to intensify competition, the math needs to change to cause, where possible, capital expenditures (cap ex), operating expenses (op ex), and risk to go down while revenues, system benefits, and competition go up. This change is represented in the equation below.

$$C + O < (1-r)R + SB + (-CL)$$


*Third, historically, the biggest changes in the competitive landscape in communications result from changes in the formula, which themselves result directly from changes in government policy.*³⁵ There are a few examples of

33. Benefits to the system refers to the benefits a service provider may obtain in markets outside of the area of the investment. For example, AT&T, by building out fiber in Raleigh, North Carolina, may derive some benefit in another market such as Wilmington, North Carolina. *Where is AT&T U-Verse Available in North Carolina?*, AT&T, <http://www.att-services.net/att-u-verse/availability/uverse-north-carolina.html> (last visited Sept. 3, 2016). In the experience of Gig.U, this is significant for Google but not significant for incumbent ISPs. It is not clear where government policy could affect this factor. Nonetheless, it is a factor that is relevant to the formula for upgrades.

34. There are certainly other factors that affect the equation. For example, as the investments in question are long-term, there is significant sensitivity to interest rates. Two factors that are not reflected in the equation but were significant in the Gig.U experience are entrepreneurial talent in network services and local leadership that can organize local resources to improve the economic opportunity. As to the first, it appears that the generation of entrepreneurial network talent that grew up at MCI and went on to start a number of CLECs and DLECs in the late 1990s has largely left the sector, though a new generation is starting to emerge. As to the second, there has been a significant increase in local government interest and talent related to broadband networks, owing to a number of factors, such as the sharing of lessons learned from the dozens of cities that have now successfully accelerated the deployment of next-generation networks.

35. This is not always true. One counterexample would be Netflix, which transformed from a service that utilized postal delivery to a streaming and original programming service, thereby creating competition to MVPDs. Emily Steel, *Netflix Refines Its DVD Business, Even As Streaming Unit Booms*, N.Y. TIMES (July 26, 2015), <http://www.nytimes.com/2015/07/27/business/while-its-streaming-service-booms-netflix-streamlines-old-business.html>. The critical change was the increase in broadband capacity and customers, making a streaming service viable. However, Netflix would not have made that transition if it were not for earlier government policies requiring interconnection, banning terminating access charges for data, and looking unfavorably upon blocking or throttling traffic. See Telecommunications Act of 1996 § 101, 47 U.S.C. §§ 251-252 (2012). Government policy played a critical role but the timing was different from the examples cited. Going back even further, Netflix would probably not exist but for 17 U.S.C § 109, which codified the first sale doctrine. If Netflix had had to ask Hollywood's permission first before buying and then lending

companies reallocating capital to intensify competition that demonstrate how policy affects capital allocation and competition. They also suggest not all elements of the equation are equal in producing long-term competitive effects.

1. Cable intensified competition with broadcast television when government rules lowered its cap ex and op ex through pole attachment rules and copyright rules. These rules increased its access to programming;³⁶
2. Direct broadcast satellite (DBS) intensified multichannel video programming distributor (MVPD) competition when the government lowered its op ex by granting non-discriminatory access to programming. Telecommunications companies (telcos) did so as well when the government prohibited local franchising monopolies and adopted state franchising, lowering costs for the telcos;³⁷
3. Wireless began competing with wireline voice when the government both enabled more wireless competition with the PCS spectrum auctions and lowered its op ex by reducing the terminating access charges wireless had been paying wired providers;³⁸
4. Cable began competing with the telcos' dial-up Internet service when faced with the loss of revenue due to intensified video competition from DBS,³⁹ and
5. Google devoted more capital to its fiber project when cities expressed a willingness to reform construction-related and other regulations in ways that reduced cap ex, op ex, and risk, thus increasing potential revenues.⁴⁰ In turn, the telcos facing Google Fiber competition were able to take advantage of these same streamlined regulations and devoted more capital to fiber

out DVDs (or, at least, if first sale were not there as a backstop should negotiations fall through), the original business plan would have been unlikely to get off the ground.

36. 47 U.S.C. § 224 (2012).

37. See Cable Television Consumer Protection and Competition Act of 1992 § 19, 47 U.S.C. § 548 (2012).

38. See *Broadband Personal Communications Service (PCS)*, FCC, <https://www.fcc.gov/general/broadband-personal-communications-service-pcs> (last visited Aug. 9, 2016) [hereinafter *Broadband PCS*].

39. The program access rules made it possible for DBS to compete with cable in the multi-channel video market, but with a lower cost structure, more channels, a better picture quality and an easier (national, rather than local) regulatory structure. See Cable Television Consumer Protection and Competition Act of 1992, Pub. L. No. 102-385, 106 Stat. 1460. This caused cable to upgrade its networks and gave it the incentive to enter a market, internet access services, that DBS could not enter.

40. See Berin Szoka et al., *Don't Blame Big Cable. It's Local Governments That Choke Broadband Competition*, WIRED (July 16, 2013, 9:30 AM), <http://www.wired.com/2013/07/we-need-to-stop-focusing-on-just-cable-companies-and-blame-local-government-for-dismal-broadband-competition/>.

deployment, causing cable to accelerate deployment of its next-generation product.⁴¹

Scholars also disagree on the categorization of the type of entrant in the market. Baer cites online video distribution as “disruptive innovation.”⁴² He explains, “some innovation comes from incumbents smart and nimble enough to take advantage of these new opportunities. But new entrants deserve a lot of credit, too. Companies like Netflix and Amazon offer consumers flexibility and control; established players like CBS and HBO have been forced to respond.”⁴³

There is truth behind the value of disruptive, instead of traditional, competition. After some period of time markets tend to stabilize, and it is difficult to affect the incentives of existing players without introducing a new competitor or better and/or cheaper technology substitute.⁴⁴

To bring improvements in price and quality to such mature markets, disruptive competition has proven key.⁴⁵ Indeed, the decisions on wireless to wired terminating access and on enabling inexpensive VOIP is the reason that long-distance charges of pennies per minute is now an anachronism.⁴⁶

However, Wireless, VoIP, Netflix, Amazon, or other disruptors are different from what many call new entrants and are greenfield new entrants.⁴⁷

41. GIG.U, FROM GIGABIT TESTBEDS TO THE “GAME OF GIGS”: THE THIRD ANNUAL REPORT OF GIG.U 4 (2014), <http://www.gig-u.org/cms/assets/uploads/2012/12/81714-Gig.U-Final-Report-Draft-1.pdf> (discussing the early rounds of the game of gigs).

42. Baer, *supra* note 3, at 1.

43. *Id.*

44. For example, government policy did successfully enable wireless new entrants into wireless through the 1994-95 PCS auction. See Peter Cramton et al., *Using Spectrum Auctions to Enhance Competition in Wireless Services*, 54 J.L. & ECON. 167, 167 (2011). In that case, the existing market penetration was low enough and the potential high enough to induce new entrants. See MOTOROLA, 1995 SUMMARY ANNUAL REPORT 3, https://www.motorolasolutions.com/content/dam/msi/docs/en-xw/static_files/history-motorola-annual-report-archive-1995-9p55mb-28.pdf (last visited Aug. 9, 2016). Despite many efforts, subsequent auctions have not done so, as it is too difficult to dislodge existing efforts. T-Mobile has recently intensified competition, but only after it got a boost from a spectrum and financial payment from AT&T for the rejected merger. See Alice Truong, *Blocking AT&T’s Merger with T-Mobile Has Been Great for U.S. Consumers, But Bad News for Operators*, QUARTZ (Dec. 15, 2014), <http://qz.com/312907/blocking-atts-merger-with-t-mobile-has-been-great-for-us-consumers-but-bad-news-for-operators/>; Timothy B. Lee, *AT&T Admits Defeat on T-Mobile Takeover, Will Pay \$4 Billion Breakup Fee*, ARS TECHNICA (Dec. 19, 2011, 4:57 PM), <http://arstechnica.com/tech-policy/2011/12/att-admits-defeat-on-t-mobile-takeover-will-pay-4-billion-breakup-fee/>. Adjacent market entry, through Wi-Fi, discussed *infra*, is most likely to be the next disruptive competition.

45. The wireline voice market was disrupted by the introduction of wireless competition through PCS spectrum auctions. See *Broadband PCS*, *supra* note 38.

46. The one exception is prisons, where the FCC recently acted to lower rates. See News Release, FCC, FCC Takes Next Big Steps in Reducing Inmate Calling Rates (Oct. 22, 2015), <https://www.fcc.gov/document/fcc-takes-next-big-steps-reducing-inmate-calling-rates>. Without commenting on that decision or the unique market structure for prison phone services, it is worth noting that bandwidth abundance in prisons could also do a lot to increase communications, security, education, and job training, while reducing the cost of prison operations and bringing the cost of voice services to where it is in the nonprison market. But that is a subject for another time.

47. See *id.*

Rather, the entities Baer cites are adjacent market entrants.⁴⁸ They had different assets and motives than existing players. The experience of the last twenty years suggests that the asymmetry of those assets and motives, if unleashed to enter an adjacent market, leads to far greater disruptions in a mature market than those caused by existing competitors or greenfield new entrants.

Similarly, while Google Fiber could be seen as a new entrant, it had both existing network assets to lower its cost structure and motive to improve its search business revenues through better broadband performance.⁴⁹

Gig.U worked with some greenfield new entrants, but those efforts failed as efforts involving greenfield new entrants have a higher likelihood of failure.⁵⁰ Regulators should be cautious about betting on a greenfield new entrant, but they should also prioritize strategies that enable asymmetric, adjacent market entry.

Unbundling can work to reduce prices, but it discourages broad network upgrades. Unbundling can be appropriate when the government finances the facility, as it did in the BTOP program,⁵¹ or when there are economic reasons such that there is no appropriate way to make the economics work for providing an essential facility.⁵² Some argued that this point has been reached in 2009 and bitterly criticized the National Broadband Plan for not recommending unbundling.⁵³ As of today, it is likely that Google

48. See *id.*; *Growth Through Adjacent Markets*, *supra* note 30.

49. In Porter's model, this would be described as competition from both a buyer and supplier as Google is both a supplier to ISPs and a buyer from ISPs. See Stacey Higginbotham, *The Economics of Google Fiber and What It Means for U.S. Broadband*, GIGAOM (July 26, 2012, 3:52 PM CDT), <https://gigaom.com/2012/07/26/the-economics-of-google-fiber-and-what-it-means-for-u-s-broadband/>; Eric Rosenberg, *The Business of Google (GOOG)*, INVESTOPEDIA (Aug. 5, 2016, 4:51 PM EDT), <http://www.investopedia.com/articles/investing/020515/business-google.asp>.

50. See BLAIR LEVIN & DENISE LINN, *THE NEXT GENERATION NETWORK CONNECTIVITY HANDBOOK 25* (2015) [hereinafter *THE NEXT GENERATION NETWORK CONNECTIVITY HANDBOOK*], http://www.gig-u.org/cms/assets/uploads/2015/07/Val-NexGen_design_7.9_v2.pdf.

51. *Program Information*, NAT. TELECOMM. & INFO. ADMIN., <http://www2.ntia.doc.gov/information> (last visited Aug. 9, 2016).

52. This is the heart of the economic inquiry in the FCC's current review of the special access market. See *Special Access Data Collection Overview*, FCC, <https://www.fcc.gov/general/special-access-data-collection-overview-0> (last viewed July 12, 2016). In that inquiry, the FCC has to make an assessment of, among other issues, under what circumstances is it economically feasible for a CLEC to be able to build its own last-mile fiber loops to a location, to what extent do lower wholesale rates provide negative incentives for a CLEC to construct its own fiber loops, and given that the ILEC, as the historical monopolist, likely has a first-mover advantage and thus a larger market share than the CLEC, how that larger market share affects comparative costs between the ILEC and the later entrant. Those issues are the subject of extensive economic analysis in the FCC docket. It is also at the heart of what I think will be an emerging issue for fiber upgrades as to access to poles and multiple dwelling units. Blair Levin, *Cities, Technology, the Next Generation of Urban Development, and the Next Administration, Part 3*, BROOKINGS (July 20, 2016), <https://www.brookings.edu/2016/07/20/cities-technology-the-next-generation-of-urban-development-and-the-next-administration-part-3/>.

53. See Yochai Benkler, *Ending the Internet's Trench Warfare*, N.Y. TIMES (Mar. 20, 2010), <http://www.nytimes.com/2010/03/21/opinion/21Benkler.html>.

Fiber and other fiber efforts will prove them wrong, but it is still early on in the process. Recently, there have been press reports that Google has been rethinking its strategy, considering a wireless approach for the last link instead of fiber all the way to the home.⁵⁴ If those efforts end before bandwidth abundance can be reached in a critical mass of the country, then perhaps, the critics were right.⁵⁵

In short, if intensified competition is going to deliver abundant bandwidth, we should look at how government affects that equation today, with particular attention to how it can incent adjacent market entry.⁵⁶

C. Given the Current Market, What Are the Appropriate Government Levers to Intensify Competition at This Part of the Cycle?

It is clear some government actions are not appropriate, even if they would improve bandwidth abundance in the short term. To understand the proposed government levers, one must first understand the environment. In 2009, there appeared to be three broadband markets:

1. A high-speed wired market, generally characterized by a single cable provider. The first government acknowledgement of that was in a slide we presented to the Commission in September 2009,⁵⁷

54. Jack Nicas, *Google's High-Speed Web Plans Hits Snags*, WALL ST. J. (Aug. 15, 2016, 12:00 AM ET), <http://www.wsj.com/articles/googles-high-speed-web-plans-hit-snags-1471193165>.

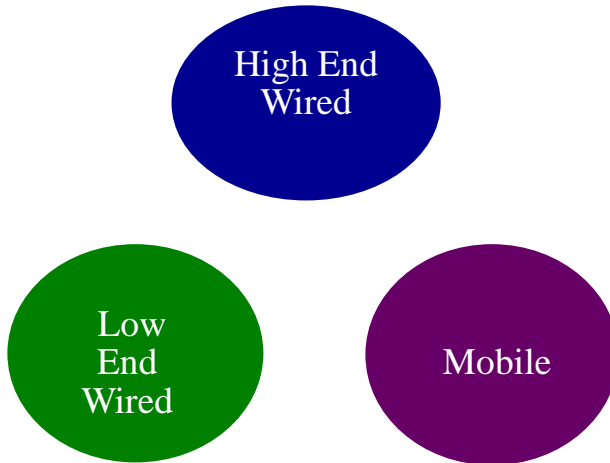
55. A Google Fiber study from Bernstein, an equity research firm, suggested a possible scenario in which Google Fiber would reach 15-20 million homes in six to eight years. See Jeff Baumgartner, *Study: Market "Too Dismissive" of Google Fiber*, MULTICHANNEL NEWS (Oct. 07, 2015, 10:45 AM ET), <http://www.multichannel.com/news/distribution/study-market-too-dismissive-google-fiber-s-potential/394356>. If that were to occur, it would drive a number of developments, including competitive responses and new products that would improve the economics of deployment throughout most of the rest of the country.

56. This is not the occasion for a full discussion of the FCC's decision to pre-empt state laws restricting local broadband efforts except to note that the threat of competitive losses is, as demonstrated by the competitive response to Google and by our experiences with Gig.U, the single biggest driver of incumbents accelerating their deployment of next generation networks. See Levin, *supra* note 12; Brian Fung, *Comcast's New Internet Service Is Twice As Fast As Google Fiber*, WASH. POST (Apr. 2, 2015), <https://www.washingtonpost.com/news/the-switch/wp/2015/04/02/comcasts-new-internet-service-is-twice-as-fast-as-google-fiber/>. Whether it is wise for cities to build their own networks is subject to a reasonable debate. See Sorawit, *Transcript: Community Broadband Bits Episode 132*, COMMUNITY BROADBAND NETWORKS (Jan. 09, 2015), <http://muninetworks.org/content/transcript-community-broadband-bits-episode-132>. On the other hand, there shouldn't really be a debate about whether a city having the ability to build its own fiber network increases the probability that the incumbent will act to make it unnecessary for a city to build its own. That is a factual question for which all the evidence is on the side arguing that just like any negotiation, more leverage increases the odds of a successful outcome. This is why the National Broadband Plan favored preemption of such laws. See NATIONAL BROADBAND PLAN, *supra* note 5, at 153 (Recommendation 8.19).

57. It was also Exhibit 4.G of the Plan, where the text noted "in areas that include 75% of the population, consumers will have only one service provider (cable companies with DOCSIS 3.0 enabled infrastructure) that can offer very high peak download speeds." *Id.* at 42.

and was subsequently resurrected several years later by government officials.⁵⁸

2. A low-speed wired market, generally characterized by a single telephone company; and
3. The mobile market, generally characterized by at least four providers.



Some would argue that these three markets are actually a single market.⁵⁹ After all, AT&T's DSL service provides some competition to Comcast's DOCSIS 3.0 service.⁶⁰ However, government officials have concluded in their speeches that the competition provided is not much, particularly as we move to streaming video, and will be even less with the move to 4K and virtual reality.⁶¹

Others might argue that wireless competes with both high end and low end wired.⁶² Baer directly addressed that in noting, "today[,] wireless is too capacity-constrained and costly to provide a meaningful alternative for consumers."⁶³

58. Chairman Wheeler presented a similar slide in his competition speech, and as Mr. Baer noted, "One characteristic stands out most of all – today most consumers do not enjoy competition for high-speed Internet access. As Chairman Wheeler put it, "as bandwidth increases, competitive choices decrease." Wheeler, *supra* note 1, at 2; Baer, *supra* note 3, at 1. The Broadband Opportunities Council similarly wrote that "[t]hree out of four Americans do not have a choice of providers for broadband at 25 Mbps, the speed increasingly recognized as a baseline for broadband access." BROADBAND OPPORTUNITY COUNCIL, BROADBAND OPPORTUNITY COUNCIL REPORT AND RECOMMENDATIONS 6 (Aug. 20, 2015), http://www.ntia.doc.gov/files/ntia/publications/broadband_opportunity_council_report_final.pdf.

59. See Cassidy, *supra* note 14.

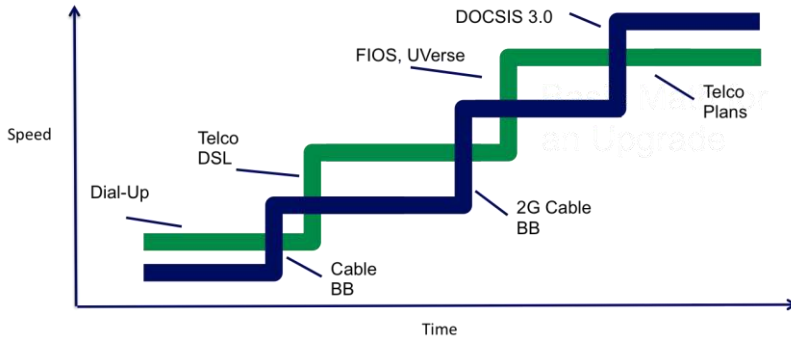
60. See *Check DSL Availability*, AT&T, <https://www.att.com/shop/internet/internet-service.html> (last visited Aug. 10, 2016); *Upgrade Your XFINITY Internet Speed with DOCSIS 3.0*, Comcast, <https://customer.xfinity.com/help-and-support/internet/docsis3/> (last visited Aug. 10, 2016).

61. See Wheeler, *supra* note 1, at 3; See Baer, *supra* note 3, at 1.

62. See generally Baer, *supra* note 3, at 1.

63. *Id.*

In the summer of 2009, the National Broadband Plan team looked at the data and realized that for the first time since the beginning of the commercial Internet, there was no national carrier with plans to deploy a better network than the current best available network.⁶⁴ The data suggested, and subsequent experience confirmed, that current market forces would not drive deployment of world-leading wireline networks in the United States.⁶⁵



As noted above, for 75% of the country, cable had the faster network and the cheapest upgrade path.⁶⁶ The future looked like a cable versus copper competition that would be premised on allocating scarce bandwidth instead of building on technological advances to deploy abundant bandwidth.⁶⁷

In thinking about moving from scarcity to abundance, the prisoners' dilemma provides a framework to understand the challenge. In that classic bit of game theory, the prisoners are both better off if they both do not talk but that requires that they trust each other not to talk.⁶⁸ The officer wants one or both to talk, and to do so, he must cause a defection.

If we substitute the idea of talking with investing, economic logic would suggest that if cable and telco trusted each other not to invest in next generation networks, they would both be better off simply harvesting from past investments. But if society wants to remove bandwidth constraints on innovation, economic growth, and social progress, society would have to cause a defection.

64. See NATIONAL BROADBAND PLAN, *supra* note 5, at 21.

65. See *id.*; Jon Brodtkin, *Why Comcast and Other Cable ISPs Aren't Selling You Gigabit Internet*, ARS TECHNICA (Dec. 1, 2013, 8:00 PM), <http://arstechnica.com/information-technology/2013/12/why-comcast-and-other-cable-isps-arent-selling-you-gigabit-internet/>.

66. See NATIONAL BROADBAND PLAN, *supra* note 5, at 42.

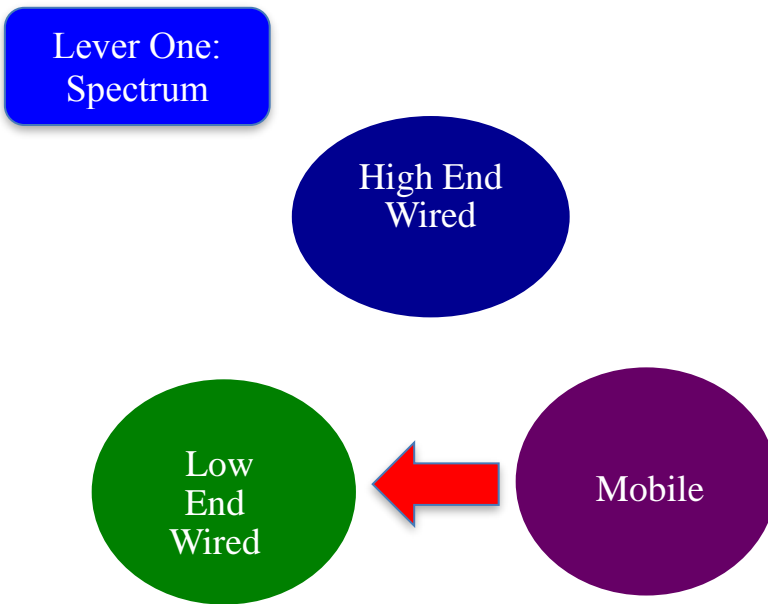
67. See Ed Lieber, *Fiber, Copper, or Wireless: Which Connection Is Best for Your Company?*, SMALL BUS. TRENDS (Aug. 4, 2015), <http://smallbiztrends.com/2015/08/fiber-optic-copper-wireless-internet-transmission-methods.html>

68. See Avinash Dixit & Barry Nalebuff, *The Concise Encyclopedia of Economics: Prisoners' Dilemma*, LIBR. ECON. & LIBERTY, <http://www.econlib.org/library/Enc/PrisonersDilemma.html> (last visited July 12, 2016).

Thus, we saw the competition question as how to incent players in the three adjacent markets to defect, by investing in ways that threaten the other adjacent markets.

1. Lever One: Spectrum

Our first thought was consistent with Baer's observation: remove capacity constraints by providing the wireless sector more spectrum.⁶⁹ Not only is that a benefit in and of itself, but also it would negate the telcos' harvest strategy. It would change the capital allocation decisions for both the wireless and telco sectors, improving the economics of the upgrade for wireless, and by increasing competition, it would increase the motive for telcos to upgrade.



The Plan had numerous recommendations for improving the spectrum position of mobile providers. While there have been some problems, the government made significant progress replenishing the empty spectrum cupboard of 2009 and creating new supplies.⁷⁰

But there are three problems with increasing available spectrum as the sole strategy. First, it takes a very long time to identify spectrum bands and make them available for use.⁷¹ Second, the two largest wireless providers also

69. See Baer, *supra* note 3, at 1.

70. See Blair Levin, *Net Neutrality at 10+; National Broadband Plan at 5; Civic Internet of Things at Birth: Lessons in Government Action in a Changing Landscape*, 23 *COMMLAW CONSPECTUS* 289, 294-96 (2015).

71. The generation of wireless capable of competing with high-end wireline speeds is not expected to be available to consumers until sometime early in the next decade at best. Stephen Shankland, *Think 5G Wireless Is Speeding to Your Phone? Hold Your Horses*, CNET

have significant wireline business, changing the incentives for what it would be if they were separate companies.⁷² Third, the next generation of mobility, sometimes referred to as 5G, will rely on small cells, an architecture that will require greater fiber connectivity.⁷³

These problems do not mean that increasing spectrum is a bad solution. Rather, only that realistically, the timing and impact of such an action may not be enough.

2. Lever Two: Lower Deployment Costs

The second lever would be to improve the economics of a telco upgrade. Although national policy proposals were made,⁷⁴ cities have greater leverage to improve the equation than the federal government.⁷⁵ This has become clear through the Google Fiber effort wherein Google turned out to be the officer that caused the greatest level of defection.⁷⁶

The Google project, which came out of discussions with the Plan,⁷⁷ has been the principal driver of the “game of gigs.”⁷⁸ Everywhere Google Fiber announces, the impacted telco has announced a matching upgrade.⁷⁹ Further, everywhere Google Fiber announces, the prices of other providers go down.⁸⁰

(Feb. 27, 2016, 9:25 AM PST), <http://www.cnet.com/news/5g-wireless-wifi-mobile-network-fast-internet-high-speed-broadband/>.

72. See Sean Buckley, *AT&T, Verizon, Other Top Telcos Lose 185K Broadband Subs in 2015 as Cable Surges Ahead*, FIERCETELECOM (Mar. 13, 2016, 9:46 AM), <http://www.fiercetelecom.com/telecom/at-t-verizon-other-top-telcos-lose-185k-broadband-subs-2015-as-cable-surges-ahead>.

73. See *Small Cells: The Only Way to 5G*, TELECOMS.COM (Nov. 10, 2014, 3:55 PM), <http://telecoms.com/opinion/small-cells-the-only-way-to-5g/>. Most of the distance a “mobile communication” travels is over a wired network. This will be even more true in the future.

74. See NATIONAL BROADBAND PLAN, *supra* note 5, at 110-13.

75. See *id.* at 113.

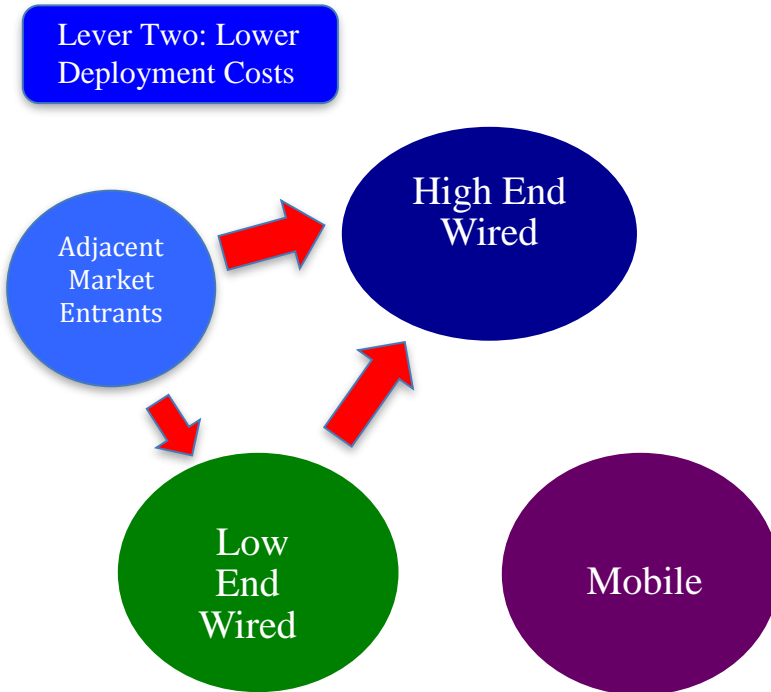
76. From GIG.U, *supra* note 41, at 4 (discussing the early rounds of the game of gigs).

77. See Marguerite Reardon, *Google Exec Sees Google Fiber as a “Moneymaker,”* CNET (May 30, 2013, 11:39 AM PDT), <http://www.cnet.com/news/google-exec-sees-google-fiber-as-a-moneymaker/>.

78. See GIG.U, *supra* note 41, at 4 (discussing the early rounds of the game of gigs).

79. See Brian Fung, *Google’s Playing a Multi-Billion Dollar Game of Chicken with Traditional ISPs*, WASH. POST (Oct. 28, 2014), <https://www.washingtonpost.com/news/the-switch/wp/2014/10/28/google-fibers-playing-a-multibillion-dollar-game-of-chicken-with-traditional-isps/> (comparing this competition to a game of chicken between Google and incumbent ISPs).

80. See, e.g., Jamie McGee, *AT&T Drops Fiber Prices to Google Fiber Levels*, TENNESSEAN (Sept. 29, 2015, 12:43 PM CDT), <http://www.tennessean.com/story/money/2015/09/29/t-drops-fiber-prices-google-fiber-levels/73023434/>. But see Chris Morran, *AT&T Touts “Lower Prices” for Gigabit Internet; Still Charges \$40 More if Google Fiber Isn’t Around*, CONSUMERIST (Sept. 30, 2015), <http://consumerist.com/2015/09/30/att-touts-lower-prices-for-gigabit-internet-still-charges-40-more-if-google-fiber-isnt-around/> (prices stay higher in non-Google areas).



Google Fiber is highly unlikely to cover the entire country,⁸¹ but the project has inspired other activities such as the Gig.U project.⁸² Over twenty five of the Gig.U communities have accelerated the deployment of next-generation networks.⁸³ Further, even some rural communities, which have more difficult economics, have found ways to use smart dig-once and dark fiber policies to stimulate public private partnerships that bring new choices for their residents.⁸⁴

Some are now Google Fiber Gig.U communities, but most have brought about their upgrade through other means.⁸⁵ The lessons are the same as in Google communities in terms of generating a positive competitive response. Indeed, there are a variety of adjacent market entrants beyond Google, including electric utilities, municipalities, small ISPs, and non-profits, all of which have had the same positive affect.⁸⁶

81. See Baumgartner, *supra* note 55 (estimating a maximum coverage of 20 million homes in six to eight years).

82. GIG.U, *supra* note 41, at 16.

83. THE NEXT GENERATION NETWORK CONNECTIVITY HANDBOOK, *supra* note 50, at 21.

84. See, e.g., Heather Coburn, *Westminster Demonstrates Speed of Fiber Network*, CARROLL COUNTY TIMES (June 26, 2015, 10:52 PM), <http://www.carrollcountytimes.com/news/local/ph-cc-fiber-lighting-ceremony-20150626-story.html>; Kathryn Trogdon, *Holly Springs to Get Ultra High-Speed Internet Through Ting Internet*, NEWS & OBSERVER (Oct. 22, 2015, 4:00 AM), <http://www.newsobserver.com/news/local/community/southwest-wake-news/article40803345.html>.

85. THE NEXT GENERATION NETWORK CONNECTIVITY HANDBOOK, *supra* note 50, at 8.

86. *Id.* at 13.

The lessons are also the same as to how cities have changed the capital allocation equation through three key strategies: asset utilization and improvement;⁸⁷ regulatory flexibility to accommodate new business models;⁸⁸ and demand aggregation.⁸⁹

However, this does not mean the federal government has no role. Many of Google and AT&T's proposals to the Broadband Opportunity Council mirrored Plan proposals that have yet to be implemented.⁹⁰ Further, certain legislative efforts, such as the Dig Once bill introduced by Representatives Greg Walden and Anna Eshoo,⁹¹ are consistent with, and improve on, the recommendations in the Plan.⁹² A 2015 congressional hearing on broadband deployment, widely praised on all sides, included many ideas from the Plan.⁹³

87. The key inquiry is what assets does the city have that can be provided at no or little incremental cost that improve the economics of deployment and operations. *Id.* at 36. This can include: *physical assets*, like rights-of-ways (ROWs), utility poles, conduit, buildings, etc.; *information assets*, like information regarding conduit, ducts, and other ROWs; and *processes* to improve current assets, such as ensuring that make-ready work is done expeditiously, coordinating with new providers to save costs or allowing them to perform work themselves through approved contractors. *Id.*

88. The key inquiry here is what rules does the city have that may have made sense in a different time and with a different market structure that in today's market creates a barrier to an upgrade or new deployment. *Id.* For example, all the projects with national ISPs, including Google Fiber, have allowed neighborhood-by-neighborhood builds, which significantly reduces capital expenditures and risk through a pre-commitment strategy. See Alisha Green, *Lawmakers Push "Dig-Once" and Other Bipartisan Policies to Expand High-Speed Internet*, ROLL CALL, (Oct. 30, 2015, 2:01 PM), http://www.rollcall.com/news/lawmakers_push_dig_once_and_other_bipartisan_policies_to_expand_high_speed-244530-1.html.

89. The key inquiry here is how to aggregate demand to demonstrate to existing players the value of an upgrade and to potential new entrants the opportunity in the community. Levin, *supra* note 52, at 36. This can be done on both the institutional and residential level. *Id.*

90. See *Comments of Google Inc.*, NTIA (June 10, 2015, 10:35 AM), https://www.ntia.doc.gov/files/ntia/google_inc_boc.pdf (Google's comments regarding the Broadband Opportunity Council). For example, among other proposals, Google proposed changes to pole attachment rules similar to those proposed in Recommendations 6.2 and 6.3 of the Plan, changes to enable a more competitive marketplace for navigational devices similar to recommendation 4.12 of the Plan, and accountability measures similar to those proposed in Chapter 17 of the Plan. *Id.* Similarly, AT&T proposed moving forward with the IP Transition, as recommended in Section 4.5 of the Plan, improve federal coordination to facilitate more efficient spectrum use, similar to recommendation 5.15 of the Plan, and utilizing master contracts to expedite the placement of wireless towers on federal property and buildings, similar to Recommendation 6.10 of the Plan. See *Comments of AT&T Services, Inc.*, NTIA (June 10, 2015, 3:11 PM), https://www.ntia.doc.gov/files/ntia/att_services_inc_boc.pdf.

91. See H.R. 3805, 114th Cong. (2015).

92. See NATIONAL BROADBAND PLAN, *supra* note 5, at 114-15.

93. The success of the hearing raises the question of why these bipartisan ideas did not get aired in Congress immediately after the release of the Plan. Indeed, Congresswoman Anna Eshoo correctly commented, "It is so common sense that I wonder why we didn't come up with this a decade ago." See Green, *supra* note 88. There were a variety of factors but one of them was that the broadband political capital at that time focused on how the FCC should respond to its loss in the Comcast net neutrality case. See *generally* Comcast Corp. v. FCC, 600 F.3d 642 (D.C. Cir. 2010). Another was a focus on specific issues of the moment, such as a West Virginia mine disaster. See Cecilia Kang, *Rockefeller Vows Congressional Support for FCC on Broadband*, WASH. POST: POST TECH (Apr. 14, 2010, 3:00 PM ET), http://voices.washingtonpost.com/posttech/2010/04/for_senator_jay_rockefeller_d-.html.

There were also new proposals at the hearing on topics such as pole attachments. The Plan made several proposals on pole attachments,⁹⁴ but the issue of pole attachments is even bigger than at first glance. Indeed, if there were one thing that would accelerate competition more than anything else, it would be cities updating their as-builts.⁹⁵

From a federal perspective, the most helpful change would be a rule that amends the pole attachment rules to reduce delays associated with pole attachments and conduit occupancy.⁹⁶ In the category of “good problems to have but must still be solved,” cities have experienced delays due to multiple parties upgrading at the same time.⁹⁷ The more successful federal, state, and local governments are in creating the conditions for investment in new networks, the more there will be multiple competitive network builds.⁹⁸ Given that this is already occurring in some markets, attention should be focused on the reform of make-ready policies.

Another area of interest is access to video programming. Google Fiber wanted to offer a pure broadband service but found the economics did not make sense without a video offering.⁹⁹ At the same time, the company has found the difficulties in obtaining programming have limited the pace and expanse of its Fiber effort.¹⁰⁰ Google has proposed a number of adjustments to the current rules to enable smaller broadband players to obtain the

94. See NATIONAL BROADBAND PLAN, *supra* note 5, at 110-13.

95. See Karl Bode, *Google Quietly Argues Broadband Competition, Google Fiber Build Out Could Be Aided by Title II*, TECHDIRT: NETNEUTRALITY (Jan. 5, 2015, 11:21 AM), <https://www.techdirt.com/blog/netneutrality/articles/20150102/06201029579/google-quietly-argues-broadband-competition-google-fiber-build-out-could-be-aided-title-ii.shtml>. Not only would this make those cities more attractive for new fiber investment, it would minimize the risk to their infrastructure from fiber construction, and it would also improve their own plant maintenance capabilities.

96. Among other things, such a rule should introduce shorter timeframes and establish higher pole-count thresholds before additional time allowances are triggered, accelerating deployments. Infrastructure owners should be required to negotiate access agreements in good faith with a broadband provider as soon as the provider has begun the process of obtaining necessary regulatory approvals. The rule should allow use of utility-approved contractors to perform all pole attachment and conduit make-ready work. Further, broadband providers should be permitted to use independent contractors if, in their estimation, utility-approved contractors alone cannot meet the deployment timetables.

97. See Gary Dinges & Claudia Grisales, *Google Fiber's Austin Rollout Trudges Onward*, AUSTIN AM.-STATESMAN (Feb. 6, 2016, 1:52 PM), <http://www.mystatesman.com/news/business/google-fibers-austin-rollout-trudges-onward/nqK9L/>.

98. Under the current regime, these projects are handled by a queuing system that blocks simultaneous construction. See Jay F. Ireland et al., *FCC Amends Pole Attachment Rules to Promote Broadband Deployment*, DAVIS WRIGHT TREMAINE LLP (Apr. 08, 2011), http://www.dwt.com/advisories/FCC_Amends_Pole_Attachment_Rules_to_Promote_Broadband_Deployment_04_08_2011/.

99. See Reardon, *supra* note 77.

100. *Id.*

programming they need to invest and compete.¹⁰¹ Another cost to deployment is related to access to multiple dwelling units and inside wiring rules.¹⁰²

These policy adjustments to our current pole attachment, programming and other regimes are, to most people, dull. They are not nearly as much entertaining as blaming incumbent providers for limited bandwidth.¹⁰³ But based on the experience of Google Fiber and Gig.U, in order to seriously intensify competition, action must be taken to lower cap ex by, for example, improving the economics of make ready work for poles.

These first two levers address the issue noted by the Broadband Plan's Slide 4-G¹⁰⁴ and provide telcos two incentives to upgrade: better economics for deployment of upgraded networks and the threat of new competition. Both of these levers help put greater competitive pressure on cable to upgrade.

3. Lever Three: Wi-Fi Based Mobile Entry

My understanding of a third lever to intensify competition stems from discussions with my friend David Morken, the CEO of Bandwidth.¹⁰⁵ In the summer of 2011, he suggested that his company could use its existing assets to launch a Wi-Fi-based mobile service.¹⁰⁶ At first, I thought his suggestion was outrageous, but I soon became a convert. A few months later, the company launched Republic Wireless,¹⁰⁷ "one of the first hybrid Wi-Fi and cellular mobile services" in the United States and which is already profitable.¹⁰⁸

One reason why I thought David was wrong was because everything Bandwidth could do, cable could also do with superior economics for all of the inputs. David argued that while cable would eventually enter the market, they would take a long time to do so, and if they did, they would price their

101. See *Comments of Google Inc.*, *supra* note 90, at 8. In the long run, I am certain such measures will not be necessary, but as economist John Maynard Keynes said, "In the long run we are all dead." JOHN MAYNARD KEYNES, A TRACT ON MONETARY REFORM 80 (1923) (emphasis omitted).

102. See *Comments of Google Inc.*, *supra* note 90, at 9-10; see also NATIONAL BROADBAND PLAN, *supra* note 5, at 47.

103. As I hope is clear, I do not regard our need for more abundant bandwidth as representing any kind of a moral failure by incumbent providers. Rather, I see it as reflecting economic incentives. I am somewhat perplexed by arguments that go after the character of companies as if they should read David Brooks's book "The Road to Character" and reform themselves. Then again, I could be wrong, as the Supreme Court appears to think companies are people.

104. See NATIONAL BROADBAND PLAN, *supra* note 5, at 44.

105. See *David Morken*, BANDWIDTH, <http://www.bandwidth.com/people/team-members/david-morken> (last visited July 19, 2016).

106. *Id.*

107. *Id.*

108. See Scott Moritz, *Republic Wireless Adds "Magenta" Network Partner, Samsung Phones*, BLOOMBERG (May 11, 2016, 9:00 AM EDT), <http://www.bloomberg.com/news/articles/2016-05-11/republic-wireless-adds-magenta-network-partner-samsung-phones>.

product differently.¹⁰⁹ There would always be a niche that would be profitable for Bandwidth.

As to his first assertion, time will tell but so far, so good for Bandwidth.¹¹⁰ As to his second, cable companies like Comcast and other companies like Google are in the midst of testing entry into the wireless market.¹¹¹ However, David was right for another reason, which goes back to the prisoners' dilemma, with a bit of the classic innovator's dilemma thrown in.¹¹²

It is not plausible that a company with a couple hundred employees in North Carolina can develop and deliver a product that a company with tens of thousands has not yet done until one considers motive. Why would Comcast attack a market that might cause a counterattack and potentially reduce prices throughout all broadband markets?¹¹³ In this light, the logical path is not to attack but to focus on harvesting until one is forced to attack. That brings us to the third lever. If there are sufficient forces threatening cable's existing revenue streams of multichannel video and broadband, it will attack new markets, as it did when DBS threatened its revenue.¹¹⁴ Alternatively, if enough players like Republic Wireless enter the space and the wireless providers seek new revenue streams by aggressively pursuing cord cutting in the broadband market, such moves would increase cable's motive and ability to enter the mobile market. With Verizon and AT&T ramping up the competition in the video market and over-the-top (OTT)¹¹⁵ threatening as well, Comcast and Charter are now both more aggressively

109. See *Republic Wireless Tops National Carriers in Overall Customer Satisfaction*, REPUBLIC WIRELESS (Mar. 19, 2014), <https://republicwireless.com/press/republic-wireless-tops-national-carriers-in-overall-customer-satisfaction/>.

110. See Walt Mossberg, *Wi-Fi Calling from Republic Wireless Takes a Big Leap*, VERGE (July 13, 2016, 9:00 AM), <http://www.theverge.com/2016/7/13/12166560/walt-mossberg-republic-wireless-review-wifi-calling>.

111. *Id.*

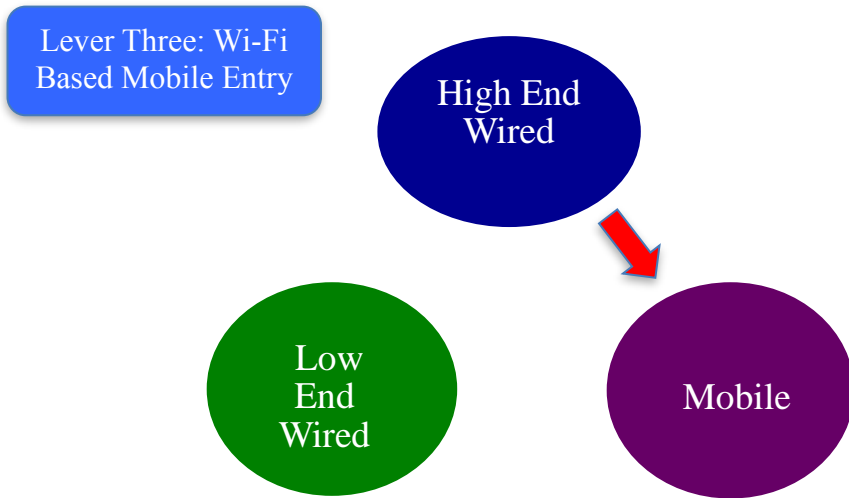
112. The innovator's dilemma is from the eponymous book by Clayton M. Christensen. See CLAYTON M. CHRISTENSEN, *THE INNOVATOR'S DILEMMA* (2011). The theory suggests that "incumbents often are the ones to spot and develop new technologies while easily reorganizing themselves to do so," but "they fail to value new innovations properly because incumbents attempt to apply them to their existing customers and product architectures – or value networks." Xenios Thrasyvoulou, *Understanding the Innovator's Dilemma*, WIRED, <http://www.wired.com/insights/2014/12/understanding-the-innovators-dilemma/> (last visited July 29, 2016). This makes ROI seem low on new technologies, and it is new entrants, who have little to lose, that enter the market. *Id.* As the new entrants discover the "right application use and market," they rapidly grow and start to disrupt and compete with the established market players. *Id.*

113. See Brodtkin, *supra* note 65.

114. Austan Goolsbee & Amil Petrin, *The Consumer Gains from Direct Broadcast Satellites and the Competition with Cable TV*, 72 *ECONOMETRICA* 351, 351 (2004).

115. Over the top (OTT) refers to "film and television content provided via a high-speed Internet connection rather than a cable or satellite provider." *Over The Top*, INVESTOPEDIA, <http://www.investopedia.com/terms/o/over-top.asp> (last visited July 23, 2016). Examples include Netflix and Amazon. *Id.*

pursuing their mobile strategy..¹¹⁶ That will intensify competition in all three broadband markets in turn.



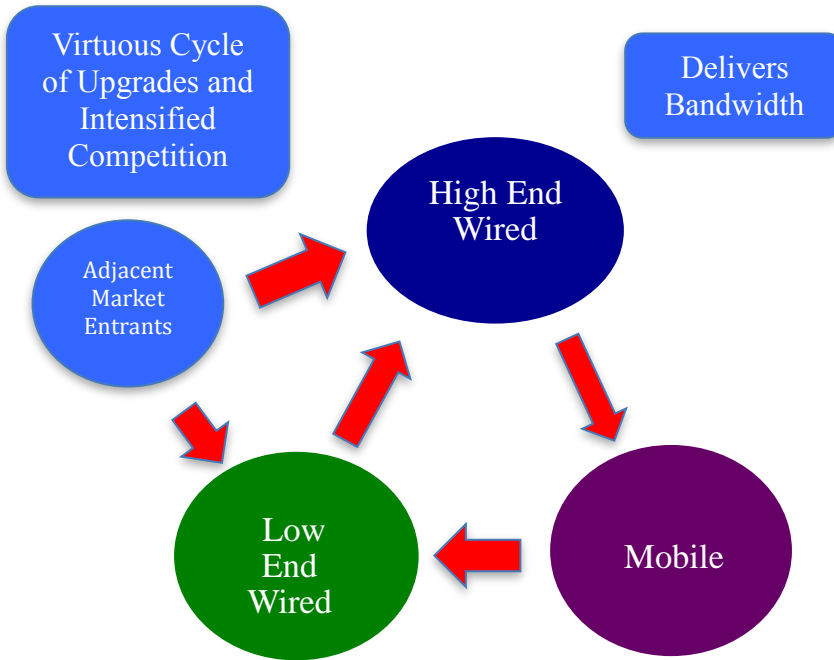
Guaranteeing that this lever can continually drive competition requires two elements. First, the government should ensure that unlicensed spectrum bands will continue to have sufficient spectrum for the public to use and will not suffer degradation.¹¹⁷ Second, the cellular market structure should be

116. See Gerry Smith, *Charter Follows Comcast with Plan to Offer Mobile Phone Service*, BLOOMBERG TECH. (Sept. 21, 2016, 6:45 PM EDT), <http://www.bloomberg.com/news/articles/2016-09-21/charter-follows-comcast-with-plan-to-offer-mobile-phone-service>. Consistent with theory that adjacent market entry accelerates the competitive reaction at the same time that cable is accelerating its entry into mobile, wireline companies such as AT&T and Century Link are accelerating their entry into over-the-top video distribution. See Roger Cheng, *AT&T to Launch DirecTV Now Streaming Video Service Before 2017*, CNET (Sep. 21, 2016, 5:54 AM PDT), <https://www.cnet.com/news/at-ts-directv-now-streaming-video-service-will-launch-in-fourth-quarter/>; Sean Buckley, *Century Link to Launch 17-Channel OTT Video Service Early Next Year*, FIERCE TELECOM (Sep. 22, 2016, 1:39 PM), <http://www.fiercetelecom.com/telecom/centurylink-to-launch-17-channel-ott-video-service-early-next-year>.

117. Unlicensed spectrum refers to “frequency bands that anyone is free to use to operate wireless devices.” Chris Szymanski, *Why Unlicensed Spectrum Allocation Is Critical to the Next Wave of Innovation*, BROADCOM (July 15, 2014), <http://www.broadcom.com/blog/wireless-technology/why-unlicensed-spectrum-allocation-is-critical-to-the-next-wave-of-innovation/>. It generates \$62 billion a year for the U.S. economy, has been referred to as “the oxygen of innovation,” and is critical to making Internet access more available to consumers. *Id.* The FCC is in agreement with this goal, and its decisions have made more unlicensed spectrum available. *Id.* This raises the issue of whether LTE-U threatens Wi-Fi. See Harold Feld, *My Insanely Long Field Guide to the LTE-U Dust Up, Part I: Spectrum Game of Thrones*, WETMACHINE (Oct. 7, 2015), <http://www.wetmachine.com/tales-of-the-sausage-factory/my-insanely-long-field-guide-to-the-lte-u-dust-up-part-i-spectrum-game-of-thrones/>; Harold Feld, *My Insanely Long Field Guide to the LTE-U Dust Up, Part II: A Storm of Spectrum Swords*, WETMACHINE (Oct. 20, 2015), <http://www.wetmachine.com/tales-of-the-sausage-factory/my-insanely-long-field-guide-to-the-lte-u-dust-up-part-ii-a-storm-of-spectrum-swords/>.

sufficiently robust to have market forces produce a robust wholesale market.¹¹⁸

In short, government policy ought to ensure that all three submarkets have the means, motive, and opportunity to enter the adjacent market. This will create a competitive virtuous cycle that drives toward bandwidth abundance.

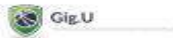
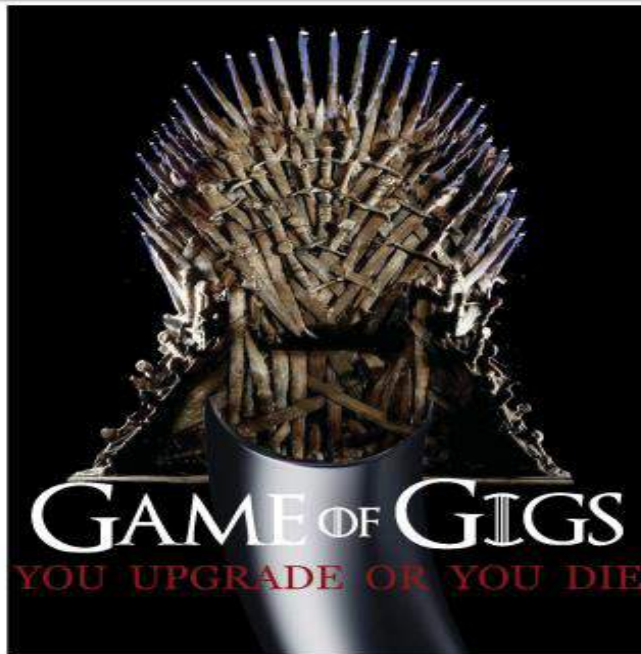


III. CONCLUSION

If we agree that the goal is to remove bandwidth constraints on innovation, growth, and social progress, then policy should create incentives for competitive upgrades. For policy to play that role, it must drive changes in capital allocations and the economics of deployment. To do that, policy should look at where it can lower the input costs for all potential competitors, particularly for adjacent market entrants. In such a market, all the major enterprises will have incentives to upgrade their networks for defensive reasons and the opportunity to play offensive in attacking the offerings and market share of others in currently well entrenched positions. While policy should not—and cannot—pick the winner in the market, it can—and

118. In this regard, the speeches by Wheeler, Sallet, and Baer were all correct in taking a victory lap for several government efforts to ensure that the mobile market structure continued to have four national players. Wheeler, *supra* note 1; Sallet, *supra* note 2; Baer, *supra* note 3. This was a mixed blessing for Republic Wireless, as the rejection of the AT&T/T-Mobile deal led to T-Mobile becoming more aggressive on pricing and thereby reducing the attractiveness of Republic's pricing plan. Nonetheless, without a wholesale option, Republic Wireless and its Mobile Virtual Network Operator (MVNO) competitors would not exist.

should—ensure that all the existing networks have some incentives, mostly from competitive threats, to accelerate their upgrade to networks offering abundant bandwidth.



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Last year, the writer Jeff Greenfield sought to explain the explosion of great television this way: “When technology replaced scarcity with abundance, every core assumption about TV began to crumble. Everything about the medium—how we receive it, how we consume it, how we pay for it, how we interact with it— has been altered, and TV is infinitely better for it.”¹¹⁹

The purpose of broadband competition is to cause that same explosion of bandwidth. We are much better off than we were five years ago, thanks in no small part to the actions described in the speeches of the three government officials and their willingness to act in accordance with their analysis. If we continue to have such leadership, if we can avoid empty words and stay focused on the key leverage points, we can create bandwidth abundance. Five years from now, our broadband offerings, our country, and the world will be better for it.

119. Jeff Greenfield, *From Wasteland to Wonderland: TV's Altered Landscape*, N.Y. TIMES (Oct. 3, 2015), <http://www.nytimes.com/2015/10/05/business/media/from-wasteland-to-wonderland-tvs-altered-landscape.html>. Graphic originally from GIG.U, *supra* note 41, at 2.