I. Introduction

My name is Lawrence J. Spiwak, and I am the President of the Phoenix Center for Advanced Legal & Economic Public Policy Studies. I am pleased to testify before you today on the role that video competition plays in broadband deployment and to discuss what legislatures can do to ensure that your constituents receive the benefits of a more-competitive environment for all communications services.

By means of introduction, the Phoenix Center is an international, non-profit 501(c)(3) organization that studies broad public-policy issues related to governance, social and economic conditions, with a particular emphasis on the law and economics of regulated industries. Among other activities, the Phoenix Center publishes a PUBLIC POLICY PAPER SERIES, a POLICY BULLETIN SERIES, and a POLICY PERSPECTIVES SERIES. We also have sponsored Congressional briefings, Policy Roundtables at the National Press Club, educational retreats, as well as its noted Annual U.S. Telecoms Symposium. Our scholars have a long and distinguished history in examining entry into the cable and telecommunications industry.2

1 A copy of my complete bio is attached hereto as Appendix A.

2 See, e.g., G.S. Ford, THE CABLE TELEVISION INDUSTRY: AN ANNOTATED BIBLIOGRAPHY (Auburn Utilities Research Center, Summer 1994); G.S. Ford, Competition in the Cable Television Industry: An Economic Analysis of Overlap Variations and Cable Prices (Dissertation, Auburn University, 1994); James W. Olson and Lawrence J. Spiwak, Can Short-Term Limits on Strategic Vertical Restraints Improve Long-Term Cable Industry Market Performance? 13 CARDOZO ARTS & ENT. L.J. 283 (1995) (http://www.phoenix-center.org/library/prog_access.doc); G.S. Ford, Horizontal Concentration and Vertical Integration in the Cable
While the Phoenix Center does not seek to influence or endorse any particular piece of legislation, I would like to stress to you the importance of the topic you are addressing today. Our research shows that competition for cable services is difficult and costly. While the Bell telephone companies are now committed to entering this market, success is by no means assured for even these large companies. But if we want to see fiber-optic broadband technology deployed in our neighborhoods and competitive prices for our citizens, then policymakers need to tear down barriers that will block that success.3

II. Summary of Research

The Phoenix Center has written a number of papers on the role that state and local franchising plays in impeding video and broadband deployment.

State and local franchising dates back from the earliest days of the cable television industry. The principal purpose of this process was for local governments to control access to public rights-of-way that a cable company may need to build its network.

Unfortunately, the franchising process quickly moved well beyond that. Before the U.S. Congress intervened, it was customary for the franchising process to turn into an “auction” for locally-awarded cable television monopolies. In these auctions, any request was fair game: “build-out” to entire communities, construction of governmental networks, sale of public access channels, equipment for video studios as the local high school, parks, and the collection of a “franchise fee”, which amounts to a special local sales tax for cable services. Cable companies were willing to make these concessions in order to receive a lucrative, de jure monopoly on cable services. Most of the country’s cable systems were built in this environment, before the federal government intervened in 1984 and later 1992 to remedy many of these abuses.

When the cable industry today talks about wanting new entrants to build competing systems on a “level playing field”, this is the playing field we are talking about. You cannot expect to ask a new entrant to make the same concessions and commitments that an incumbent cable firm would make when the incumbent firm had the expectation of a

3 Franchising, through both inherent bureaucratic delay and the extraction of political concessions, is not the only barrier to entry in video markets. Other potential hindrances to entry include the lax regulatory oversight over access to video programming, particularly programming with vertical relationships with incumbent cable operators. See Olson and Spiwak, supra n. 1. Accordingly, policymakers should not only focus on removing legal barriers to entry like franchising, but they also should focus on breaking down economic and operational barriers to entry, such as access to programming.

monopoly or dominant market position. Indeed, Phoenix Center research shows that *entry into these markets will be exceptionally difficult* and that imposing a “level playing field” rule on new entrants (as many state laws now do) will result in *less competition* and other perverse outcomes.

A. Why is Franchise Reform Important?

We are at an important juncture in this nation’s telecommunications policy. As explained in PHOENIX CENTER POLICY PAPER NO. 21,4 in the last few years, the goal of U.S. telecoms policy has been to promote and rely upon facilities-based “inter-modal competition” – that is, we are being asked to rely on competition between firms that own their own, separate networks.

We need to recognize at the outset is that we will only see this type of competition between a small number of firms.

Phoenix Center and other academic research shows that because it is costly to build and operate communications networks, even in a “best-case scenario”, only a few firms will be able to provide the complete package of voice, video and data services over their own network.

As easy as it would be to demand that you implement policies that assumes that mandate six to twelve firms will be able to build robust multiservice network platforms, that result will simply not happen given today’s circumstances. Instead, you should start from the assumption that there will, at best, be only a “few” facilities-based firms – and that the policies you adopt will hopefully maximize the potential for competition between that small number of firms that are in the market.

For more detail, I refer you to PHOENIX CENTER PUBLIC POLICY PAPER NO. 21, which I have attached to this testimony. Let me summarize a few of our findings as they relate to video franchising.

First, the multi-service network platforms that cable industry has today and that the telephone companies are trying to build support the provision of three communications services – voice (e.g., dialtone), video, and broadband data services. Competition between these network providers will often occur through “bundles” of these three products. With the marginal cost of providing a telephone call in a free-fall, video is now the key driver for new fiber deployment in the residential market.5 In order for the

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5 According to a 2002 Pew Internet & American Life Project survey, the average household spends $51 per month on multichannel video programming services, which represents a significant portion of their total communications (voice, video, Internet, wireless) spending (which averages about $122 per month per household). J. B. Horrigan, *Consumption of Information Goods and Services in the United States*, Pew Internet & American Life Project (2003), [http://www.pewinternet.org/pdfs/PIP_Info_Consumption.pdf](http://www.pewinternet.org/pdfs/PIP_Info_Consumption.pdf) at 28. If a
market to be fully competitive, a firm that cannot offer one aspect of this “bundle” will be severely disadvantaged.

With regard to voice and broadband services, there is no functional legal requirement equivalent to the local cable franchising process. A cable company that wants to sell voice service has no state or federal “build-out” requirement – the FCC preempted all such requirements in 1997. A cable company that wants to sell broadband data service also faces no state or federal “build-out” requirement. The cable industry has successfully launched a bevy of legal challenges to efforts by states to place limitations or requirements on its cable modem service. That litigation campaign reached ultimate success in the Supreme Court earlier this year, in the Brand X decision.

As a result of these legal victories, the cable industry faces no significant legal or technological barrier to offering a bundle of voice, video and broadband services. The telephone companies are in a quite different situation – before they can sell cable television services, they must obtain a local cable franchise. Even if a telephone company opts to become an “Open Video System” under federal law, then it must obtain a local cable franchise.

Our research shows that this situation can dramatically affect the network deployment decision by a firm and have and will have an important deleterious impact on your constituents unless remedied.

B. Build-Out Requirements Impede New Video Entry

PHOENIX CENTER POLICY PAPER NO. 22 looks at a particularly pernicious result of the local franchising process – the common requirement that a new entrant “build-out” to serve essentially all of the local franchise area. We show that a “build-out” requirement has an important impact on the firm’s decision and results in far less network

new entrant cannot readily provide consumers multichannel video over an advanced network, then the prospects for success will be diminished substantially due to a reduction in the entrant’s potential revenues. Quite simply, the ability to sell video services over these fiber networks may be a crucial factor in getting those fiber networks deployed.

Regulators are not always sensitive to the importance video availability has on deployment. For example, the New York Public Service Commission issued an order recently that failed to resolve the question as to whether Verizon could sell video services over its new, all-fiber FiOS network, stating that it would resolve that question only after Verizon had constructed the fiber network and stood ready to sell video service. DECLARATORY RULING ON VERIZON COMMUNICATIONS, INC.’S BUILD-OUT OF ITS FIBER TO THE PREMISES NETWORK, Joint Petition of the Town of Babylon, et al., Case Nos. 05-M-0250 and 05-M-0247 (rel. June 15, 2005).


construction than not having such an entry. A “build-out” policy forces a firm bypass certain communities entirely, even if it might have been profitable to serve a portion or much of that community. The result of a “build-out” policy is to “solve” the problem of a company “redlining” within a community by encouraging that company to “redline” between communities.

I understand the altruistic attraction of a “build-out” requirement - all of us want to prevent a “digital divide” or promoting local economic development that universal broadband and cable service might bring. But *ex ante* build-out requirements are, in our view, a poor way of achieving this goal. The simulation we run in *PHOENIX CENTER PUBLIC POLICY PAPER NO. 22* shows that a build-out rule implemented on a franchise-by-franchise basis within a state would on average, markedly slow down the deployment of communications networks and force new entrants to bypass many communities entirely. As a result, these build-out mandates for new entrants actually reduce consumer welfare and increase the profits of incumbent providers in many communities. Build-out requirements are, therefore, a self-defeating exercise.\(^9\)

For similar reasons, as noted above, the FCC preempted state “build-out” requirements for competitive local telephone companies in 1997.\(^10\) And in 1994, the FCC found over ten years ago that the “local franchise process is, perhaps, the most important policy-relevant barrier to competitive entry in local cable markets.”\(^11\)

For a policymaker, a build-out requirement is a risky gamble. You are betting that if you impose a build-out requirement, a firm like the telephone company will still decide to build a network in your community. And our simulation shows that that entry will

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8. D. McCullagh, *Bells’ Fiber Plans Spark Political Flame War*, CNET News (20 April 2005) (quoting Ranking House Energy and Commerce Committee Member Ed Markey as complaining that “When a cable company wires a community, it must offer service to all households, so why should [new MVPD entrants] be permitted to select which neighborhoods are wired with fiber first?”). However, numerous studies reveal there is little correlation between income and cable penetration. For a review of this literature, see R. Kieschnick and B. D. McCullough, *Why Do People not Subscribe to Cable Television? A Review of the Evidence*, Unpublished Manuscript (1998) at 7-8 and Appendix A (available at [http://www.tprc.org/abstracts98/kieschnick.pdf](http://www.tprc.org/abstracts98/kieschnick.pdf)).

9. While consumers do have satellite as a possible substitute to the incumbent cable operator, the U.S. General Accounting Office found that the price cuts for video services from w ireline competition are approximately three times larger than those from satellite competition. *See Direct Broadcast Satellite Subscribership Has Grown Rapidly, but Varies across Different Types of Markets, Report to the Subcommittee on Antitrust, Competition Policy and Consumer Rights, Committee on the Judiciary, U.S. Senate, US Government Accountability Office, GAO-05-257 (2005).* As such, consumers clearly benefit significantly from terrestrial MVPD overbuild entry.

10. *See supra* n. 6.

certainly happen in some communities. But our simulation shows that it will not happen in all. There is a very real possibility that a new entrant will bypass the community altogether – a worst-case scenario.

I also want you think about the motivations of incumbent cable firms that insist that new entrants “build-out” to an entire community with a 100% overlap of its existing cable network. Why would an incumbent firm, with a dominant market share and, want to see that – unless it knew that to insist on a 100% “build-out” would deter much more competition than it would invite? To ask that question is to answer it.

C. The Franchise Process Exacerbates a “Digital Divide”

Rules that make video competition more difficult will also have a significant and adverse impact on the availability of broadband services in low-income areas. PHOENIX CENTER POLICY PAPER NO. 23, attached to my testimony, examines this relationship in detail.

President George W. Bush has established a goal of “universal, affordable access for broadband technology by the year 2007,” and influential policymakers, both Republican and Democrat, almost universally share the aspiration that no community or group of citizens should be without robust broadband network alternatives. Low-income households subscribe to video service at roughly the same rate as higher income households. As a result, the ability of entrants to offer video services substantially improves the financial case for fiber deployment in low-income neighborhoods. Using publicly-available data from the U.S. Census Bureau, we employed a simple graphical analysis and a simulation of network deployment to show that a new entrant will pass substantially more households – and in particular low-income households – if that

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14 Concern over a “digital divide” appears to be bipartisan. A recent report by the Congressional Research Service lists more than a dozen legislative proposals, introduced by Republicans and Democrats alike, that share the goal of promoting more broadband deployment, particularly in disadvantaged areas. CONGRESSIONAL RESEARCH SERVICE, Broadband Internet Access: Background and Issues, IB10049 (June 9, 2005). For two different viewpoints on the “digital divide,” see United States Department of Commerce, National Telecommunications and Information Administration, FALLING THROUGH THE NET: DEFINING THE DIGITAL DIVIDE (1999) (describing problems of a rich-poor “digital divide”) and United States Department of Commerce, National Telecommunications and Information Administration, A NATION ONLINE: ENTERING THE BROADBAND AGE (2004) (expressing concern over potential rural-urban divide for broadband services) (hereinafter NTIA NATION ONLINE REPORT).

15 See, e.g., R. Kieschnick and B. D. McCullough, supra n. 8.
entrant can readily offer video with voice and broadband Internet access services than it will if its ability to sell video services is sharply curtailed or delayed.

Video service is somewhat of a “silver bullet” – i.e., when the network firm can bundle video, the percentage of poverty and minority homes with access to the network rises significantly. Accordingly, our analysis indicates that policies that make video competition more difficult will lead to significantly lower deployment of advanced broadband networks in low-income areas than would occur with pro-entry video policies. In so doing, our findings provide empirical support for the assertion by FCC Chairman Kevin J. Martin that additional multichannel video competition also would “stimulate broadband deployment.”16

D. Franchise Reform will not Decrease Local Revenues

The Phoenix Center has also done research on the impact that video competition would have on the collection of “franchise fees” by local franchising authorities. State and local governments have historically imposed a “franchise fee”, or tax, on the provision of cable television services. Franchise fees are assessed as a percentage of gross cable revenues. These fees are substantial: in 2004, state and local governments collected approximately $2.4 billion in these franchise fees, slightly more than $37 per year from every household that subscribes to cable.17

As you know, several bills have been introduced in Congress and may be introduced before state legislatures to change how these franchise fees are assessed and collected. Local government advocates have asserted that these proposals would deprive state and local governments of substantial revenues.18 In our view, proposals to reform franchise fees needs to be placed in context of the prospect of increased competition for video services. In PHOENIX CENTER POLICY BULLETIN NO. 12,19 we show that successful wireline video competition would dramatically increase total industry revenues and, as a result, gross franchise fee collections would soar.

We estimate that if wireline, local telephone company entry into the multichannel video industry is successful, there would be a “competition dividend” – a 30% increase in gross taxable revenues from the wireline multichannel video industry if the current method of assessing and collecting franchise fees remained in place.

16 Leslie Cauley, FCC Chief Considers Forcing Cable TV Competition, USA TODAY (22 August 2005).
We estimate that with successful wireline video entry, local governments would remain “revenue neutral” if the common 5% franchise fee were reduced to approximately 3.7%.

I will note that this “competition dividend” will only occur if wireline video entry happens. Policymakers would need to change other practices – in particular, local franchising requirements and level-playing field laws – for this “competition dividend” to be realized.

### III. Summary and Conclusion

In sum, the issues raised by franchise reform are complex and must be viewed carefully and comprehensively in the context of the overall telecoms restructuring debate. Thank you for inviting me to appear today, and I look forward to answering your questions to the best of my ability.
Lawrence J. Spiwak is President of the Phoenix Center for Advanced Legal & Economic Public Policy Studies. The Phoenix Center is an international, non-profit 501(c)(3) organization that studies broad public-policy issues related to governance, social and economic conditions, with a particular emphasis on the law and economics of regulated industries. Among other activities, the Phoenix Center publishes a PUBLIC POLICY PAPER SERIES, a POLICY BULLETIN SERIES, and a POLICY PERSPECTIVES SERIES. In addition, the Phoenix Center sponsors Congressional briefings, Policy Roundtables at the National Press Club, educational retreats, as well as its noted Annual U.S. Telecoms Symposium. The Phoenix Center also hosts its internationally renowned web page (http://www.phoenix-center.org), which contains one of the largest sources of free research material on the Internet and receives around a half a million hits annually from people around the globe.

Mr. Spiwak is an internationally recognized authority regarding the legal and economic issues affecting regulated telecommunications and related industries. For example, Mr. Spiwak has written numerous acclaimed articles and papers addressing the complexity and variety of these issues and has been cited by, *inter alia*, the United States Federal Communications Commission, the United States Securities and Exchange Commission, the United States Federal Trade Commission, the United States Code Annotated, the Congressional Research Service, American Jurisprudence (2d), and the Organisation for Economic Co-Operation and Development (OECD). Other scholars also frequently cite to Mr. Spiwak, and simple web searches reveal that Mr. Spiwak’s papers are used as teaching material at universities around the world. To wit, Mr. Spiwak is ranked in the top 9% of authors listed overall with the Social Science Research Network (“SSRN”).

*The Phoenix Center has served as an important catalyst for debate concerning the proper application of the antitrust laws in our free market economy. Over the last few years, the Center’s focus on the role of antitrust law in promoting consumer welfare in the telecommunications sector has been particularly instructive to both legislators and regulators alike.*

– REP. JAMES SENSENBRENNER
CHAIRMAN, HOUSE JUDICIARY COMMITTEE

In addition, major media news outlets such as Public Television’s NIGHTLY BUSINESS REPORT, BUSINESSWEEK, FORBES.COM, the NEW YORK TIMES, the ATLANTA JOURNAL-CONSTITUTION, the WASHINGTON TIMES, the NATIONAL JOURNAL, CNET, ZDNet, the CHICAGO TRIBUNE, UNITED PRESS INTERNATIONAL, KIPLINGER’S, the MIAMI HERALD, the MILWAUKEE-JOURNAL SENTINEL, the DALLAS-MORNING NEWS, the FORT WORTH STAR TELEGRAM, the SEATTLE TIMES, the SEATTLE POST-INTELLIGENCER REPORTER, the SAN FRANCISCO CHRONICLE, the INDIANAPOLIS STAR, the PALM BEACH POST, the HARTFORD COURANT, the ROCKY MOUNTAIN NEWS and the WASHINGTON POST, as well as key trade and professional publications such as...

Mr. Spiwak is also often asked to speak before, and counsel to, industry business leaders and domestic and foreign government officials. For example, in addition to hosting the Phoenix Center’s various conferences and events, recent presentations include such diversified forums as the Federal Communications Commission Consumer Advisory Committee, the Global Broadband Forum at George Washington University, Columbia University’s Columbia Institute for Tele-Information (CITI), the Conservative Political Action Conference, Citizens Against Government Waste, Voice on the Net (VON), the National Association of Regulatory Utility Commissioners (NARUC), the Mid-America Regulatory Conference (MARC), the Mid-Atlantic Conference of Regulatory Utilities Commissioners (MACRUC), the National Association of State Utility Consumer Advocates (NASUCA), ITFlorida, the American Legislative Exchange Council (ALEC), National Conference of State Legislatures (NCSL), the National Consumers League, Americans for Tax Reform, Northwind Professional Institute Annual Canadian Telecoms Symposium, Georgetown University, the International Astronautical Congress in Toulouse France, the Agência Nacional de Telecomunicações (“ANATEL” – the Brazilian telecommunications regulator), the American Chamber of Commerce Telecommunications Symposium in Sao Paulo Brasil, Center of Latin American Economic Studies in Telecommunications (“CELAET”) - University of Campinas, Brasil, the United States Embassy - Vienna Austria, Victoria University of Wellington, New Zealand, and serving as a Reporter at a Symposium sponsored by the Robert Schuman Centre of the European University Institute (an arm of the European Union) on “Dispute Resolution and Dispute Prevention in the Transatlantic Partnership” in Florence Italy where his book – The Telecoms Trade War: The United States, the European Union and the WTO (Hart Publishing 2001 and co-authored with Phoenix Center Adjunct Fellow Mark Naftel) – was used as a case study and later reprinted in a complete volume by Oxford University Press.

Mr. Spiwak also contributes actively to academia, as his work is used as teaching material at universities around the world. Finally, in addition to his academic lecturing and publishing schedule, Mr. Spiwak expresses his views and analysis of current market developments as a frequent commentator in such major outlets as CNET.com, the Legal Times, Total Telecom and United Press International.

Prior to joining the Phoenix Center, Mr. Spiwak was a Senior Attorney with the Competition Division in the FCC’s Office of General Counsel from 1994-1998. While with the Competition Division, Mr. Spiwak provided the Commission and its individual bureaus with legal and economic advice regarding domestic and international inter-exchange, local exchange, delivered video programming, broadcast, wireless and satellite policies. During his tenure with the Competition Division, Mr. Spiwak was responsible for, among other things, co-authoring the FCC’s original 1994 Cable Competition Report, providing the primary legal and economic
analysis for the FCC’s landmark decision to de-regulate AT&T and – given his substantial public (Senior Attorney, Federal Energy Regulatory Commission, 1992-1994) and private sector experience in the electric utility industry (including serving as the vice-chair of the Federal Energy Bar Association’s antitrust committee between 1993 and 1994) – for drafting the FCC’s rules regarding public utility entry into telecommunications and information services markets. In addition, Mr. Spiwak was accepted into the Presidential Stay-In School program while in college, where he was responsible for delivering classified and confidential material among senior White House and Reagan Administration officials and received a full FBI security clearance.

Mr. Spiwak received his B.A. with special honors from the George Washington University in 1986 (Special Honors, Middle Eastern Studies) and his J.D. from the Benjamin N. Cardozo School of Law in 1989, where he was the international law editor of the Cardozo Moot Court Board and served on the National Moot Court Team.

Mr. Spiwak is a member in good standing of the bars of New York, Massachusetts, the District of Columbia, and the U.S. Court of Appeals for the D.C. Circuit.

Mr. Spiwak is a native of Washington, D.C. He, his wife and their daughter live in North Bethesda, MD.

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WRITTEN TESTIMONY OF
LAWRENCE J. SPIWAK

APPENDIX B
PHOENIX CENTER POLICY PAPER SERIES

Phoenix Center Policy Paper Number 21:

Competition After Unbundling:
Entry, Industry Structure and Convergence

George S. Ford, PhD
Thomas M. Koutsky, Esq.
Lawrence J. Spiwak, Esq.

(July 2005)

Abstract: In the last few years, U.S. telecoms policy has shifted from encouraging the sharing of existing networks to facilitating the deployment of advanced communications networks. Given the large capital expenditures required for these networks, there can be only a few of such networks. In light of the natural forces that limit the number of facilities-based suppliers, it is vital for policymakers to investigate and implement rules that make markets more conducive to facilities-based entry, and eliminate any existing rules that discourage deployment. The purpose of this POLICY PAPER is to provide a simple conceptual framework that can be used to evaluate the effect of particular rules and regulation on the construction of advanced communications networks and the expansion of existing networks into new markets. We provide numerical examples and a number of applications to illustrate how the conceptual framework can be used to evaluate particular rules and regulations as to their effect on facilities-based entry. Applications include an analysis of convergence, regulated limitations on service offerings, the pernicious effects of cable franchising, and the potential for collusion.
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I. Introduction and Summary

In the last few years, the goal of U.S. telecoms policy has been to promote and rely upon facilities-based “inter-modal competition” – that is, competition among network platforms. This approach marks an important change from the initial implementation of the Telecommunications Act of 1996, in which policymakers vigorously enforced various network sharing and unbundling obligations that were designed to jump-start competition through “intra-modal” means.
This brave new world of telecoms competition raises very basic and essential questions for policymakers: (1) what will be the market structure of this new “inter-modal” market, in which competition is effectively limited to firms that own their own network facilities; and (2) will we be satisfied with the results? In this POLICY PAPER, we provide policymakers with a framework for analyzing this emerging industry structure. The linchpin of our framework is its focus on the entry by new firms and the expansion by existing firms into related markets – i.e., for facilities-based “inter-modal” competition to work, entry by new firms should be encouraged and existing network platforms need to be able to expand freely into other markets in which their respective network platforms are capable of serving.

At the outset, it is important for all to understand that facilities-based competition in local communications markets will be characterized by only a few firms. As consistently demonstrated by academic and Phoenix Center research, and again in this POLICY PAPER, given the huge fixed and sunk costs inherent to the construction and commercial operation of communications networks, the equilibrium level of concentration of terrestrial firms in local communications markets (voice, video, and data) will be relatively high. As we discuss below, fewness arises because scale economies and sunk costs limit the number of firms that can profitably serve a market – and local communications networks are notoriously riddled with scale economies and sunk costs. Any policymaker interested in local communications markets should, therefore, start from the assumption that there will, at best, be only a “few” facilities-based firms. The notion that the local market can sustain five to seven local terrestrial networks all offering highly substitutable services is both naïve and unrealistic. Indeed, a federal policy that relies on facilities-based, intermodal competition in


2 Unless, of course, these five to seven firms somehow collude to artificially raise prices to allow this structure. See infra Section II.A.2.
communications markets is a decision to embrace, or at least tolerate, more concentrated industry structures.

But, policymakers should not let the "perfect" become the enemy of the good: competition, even among a few firms, is vastly superior to (even regulated) monopoly. While it is highly unlikely that dozens of local networks or facilities-based competitors could thrive in the communications markets (i.e., various forms of video, voice, and data services), this lack of headcount does not mean that competition is absent or that consumers do not reap substantial benefits from a more limited number of competitors. Indeed, many telecommunications markets deemed substantially competitive are concentrated. In the wireless industry, the Herfindahl-Hirschman ("HHI") is nearly 3,000 (the numbers equivalent of 3 firms), and in the long-distance market, the three largest firms (AT&T, MCI and Sprint) controlled nearly 70% of that market fifteen years after divestiture. Yet, both markets have been characterized historically by substantial price and quality competition.

Nor do few facilities-based local distribution networks imply few competitors. For example, over one-thousand firms offer long distance services over about six nationwide long-haul networks. A more contemporary example is the existence of many firms, large and small, offering consumers telephone service using VoIP technology (Voice-Over-Internet-Protocol). These "service" providers can provide meaningful benefits to consumers in both price and non-price dimensions, even though these providers did not spend billions to construct networks.

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3 For an interesting and detailed analysis of the prospects and welfare effects of competition in communications markets, see F. Gasmii, D. Kennei, J. Laffont, and W. Sharkey, COST PROXY MODELS AND TELECOMMUNICATIONS POLICY (2002), at, primarily, Ch. 5.

4 The HHI is an accepted measure of market concentration. The index is calculated by summing the squared market shares of each firm. For example, a market consisting of three equal sized firms has an HHI of 3,333 (= 33² + 33² + 33²). The numbers equivalent is simply [1/(HHI/1000)], where this ratio measures the number of hypothetical, equally-sized firms in a market (irrespective of the actual distribution of market shares).

5 TRENDS IN TELEPHONE SERVICE, Federal Communications Commission (August 2003) at Tbl. 9.6.

6 See PHOENIX CENTER POLICY PAPER NO. 12, supra n. 1; TRENDS IN TELEPHONE SERVICE, Federal Communications Commission (June 2005), at Tbl. 9.9.
Similarly, focusing narrowly on terrestrial, local distribution networks can present a misleading picture of rivalry. Alternative technologies, including wireless and satellite platforms, clearly expand service offerings to consumers, and in some cases provide meaningful price competition to more traditional communications services, even if only for subsets of consumers. Wireless carriers are investing billions in 3G technologies (e.g., EVDO) capable of providing advanced services, including some video applications. Even if these inter-modal substitutes (versus inter-modal competitors) do not provide a significant constraint on market power in traditional voice and video markets (though they may), they can have the effect of shrinking the negative effects of market power by reducing the size of traditional markets. Minutes of long-distance telecommunications traffic have fallen by 25% over the past five years, probably due to increased use of wireless telephone services and email. While such substitution may not reduce prices, it clearly reduces the relevance of any residual market power in the long-distance market.

Analysts suggest that roughly 9% of households have “cut the cord,” using wireless exclusively for telephone service. See David W. Barden, Bank of America Securities Report, 2Q05 TELECOM RESULTS HEAT UP (13 July 2005). This does not imply, however, that wireless and wireline are effective economic substitutes. To be economic substitutes, there has to be some price at which both the buyer will switch back to wireline and the seller would be willing to offer the service. See, e.g., Greg Lalas, The Year of Living Wirelessly, CHICAGO TRIBUNE (25 April 2005); see also Time to Deregulate Wireline Communications in Texas, Remarks of Barry M. Aarons, Research Fellow, Institute for Policy Innovation, Before the Texas House Committee on Regulated Industries (March 22, 2004) (“[my youngest son] who upon moving to [Butte, Montana] and renting a house decided that having cellular service was enough and having a hard wire residential local service was a waste of money. *** [T]he local phone company, Qwest, was never under consideration....”) (http://www.ipi.org/030404/ipipapers/n05/0219fe5f445997f186256e6e007398917OpenDocument).

As markets shrink, the absolute size of welfare loss from market power shrinks with it, and justifying the expense of remedial action becomes more difficult as the market gets smaller.

This type of substitution is perhaps best viewed as a rotation about the price axis intercept of, rather than a shift of, the demand curve. If the demand curve rotates as the number of potential customers falls, then the profit-maximizing price may not change. Nevertheless, the profits and welfare losses resulting from market power are reduced. The payphone market is a good example. While many described mobile phones and payphones are competitors, they are better characterized as inter-modal substitutes, since as mobile telephony has grown, payphone prices have rise. In essence, the owner of a mobile phone has left the payphone market.
Alternatively, inter-modal competitors (in contrast to inter-modal substitutes), like intra-modal rivals, strike directly at margins, providing substantial and direct consumer benefits in both price and non-price dimensions.¹¹ A government study shows, for example, that wireline (intra-modal) competition in the cable television industry provides three-times the price reduction as satellite competitors do (intra-modal competition). Our focus in this paper is on inter-modal competitors of arguably the most significant kind, that is those competitors offering very close substitutes to the traditional services (voice, video, and data) consumed by the vast majority of consumers (or, the typical household).

Given the inevitability of fewness in the number of competitors of this kind, it is vital for policymakers to understand the entry decisions of firms so that the number of competitors can be maximized under the relevant demand- and supply-side constraints of the market.

First and foremost, policymakers must identify and change those policies that make it more difficult for firms to enter or to expand into related markets. Recent advances in technology have substantially expanded the potential for facilities-based entry and inter-modal competition, provided that regulation does not foreclose opportunities for competitive entry, and that regulators do not act in concert with incumbents to raise effective entry barriers. The value of one more entrant in a concentrated market is sizeable, so policymakers should favor entry to the greatest extent possible. To do so, policymakers must understand the entry calculus of firms, and be able to apply the logic of this entry calculus to decipher how particular policies may affect entry. We provide in this POLICY PAPER a simple conceptual framework of entry ideally suited for the evaluation of policies that may influence the entry decisions of firms.

To flush these important points out in further detail, this POLICY PAPER is outlined as follows: Section II first establishes the fact that local telecoms markets will be characterized by only a “few” facilities-based firms. This section

¹¹ The difference between inter-modal substitutes and competitors is perhaps best made in the context of antitrust market definition. An inter-modal competitor would be in the “antitrust” market of the traditional service (a close substitute that meaningfully affects market power), where an inter-modal substitute would not. See PHOENIX CENTER POLICY BULLETIN NO. 10: Fixed-Mobile “Intermodal” Competition in Telecommunications: Fact or Fiction? (30 March 2004) (available at http://www.phoenix-center.org/PolicyBulletin/PCPB10Final.pdf) for an application of this logic to wireless/wireline substitution.
draws on the economic literature on entry to show that given the huge sunk costs required for entry, the equilibrium number of terrestrial firms for the local market will be highly concentrated. Section III goes on to present a simple and intuitive economic model of entry accessible to the layperson, which illustrates the concept of an equilibrium industry structure. In this section, we describe the primary determinants of competitive entry, and present simple numerical examples to facilitate comprehension.

Section IV includes four applications of the logic of our entry model to real-world policy issues.

For example, there has always been great talk about “convergence”, but true convergence (i.e., one that actually affects the underlying market structure) is not the ability to “bundle” a variety of products in a single marketing but is, in fact, a technological spillover that reduces entry costs so that existing firms find it profitable to extend their networks into related markets, a decision that would not be profitable without the spillover. As such, “convergence” does not generally mean that busloads of new firms can now enter the market – it means only those firms with assets in a related market that have been affected by the spillover can afford to enter.

Similarly, if policymakers artificially restrict or impede access to various ancillary product markets, then firms may not expand into related markets or upgrade their existing networks (e.g., copper to fiber) to facilitate the technological “convergence” discussed supra. If network modernization is to occur, then regulatory entry barriers that exist in any market that the network is capable of serving must be eliminated to the greatest extent possible.

The same can also be said about arguments for so-called “regulatory symmetry”, such as franchise and build-out requirements on new terrestrial multichannel video programming distributors (“MVPD”), because such requirements, in fact, treat sunk costs incurred by the new entrant and the incumbent in a very asymmetrical way. As we show, incumbents can incur more sunk costs than entrants because their profits are higher. In fact, many cable systems were constructed during the era of exclusive franchising, so incumbent firms incurred these costs at a time when it was guaranteed a monopoly over cable services in the area. A firm offered a monopoly would readily propose or agree to a higher entry cost than it otherwise would have agreed to in a competitive environment, particularly if policy requires future entrants to match the sunk entry costs of the incumbent.
Finally, but perhaps most importantly, after all of these hurdles are overcome, the level and degree of entry can tell us much about the potential for collusion. As we show, it is easy to confuse collusion with intense price competition, and this confusion arises primarily from a strict adherence to the traditional view that the intensity of price competition rises with the number of firms. Once the effects of sunk costs are incorporated into the model of competition, however, such a simple notion of competition no longer tells the complete story because the easiest time for firms to collude is before they enter one another’s markets. As such, if we observe reciprocal entry, then this is solid evidence that collusion is not occurring. Indeed, as we continue to witness cable operators moving into the telephone business and the telephone companies moving aggressively into the video business, this simple observation alone is strong evidence that collusion is not present.

II. Industry Concentration in Communications Markets

The construction of a local communications network – whether used for voice, video, data or some combination thereof – requires enormous capital expenditures. These expenditures are fixed costs and, consequently, firms in these markets have considerable economies of scale (i.e., average costs fall as output increases). The presence of these significant scale economies results in highly-concentrated market structures, since larger firms operate at a sizeable cost advantage over smaller firms.

This situation is exacerbated by the fact that in local communications markets, a good deal of these fixed costs are also “sunk.” A sunk cost is a cost that, once incurred, cannot readily be recovered (it cannot be sold in an aftermarket). Communications plant, once installed, has no other use and, thus, cannot readily be sold in an aftermarket for alternative uses. In addition to scale economies...
economies, fixed costs that are sunk raise the risk of entry, since investments that are sunk have virtually no value if the business fails.\footnote{In fact, a large portion of the capital expense of constructing communications plant is installation costs, and expended installation labor clearly has no value in an aftermarket.}


From a theoretical (and empirical) perspective, Sutton (1995) provides an excellent treatment of the relationship of sunk costs to market structure, and this framework is extended slightly in \textit{Phoenix Center Policy Paper No. 10}.\footnote{\textit{Supra} n. 1.} What these theoretical analyses show is that, under certain conditions, the equilibrium number of firms in a market is equal to (the integer part of)\footnote{The assumptions of the model include Cournot competition in quantities, an isoelastic demand curve (that is, the demand elasticity is constant and equal to –1), constant costs, and symmetric firms. The game is a two-stage game and the equilibrium is a Nash Equilibrium. \textit{See} John Sutton, \textit{Sunk Costs and Market Structure} (1991) at Ch. 2.}

\begin{equation}
N^* = \left\lceil \frac{S}{E} \right\rceil
\end{equation}
where \( N^* \) is the equilibrium number of firms, \( S \) is the market size measured as the lifetime expenditures of consumers, and \( E \) are the sunk entry costs. The equilibrium number of firms in a market is obtained when no firm has either the incentive to enter or to exit the market. Equation (1) indicates that if market size is $10 billion (measured as the present value of the flow of gross profits over the life of the investment), and entry costs are $2 billion, then the equilibrium number of firms is \( N^* = 2 \). If entry costs rise to $3 billion, however, then the equilibrium is monopoly, or \( N^* = 1 \). Equation (1) reveals that the equilibrium number of firms rises as the market gets larger (\( S \) gets bigger, other things constant), but falls as sunk costs rise (\( E \) gets bigger, other things constant).

Perhaps the most important point for modern communications policy obtained from Equation (1) is that the sustainable number of firms in a market depends on the economic characteristics of the market, and not the desired, arbitrarily selected number of firms by some group of policymakers, trade group presidents, legislators, or other types of social reformers (no matter how well intentioned). While public policy cannot choose the long-run sustainable number of firms in a market, policymakers can take steps to affect the economic character of markets, and, consequently, influence the equilibrium number of firms. One clear example is investment tax credits, which directly lower sunk costs of entry by lowering taxes on such investment. In addition, since the sustainable

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18 The ratios of “Revenues” to “Property Plant and Equipment” across the communications industries is interesting, with a lower ratio roughly indicating a higher expected level of concentration: (1) local exchange 0.92 (Bellsouth); (2) cable television 1.08 (Comcast); (3) mobile telephony 1.35 (Nextel); (4) long distance networks 2.65 (AT&T); (5) UNE-P providers 7.16 (TalkAmerica); and (6) VOIP retailers 64.8 (GlobeTel). The number of firms in each “market” is inversely correlated with these ratios. Of course, a more sophisticated analysis of capital stock to entry is required for a more compelling relationship of fixed/sunk costs to industry structure. See supra n. 15 for a list of studies on this topic.

19 The calculation is \( \text{INT}(10/2)^2 = \text{INT}(2.4)^2 = 2 \).

20 The calculation is \( \text{INT}(10/3)^2 = \text{INT}(1.33)^2 = 1 \).

21 While Equation (1) does not explicitly point to scale economies, the presence of scale economies is implicit. The limit on the number of firms is based on the inability of additional firms to achieve sufficient scale to serve the market profitably. For an extension of Equation (1) to a case of generalized conjectural variations, see Phoenix Center Policy Paper No. 10, supra n. 1.

number of firms in a market is a function of the size of that market, public policy can help expand that market, say by removing international trade barriers.23

It is important to recognize that a number of U.S. industries – including several that nearly all would regard as competitive – are relatively concentrated. The household appliance market, like refrigerators and freezers, has an HHI index of over 2700. The construction of large jetliners presently has only two competitors – Boeing and Airbus. Semiconductor equipment, breakfast cereal, chewing gum, soup, and disposable batteries also have only a few market participants. Indeed, while it is common to associate high concentration with poor market performance, the empirical evidence does not consistently support this common view.24 High industry concentration does not *a fortiori* mean that the interests of consumers are poorly served. Competition in concentrated markets has been shown to provide good performance in many industries.25

While law and public policy can make markets more conducive to entry, they can also result in *even fewer* firms. For example, cable franchise contracts result in more concentrated markets for video programming distribution by raising entry

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23 The ability of international trade to expand markets and thereby reduce industry concentration is shown empirically in W. F. Chappell and B. Yandle, *An Entry Model of Import Penetration*, 19 ATLANTIC ECONOMIC JOURNAL 22-28 (1991).


25 *Id.*
costs.\textsuperscript{26} According to the Federal Communications Commission: “The local franchise process is, perhaps, the most important policy-relevant barrier to competitive entry in local cable markets.”\textsuperscript{27} It should come as no surprise that the only relatively-successful MVPD entrant to date is Direct Broadcast Satellite (“DBS”), which does not need a local franchise to operate. Until 1996, public policy in many states made entry into the local telephone business illegal, which certainly constituted a significant barrier to entry.\textsuperscript{28}

Sometimes policymakers take more explicit steps directed at affecting market structure. Take for example the wireless PCS auctions: in the early 1990s, the FCC auctioned off hundreds of geographically-divided licenses for PCS spectrum, based upon an assumption that making five licenses available over multiple geographies would result in a more-competitive outcome than alternatives proposed. The FCC could not have known then whether or not five licensees in various overlapping geographies would be “too many” or “too few.” It now appears that the FCC acted conservatively and issued far too many licenses for the ultimate wireless industry structure, which seems to be trending toward four or so more or less national networks (Sprint-Nextel, Verizon Wireless, Cingular, and T-Mobile) with additional regional, fringe competitors (like U.S. Cellular and ALLTEL) in certain areas. Today, we should not be surprised to see wireless industry mergers occur when the government has

\textsuperscript{26} Another example of a policy that increased concentration is legal restrictions on advertising by cigarette companies. These restrictions limited the ability of entrants to inform consumers about their products. \textit{See}, e.g., E. W. Eckard Jr, \textit{Competition and the Cigarette TV Advertising Ban}, 29 \textit{ECONOMIC INQUIRY} 119-133 (1991). Advertising has two countervailing effects on industry structure. First, it raises the sunk costs of entry, thereby raising concentration. But, advertising is required for entry, since consumers must be informed about new products. \textit{See} Kessides (1986), \textit{supra} n. 15, for an empirical test of these two countervailing effects of sunk advertising expenditures.


initially (and artificially) divided up crucial raw materials among more firms than the industry appears to be able to profitably sustain.29

As we discuss more fully below, in light of the fact that communications markets will be – by their very nature – concentrated, policymakers should do what they can to make all communications markets more conducive to facilities-based entry. Indeed, as technology is transforming traditional “single use” networks (i.e., telephone or cable networks) into “multi-use” networks (i.e., advanced broadband networks that can provide telephone, video and data), competition between a “few firms” and the elimination of monopoly in the communications and video industries is now possible – but only if new and existing firms are not artificially hamstrung by regulations that limit their ability to utilize their networks to compete over all particular parts of a “bundle” of voice, video and data services. As a result, instead of focusing on “how many firms” are present in a market, policymakers should appropriately focus on “what policies will facilitate entry” by firms.

III. An Entry-Oriented Model of Industry Structure for Policy Analysis

Since domestic policymakers have chosen to rely on facilities-based entry in communications markets, policymakers focused on consumer welfare need to think in an analytical way about how this competition will develop. The most important aspect of network platform facilities-based competition for consumers is and will be the nature, quality, quantity, and diversity of communications services available over those competing network platforms. And, since we are in an environment in which traditional “single-use” networks are being transformed into advanced, “multiple-use” platforms competition, this transformation – to a large extent – will hinge on how those network platforms will enter one another’s markets and how public policy will affect the mobility of existing networks into new lines of business.

In this section, we present a simple and intuitive framework for analyzing the factors that influence entry. We then utilize specific examples in order to show

29 A similar wave of consolidation occurred in the radio industry after Congress significantly altered FCC rules that artificially limited the number of radio stations one firm could own. See, e.g., Robert B. Ekelund, George S. Ford and Thomas Koutsky, Market Power in Radio Markets: An Empirical Analysis of Local and National Concentration, 43 JOURNAL OF LAW AND ECONOMICS 157-184 (2000) (empirically demonstrating that the FCC’s own rules created maximum fragmentation in the industry by nearly forbidding multi-station owners).
in more detail how policies affect the equilibrium number of firms and the behavior of those firms. The numerical examples provided are not intended to reflect precisely any particular industry and are not drawn from empirical analysis, but are presented merely to illustrate the concepts embodied in the conceptual framework.

At the core of the economic framework is the obvious notion that firms will enter a market only if it is profitable to do so, and firms will exit a market if they find it unprofitable. As a result, any model of entry must focus upon the profit function of the firm. Our framework is based on this very simple logic, and is consistent with earlier work on entry such as Salop (1979), Van Witteloostuijn (1993), Sutton (1995), Hazlett and Ford (2001), PHOENIX CENTER POLICY PAPER NO. 10 (2001), and a plethora of other academic and policy papers.30

Our discussion can be made more concise by the introduction of some simple notation. Let $d$ be the flow of gross profits over the life of some venture, and $e$ be the sunk setup costs (e.g., “entry costs”) to enter the market. We use the variable “$d$” to indicate profits since many entry models evaluate entry in the context of duopolistic competition (hence “$d$”). The flow of profits should be thought of as the sum of the difference between revenues and variable costs (in present value form). Entry costs, in this simple framework, are all upfront costs incurred immediately upon entry. These entry costs are fixed and sunk. The profitability of entry is determined by the difference between gross profits ($d$) and entry costs ($e$). Since firms only enter if profits are positive (or non-negative), we have entry when $d - e \geq 0$. If $d - e < 0$, then the firm stays out of the market (i.e., does not enter). Thus, firms will enter as long as it is profitable to do so, and when entry stops, the existing number of firms will be the equilibrium number of firms ($N^*$). All firms, from lemonade stands to fiber network operators, go through this calculus in deciding whether to enter any new market.

The simple entry model, applied in a generic setting, is illustrated in Table 1. In the first column, there is a count of the number of firms in the market ($N$). In

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the second and third columns, profit \((d)\) and entry costs \((e)\) are listed. Profits are assumed to fall with the number of firms, a point we discuss in detail in the next section.\(^{31}\) Entry costs are constant at $15.\(^{32}\) Working through the table, it should be clear that the equilibrium number of firms in this example is 3. Firm 1 makes a large profit of $85. Upon the entry of firm 2, profits fall to $40 per firm, but this profit is more than sufficient to cover the entry costs $15. Likewise, the per-firm profits of $20 at 3 firms is larger than entry costs, so three firms enter. But, when the fourth firm enters, profits fall below entry costs ($12 < $15), so the fourth firm stays out. Thus, we have an equilibrium of 3 firms – no existing firm has an incentive to exit, and no new firm has the incentive to enter. Note that all firms earn positive economic profits in equilibrium ($5), but there is no threat of entry.\(^{33}\)

<table>
<thead>
<tr>
<th>(N)</th>
<th>(d)</th>
<th>(E)</th>
<th>(d - e)</th>
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<tbody>
<tr>
<td>1</td>
<td>100</td>
<td>15</td>
<td>85</td>
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<tr>
<td>2</td>
<td>40</td>
<td>15</td>
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<td>3</td>
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<td>4</td>
<td>12</td>
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<td>5</td>
<td>8</td>
<td>15</td>
<td>-7</td>
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<tr>
<td>6</td>
<td>5</td>
<td>15</td>
<td>-10</td>
</tr>
<tr>
<td>7</td>
<td>4</td>
<td>15</td>
<td>-11</td>
</tr>
</tbody>
</table>

This simple condition on entry \((i.e., \ d - e\) positive or negative), illustrated numerically in Table 1, is the core of our economic framework, and all economic models of entry. While we can and do delve into the finer properties of \(d\) and \(e\),

\(^{31}\) Profits are for illustrative purposes only and do not represent expected or actual price declines in any particular market.

\(^{32}\) Note that industry profits at two firms are $80, versus $100 at monopoly. In the absence of perfect collusion, industry profits will decline as the number of firms rises. Even if collusion occurs and industry profits remain at $100, then per-firm profits will decline \((i.e., \ 100/N)\).

\(^{33}\) As entry costs fall to zero, then the economic profits of existing firms falls to zero. Thus, entry costs represent a barrier to entry in the traditional sense of allowing positive price-cost margins. \textit{See, e.g., J. Bain, Barriers to New Competition} (1956). What we have learned from this analysis (summarized clearly in Table 1) is how incumbent firms can sometimes be perceived as having an exaggerated perception of the degree of competition in a market. In markets with large capital expenditures, the addition of one additional firm may change the incumbent’s situation from one of persistent profits to persistent losses. Thus, one’s perception of the effects of a one more firm depends on the effects of one more firm. With few firms and sunk costs, the effect of one more firm is nearly always sizeable.
these two variables encapsulate the most important components of the entry decision and the nature of the equilibrium structure. Put simply, a prospective entrant asks “what’s it worth for me to enter?” and “what does it cost me to enter?” If the benefits exceed the costs, then entry occurs. This thought process lies at the core of nearly all of economic science. For policymakers, the answer is simple and intuitive – if you want there to be more entry, figure out how to make entry more profitable. In particular, investigate and implement rules that increase gross profits (\(d\)), reduce entry costs (\(e\)), or, better yet, both (without harming consumers, of course).

A. Factors Determining Profits

As just described, it is the relationship between expected profits (\(d\)) and entry costs (\(e\)) that drives the entry decisions. Per-firm profits will fall as the number of firms increases, even with perfect collusion (as the monopoly profit is divided among a larger numbers of firms). Aside from the number of firms, we view profits as being driven by four factors: (1) the size of the market; (2) the intensity of price competition; (3) the extent of product differentiation; and (4) the degree to which two rival networks overlap in their markets served.

<table>
<thead>
<tr>
<th>Table 2. Factors Determining Profits</th>
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<tbody>
<tr>
<td>Factor</td>
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<tr>
<td>------------------------------------</td>
</tr>
<tr>
<td>Larger Market Size</td>
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<tr>
<td>More Intense Price Competition</td>
</tr>
<tr>
<td>More Product Differentiation</td>
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<tr>
<td>More Overlap of Rival Networks</td>
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</tbody>
</table>

The effects of each factor are summarized in Table 2, and the factors are described in more detail in the following sections.

1. Market Size and Entry

All other things constant, an increase in market size will increase profits and, therefore, the number of firms that can profitably serve that market.34 The easiest...

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34 This point is obvious. For any given price-cost margin (\(m\)), profits are \(m \cdot q\), where \(q\) is firm output. As \(q\) rises, \(m\) constant, profits rise. Empirical evidence on relationship of industry (Footnote Continued. . . .)
way to think about how markets can increase in size is in international trade – the removal of a tariff on a product increases the number of profitable sales for that product and invariably increases the size of the market and profits. As we discuss later, market size is not necessarily the size of consumers’ expenditures on a single product or service – it can also involve the potential for sales of additional or new services over the same infrastructure. A law that prohibits stores of a certain size from selling groceries (as anti-WalMart advocates often suggest) limits the size of the market that WalMart can address and therefore limits profits and makes WalMart entry less likely (the intended effect, of course). Like large stores, communications networks can often provide and sell multiple services, so market size can be approximated as total expenditures on the full array of services available over the network. Precluding the sale of particular services that a network is capable of providing obviously reduces market size and, therefore, reduces entry.

<table>
<thead>
<tr>
<th>Table 3. Market Size and $N^*$</th>
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<tr>
<td><strong>Example 1: $N^*$ = 3</strong></td>
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<td>$n$</td>
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</table>

We can extend our simple numerical example in Table 1 to illustrate the effect of market size. Our discussion indicates that larger markets increase profits and, consequently, may increase the number of firms in equilibrium. Example 1 in Table 2 is simply a replication of our initial example with an equilibrium number of firms $N^*$ = 3. In Example 2, however, we increase the size of the market by 50% – for instance, an import tariff abroad has been concentration to market size is provided by S. Kellner and G. F. Mathewson, *Entry, Size Distribution, Scale, and Scope Economies in the Life Insurance Industry*, 56 *Journal of Business* 25-45 (1983); M. B. Coate, *The Dynamics of Price-Cost Margins in Concentrated Industries*, 21 *Applied Economics* 261-273 (1989); Bhattacharya (2002), *supra* n. 15; and W. F. Chappell and B. Yandle, *supra* n. 23.

eliminated. Now, monopoly profits are $150, up $50 from Example 1. With entry costs constant (at $15), this larger market is capable of sustaining four firms \( (N^* = 4) \), since each firm is profitable at four firms \( (d - e = $3) \), but none is profitable at five firms \( (d - e = -$3) \). Clearly, larger markets, per dollar of sunk costs, result in a larger number of equilibrium firms.\(^{37}\)

2. The Intensity of Price Competition

Profits are also affected by the intensity of price competition. If firms compete aggressively, then profits will fall sharply when new firms enter. Weak price competition, alternatively, allows profits to fall more slowly as additional firms enter. The relationship of price/profit reductions and additional firms has important implications for industry structure.

The model of small numbers competition that is the basis of most views on the issue is Cournot competition in quantities.\(^{38}\) With this form of competition, market price falls and quantity rises to the perfectly competitive levels as the number of firms increases. In its most basic form, for example, the market quantity is \( \frac{N}{N+1} \cdot Q_c \), where \( N \) is the number of firms and \( Q_c \) is the quantity sold with perfect competition. Obviously, as \( N \) increases, the Cournot quantity gets closer to the perfectly competitive quantity.\(^{39}\) Only with perfect collusion (which is practically unobtainable) would gross profits remain at the monopoly

\(^{36}\) Profits are for illustrative purposes only and do not represent expected or actual price declines in any particular market. The larger market is assumed to be 50% larger than the initial case.

\(^{37}\) Of course, the increase in market size must be large enough to alter the entry decision of the marginal firm.

\(^{38}\) This relationship is certainly true of Cournot competition in quantities, which typically results in a smooth movement from monopoly to perfectly competitive prices as the number of rivals increases. In the Cournot model, rival firms choose the quantity they wish to offer for sale. Each firm maximizes profit on the assumption that the quantity produced by its rivals is not affected by its own output decisions. With Bertrand competition in prices and homogenous products, the duopoly price is equal to the perfectly competitive price. With heterogenous products, the Bertrand equilibrium price falls toward the perfectly competitive as the number of firms enters. Kreps and Scheinkman (1983) show that when firms must first choose capacity plant size, the equilibrium of Bertrand competition in prices is identical to that of the simple Cournot model. D. Kreps & J. Scheinkman, *Quantity Precommitment and Bertrand Competition Yield Cournot Outcomes*, 14 BELL JOURNAL OF ECONOMICS 326-337 (1983).

\(^{39}\) A monopolist sells one-half the competitive output \( \frac{1}{1+1} = 0.5 \). At five firms, the industry output is 83% (= 5/6) of the perfectly competitive output.
level as the number of firms increase. At the other extreme, we may have very intense price competition (i.e., Bertrand competition in prices) so the perfectly competitive price is obtained with only two firms. In this case, the addition of firms after the second will have no effect on prices or profits.

These widely disparate competitive interactions are not simply theoretical. Empirical and experimental research has shown that there is substantial variation in the relationship between the number of firms (or industry concentration) and prices/profits across industries or over time.

Experimental research is particularly interesting on this point. Fouraker and Siegel (1963) evaluated the competitive behavior of 16 pairs of “student duopolists.” In 7 of 16 games, the Cournot equilibrium was observed. Other outcomes included 5 Bertrand (perfect competition) outcomes, 3 collusive outcomes, and 1 outcome between collusion and Cournot. The average outcome was Cournot, but there were significant departures from Cournot behavior. These experiments illustrate the variety of outcomes possible with small number competition. Interestingly, when the experiment was extended to three players, the Bertrand outcome was the most common. Holt (1985) and Plott (1982) also find support for the Cournot outcome in experiments.

There are many empirical studies showing a positive relationship between concentration and prices/profits; but, there also exists a large literature showing no link between the two. Econometric research finds support for the Cournot outcome, as well as more and less competitive outcomes. Iwata (1974) could not reject Cournot outcome in the Japanese glass industry, and Brander and Zhang (1990, 1993) find evidence of Cournot outcomes in the U.S. airline industry. Haskel and Martin (1994) find support for Cournot over Bertrand behavior when

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firms face capacity constraints.\textsuperscript{43} But, Berg and Kim (1994) reject Cournot behavior in the Norwegian banking industry, and Ford (2000) presents evidence that the international message telephone industry is more competitive than Cournot.\textsuperscript{44} Karp and Perloff (1989) show that the oligopolistic rice market is closer to the competitive than the collusive outcome. Without question, the empirical economics literature supports neither a simple nor consistent relationship between industry concentration and prices or profits.\textsuperscript{45} Competition among small numbers of firms can produce a variety of outcomes and assuming blindly high concentration is bad for consumers is inappropriate.

We know that the intensity of price competition can vary across industries, and the intensity of price competition can produce a somewhat paradoxical result. That is, industries with intense price competition are often highly concentrated (such as soft drinks, batteries, and soup).\textsuperscript{46}

This is a less-than obvious point, so an illustration (Table 3) will be helpful. In all our examples thus far, adding firms reduces gross profits. However, let us assume that the market we are considering is one in which the firms necessarily must compete on price.\textsuperscript{47} The presence of price competition allows for variations in the reduction in profits per added firm. We present three examples. In all three, entry costs are $15 and market size is constant, and the maximum gross (e.g., monopoly) profit is $100.


\textsuperscript{45} \textit{Supra} n. 24.

\textsuperscript{46} For empirical evidence on the relationship of industry structure to the intensity of price competition, see S. T. Berry, \textit{Estimation of a Model of Entry in the Airline Industry,} 60 \textit{ECONOMETRICA} 889-918 (1992).

\textsuperscript{47} There is anecdotal evidence that the “residential broadband” market may be such a market. Market observers have recently noted that where robust broadband competition is present, like Japan and some locations in Europe, price for local bandwidth drops sharply. There is anecdotal evidence that the “residential broadband” market may be such a market in which price competition plays an important role. One market observer has noted that there is a “huge increase in demand when [monthly] prices go to $15-$20 (Italy, France, Japan, adjust for included phone calls).” Dave Burstein, \textit{Huffing and Puffing,} DSL PRIME (June 8, 2005).
Table 3. Price Competition and N*

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Example 1 is described as “Less Intense Competition,” since gross industry profits do not fall with the increasing number of firms as rapidly as they do in Example 2, “Intense Competition.”48 Example 1 is the same as the initial example (Table 1), and the equilibrium number of firms is $N^* = 3$. In Example 2 where competition is more intense (and profits are therefore lower), the equilibrium number of firms falls to $N^* = 2$, since a third entrant has an expected net profit of -$3. If firms compete aggressively on price, therefore, then the number of firms in equilibrium will be smaller than if firms are more accommodating to their rivals. Note that we have not assumed any collusion between the firms in any of these models – the fact that $N^*$ is lower where intense price competition is present is a symptom of intense competition and not necessarily a harbinger or evidence of collusion.49

In Example 3 in Table 3, we demonstrate how “Perfect Collusion” impacts $N^*$. In this example, industry profits remain at the monopoly level ($100) regardless of the number of firms, with each firm taking an equal share of the

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48 Note that industry profits at two firms are $80, versus $100 at monopoly. In the absence of perfect collusion, industry profits will decline as the number of firms rises. Even if collusion occurs and industry profits remain at $100, then per-firm profits will decline (i.e., $100/N). 

49 It is often difficult to distinguish between cooperative and non-cooperative behavior. For example, price leadership is often viewed as cooperative behavior, but if there is some legitimate reason for prices to rise (a cost shock, for example), it is likely that one firm will be the first to do so and then the others will follow. The behavior in this latter case is consistent with non-cooperative behavior, thought it may be difficult in practice to distinguish it from cooperative price leadership. Philips (1995) provides an excellent and policy-oriented overview of this issue. See L. Philips, COMPETITION POLICY: A GAME-THEORETIC PERSPECTIVE (1995).
profits. Given this perfect collusion, the equilibrium number of firms interestingly rises to \( N^* = 6 \).

The examples in Table 3 present an interesting paradox and a challenge for policymakers. Normally, we think of price competition as becoming more intense as the number of firms rises. Yet Table 3 shows that this is not necessarily the case. As a result, policymakers must separate their assumptions about the effects on prices (or profits) from the number of firms in a market and the way in which firms interact.

An even more important lesson from the examples in Table 3 is that a highly concentrated equilibrium may be the result of intense price competition rather than an indication of a lack thereof. Consider, for example, how we would view the competitiveness of the three markets in Table 3 if we adhered to the traditional view that price competition increases as the number of firms rises (the Cournot assumption). In the traditional view, we would conclude that the collusive outcome (Example 3, \( N^* = 6 \)) is the most competitive, and that the most competitive outcome (Example 2, \( N^* = 2 \)) is the least competitive. The confusion arises due to the presence of fixed and sunk costs. Therefore, the risk of such confusion is considerable in communications markets where sunk costs are significant.

The examples in Table 3 also show a potential danger for policymakers. If a policymaker has as a sole goal to increase the number of firms in a market, then that policymaker would be advised to adopt policies that facilitate collusion. For some real-world examples, consider the Common Agricultural Policy of the European Union and the Northeast Dairy Compact in New England, both of which impose price and production controls with the purpose of maximizing the number of farmers and dairies in the market. The OPEC oil cartel, by raising the price of oil, a commodity for which price competition is strong, has the effect of increasing the number of countries that can profitably produce and export oil. Consumers are not better off simply because there are “more farmers”, “more dairies” or “more oil-producing nations” – indeed, they pay higher prices as a result.

\[ 50 \text{ If fixed and sunk costs are small, the number of firms is likely to be very large (absent Bertrand competition in prices), so that “collusion confusion” is likely to be minimal.} \]
Put simply, a “few” number of firms in a market does not necessarily mean that those “few” firms will not compete aggressively – indeed, there may be “few” firms simply because of the presence of aggressive competition. Thus, a review of competition in concentrated industry structures will likely require a more sophisticated and subtle analysis.

3. Degree of Product Differentiation

Profits are also affected by the ability of firms to differentiate their product from their competitors’, called product differentiation. The more alike are products, the more a consumer’s purchase decision will be based purely on price. As a result, competition among firms selling homogeneous (i.e., identical) products likely will focus on price competition. Commodities like milk or oil, for example, are relatively homogeneous, and thus price is the sole determinant of consumer choice. However, if a firm can alter or tweak its product in a useful way (e.g., organic milk, fuel additives), then it might be able to charge more, and the degree of this differentiation can affects profits. Any stroll down the breakfast cereal aisle of a grocery store is a vivid reminder of the power of product differentiation – two firms, General Mills and Kellogg, dominate this market yet dozens of different product offerings are sold at various prices.

As products become differentiated, price competition weakens. In many cases, sellers may very well be selling identical products (Whirlpool and Kenmore refrigerators are the same, as are Prell and Pantene shampoos), but will differentiate themselves by offering varying levels of customer service, return policies, product information or demonstration, colors, and so forth. Location and convenience can be powerful differentiators, even if selling something as homogenous as a gallon of milk.

The effect of differentiation on prices can be significant. At the extreme, two products can become so different that they no longer are substitutes for one another – while both made by General Motors, a Hummer is not really a viable substitute product for a Chevette. Accordingly, we should expect firms to

51 Such services will only be offered if higher prices or high volumes sufficiently raise profits to cover the additional costs.
attempt to differentiate their products as much as possible in order to soften price competition.\footnote{In economic theory, this is known as the principle of maximum differentiation. S. Martin \textit{Advanced Industrial Economics} (2001), ch. 4.}

As to whether consumers are better off as a result of product differentiation, the answer is “it depends.”\footnote{In some cases, differentiation improves consumer welfare while in others it may not. There is an optimal amount of differentiation. Most Industrial Economics textbook cover this point. See, e.g., D. E. Waldman and E. J. Jensen, \textit{Industrial Organization: Theory and Practice} (1998), at 308.} Consumers usually value variety, so while differentiation results in higher prices, the value of increased variety may offset the reduction in consumer welfare from higher prices.\footnote{Appendix H, \textit{supra} n. 27 at ¶ 373.} So, there is a trade-off for consumers between variety and price. Differentiation is not always beneficial to consumers, and some firms may excessively differentiate in an effort to more aggressively soften price competition. One type of differentiation that would harm consumers is differentiation through sabotage, where one firm reduces the quality of a rival’s product instead of improving its own quality.\footnote{Product differentiation can alter the absolute quality as well as the relative quality among firms and. Beneficial differentiation raises absolute quality (and may affect relative quality), whereas differentiation for sabotage only alters relative quality.} Product differentiation may also create entry barriers by forcing entry to incur increased sunk advertising costs to win customers.

A recent study by the General Accounting Office (“GAO”) on competition between cable television and DBS firms illustrates the importance of product differentiation.\footnote{Direct Broadcast Satellite Subscribership Has Grown Rapidly, but Varies across Different Types of Markets, \textit{Report to the Subcommittee on Antitrust, Competition Policy and Consumer Rights, Committee on the Judiciary, U.S. Senate, US Government Accountability Office, GAO-05-257} (2005).} While both terrestrial and satellite multichannel video providers offer similar products, there are some meaningful forms of differentiation between the two. The differences in the delivery technology itself (\textit{i.e.}, inter-modality) are not lost on consumers. Intuitively, we would expect that product differentiation between terrestrial rivals would be less than between terrestrial and DBS providers. The GAO study indicates that this is true. Econometric evidence presented in the study shows that satellite video providers reduce cable prices by about 5\%, whereas the presence of a wireline, terrestrial

\footnote{In some cases, differentiation improves consumer welfare while in others it may not. There is an optimal amount of differentiation. Most Industrial Economics textbook cover this point. See, e.g., D. E. Waldman and E. J. Jensen, \textit{Industrial Organization: Theory and Practice} (1998), at 308.}
video rival reduces price by about 16%. The competitive effect of the “closer” rival is three times that of the satellite delivered video.

Other statistics in the study provider further support for the powerful impact of differentiation among multichannel video providers. For example, subscription to satellite services falls considerably (37%) when a terrestrial competitor exists. Even inter-market variations in the quality of the DBS service are shown to affect cable prices. The GAO study also concludes that consumers are more likely to subscribe to DBS service when the DBS provider is able to offer local broadcast stations. Limits on the ability of DBS providers to offer local broadcast channels is a classic example of public policy failing to make markets more conducive to competitive entry.

4. Geographic Overlap

Finally, profits are certainly related to the extent the “geographic” markets of rivals overlap. The question of geographic availability is particularly important for local communications networks, because the whole purpose of these networks is to provide communications services to where customers live or work. It does no good for a residential customer to be told that a new network’s service is available across the street or down the block. As a result, the degree of overlap between competing networks has a significant impact on the degree of competition that may or may not exist between those networks.

The market boundary of communications networks is frequently referred to as “homes passed.” We have observed that price competition and profits are related to geographic overlap of rivals. Beard et al. (2005) show that if the same price is charged across the entire market (i.e., price discrimination is prohibited), then the equilibrium price in cable television markets declines as the service

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57 These price differences can be computed from the reported econometric results. For the DBS price change, a 100% reduction from the mean (22%) DBS penetration is equivalent to eliminating the DBS providers from the market. The coefficient is -0.0476, which is roughly equal to 5% (the effect of DBS is measured as -0.0476/100% = -0.0476). The coefficient on a terrestrial overbuild is -0.1694, and the percentage change in price is measured as exp(-0.1694) – 1 = 15.6%.

58 GAO (2005) at 33.

59 GAO (2005) at 33.
areas of rival cable systems increasingly overlap. Thus, the larger number of homes passed by both networks in a given market, the lower equilibrium price will be.

In Figure 1, we illustrate the affect on price of changes in overlap and product differentiation. We assume that with zero overlap, the incumbent firm is a monopolist and charges price $p_m$. Dollars are measured on the vertical axis, and the percentage of rival system overlap is measured on the horizontal axis. First, consider the case where the services is so highly differentiated that consumers do not view them as substitutable in any way. In this case, we have the line labeled AA in the figure. Regardless of the overlap of the two networks, price remains at the monopoly level ($p_m$). If the two services are highly substitutable, then we might have a price-overlap relationship labeled AC. Now, price falls quickly as the overlap of the networks increases, with price $p_2$ at a 50% overlap and $p_3$ at 100% overlap. Finally, an intermediate case of product differentiation is indicated by the line labeled AB. At 100% overlap, price is $p_2$, whereas at 50% overlap, price is $p_1$. Note that price at 100% overlap with moderate

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61 If different prices can be charged in the monopoly and contested segment, then a unique price for each segment will be charged (the monopoly price in one and the duopoly price in the other).
differentiation (line AB) is equal the price for 50% of overlap with very little differentiation (line AC).

On the issue of system overlap, Beard et al. (2005) provide strong evidence that overlap matters for cable prices. But the logic of Figure 1 is probably best demonstrated by evidence regarding the nature and consequences of competition between cable operators and DBS providers. As we mentioned above, the price effect in cable markets from a terrestrial cable rival is substantially larger than a DBS providers, because of the satellite service is more differentiated from traditional cable service. On the issue of overlap, the GAO study shows that geographic conditions that adversely affect the ability of consumers to get DBS service raises cable prices. These geographic limitations on DBS effectively reduce system overlap in the same way that terrestrial systems may not serve identical geographic areas.

Overlap is likely to be an important feature of the emerging competition between cable and telephone carriers. The geographic areas of cable operators and telephone carriers do not always coincide, leaving the possibility for less than complete overlap of networks. Further, cable networks pass most, but not all homes. According to industry statistics, cable multichannel video service is available to 97% of U.S. homes, and cable modem service is available to 96% of homes. As a result, VoIP telephone services that use broadband connections, sold by either cable operators or other firms, is generally available. However, since only about 40% (and growing) of homes actually subscribe to broadband services, that limited penetration serves to reduce the effective overlap of VoIP and traditional telephone service (the latter of which is ubiquitously available). It is not yet clear whether or not cable operators will require consumers to purchase a broadband connection in order to buy the cable operator’s digital telephone service, nor is it clear how many cable operators will offer digital telephone service, but both of these decisions implicate the amount of overlap of the rival networks.

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62 Supra n. 60.
B. Types of Entry Costs

The other significant component of our entry equation constitutes entry costs. The higher are entry costs, other things constant, the fewer is the number of firms in equilibrium. Entry costs \( (e) \) can take a variety of forms, but entry costs are all fixed and sunk in our model. For a meaningful analysis of communications markets, we believe it is appropriate to divide entry costs into four major categories: (1) technological entry costs; (2) strategic entry costs; (3) regulatory entry costs; all of which may be offset by (4) spillovers. Table 4 summarizes the types of entry costs and their effect on the equilibrium number of firms \( (N^*) \).

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<td>Presence of Spillovers</td>
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As summarized in Table 4, three of the four forms of entry costs raise the cost of entry and, consequently, reduce \( N^* \). Spillovers, which can be construed as a contra-cost, are actual reductions (or offsets) in entry costs caused by the use of a firm’s existing assets to enter a related market. The larger are spillovers, the larger \( N^* \) will be. As we describe later, however, spillovers need not be available to any and all firms, but instead are often limited to particular firms with existing assets.

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A numerical example illustrating the effect of entry costs on \( N^* \) is provided in Table 5. Table 5 contains two examples. The first example is a repeat of the
example from Table 1, with entry costs of $15. With entry costs of $15, we have already shown that $N^* = 3$. In Example 2, with entry costs of $25, the second firm still finds it profitable to enter, with net profits of $15 (= $40 - $25). But, with higher entry costs, the third firm now realizes a negative net profit upon entry ($-5$), so the third firm stays out. Now, the equilibrium is two firms ($N^* = 2$). As expected, the increase in entry cost has reduced the equilibrium number of firms.

This example assumes only that entry costs rise. In the following sections, we provide examples as to what form these higher entry costs might take.

1. **Technological Entry Costs**

Technological entry costs are those entry costs inherent to providing the service. These costs include, for example, the cost of building a network, operating capital, advertising, and so forth. The technological entry costs required to construct a facilities-based telecommunications network to serve households are sizeable, and these costs alone are sufficient to render a highly concentrated industry equilibrium. It is also important to understand that technological entry costs are not simply network plant, but consist of any expenditure that is sunk.\(^65\)

2. **Strategic Entry Costs**

Strategic entry costs are costs borne by a new entrant that exist solely because of an incumbent’s strategic behavior.\(^66\) For example, the incumbent may advertise excessively (creating differentiation) so that any entrant will have to do the same to attract customers.\(^67\) Or the incumbent may lobby local authorities to

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\(^{65}\) Phoenix Center Policy Paper No. 12, supra n. 1 (calculating that for every $1 in network, telecommunications entrants spend $2 of capital on other things, and most of these expenditures are probably sunk)

\(^{66}\) Appendix H, supra n. 27 at ¶ 369. ("Incumbent systems may be able to use their incumbency to forestall or deter competitive entry via a number of entry deterring strategies."). Salop (1979) notes that incumbent behavior that raises entry barriers may be innocent or strategic. For this analysis, we would place “innocent” barriers in the “technological entry costs” category.

deny or delay the granting of rights-of-way construction permits. Finally, incumbent cable operators can “lock-up” popular programming via exclusive distribution contracts if the programming is transmitted via terrestrial means.68

Sometimes such costs can be imposed in a less-than-subtle fashion – for example, a marketing plan by a cable operator that offers customers discounts for taking down and returning DBS dishes (an action that would make subsequent DBS entry into that household more expensive.) By raising entry costs in this way, the incumbent can deter entry. Strategic entry costs typically arise only in cases of sequential entry, where there is already an incumbent(s) in the market. In that situation, the incumbent is usually willing to increase its own costs or reduce its own profits (e.g., give a discount for a return of a DBS dish) in order to raise the entry costs of potential rivals. As observed by Thomas Schelling, “the essence of [strategic entry costs] is some voluntary but irreversible sacrifice of freedom of choice. They rest on the paradox that the power to constrain an adversary may depend on the power to bind oneself.”69 In fact, we show later that an incumbent always has more incentive to deter entry than an entrant has to enter.

supra n. 27 at ¶ 372 (“Product differentiation may constitute a barrier to entry if the extent of differentiation is sufficiently “intense,” i.e., consumers perceive alternative products as poor substitutes for the differentiated product or service.”). Strategically holding excess capacity can be means by which to deter entry. For empirical evidence and a review of the theory, see J. C. Hilke, Excess Capacity and Entry: Some Empirical Evidence, 33 JOURNAL OF INDUSTRIAL ECONOMICS 233-240 (1984).

68 See, e.g., James W. Olson and Lawrence J. Spiwak, Can Short-Term Limits on Strategic Vertical Restraints Improve Long-Term Cable IndustryMarket Performance? 13 CARDOZO ARTS & ENT. L.J. 283 (1995) (http://www.phoenix-enter.org/library/prog_access.doc). In some cases, blocking an entrant’s access to programming is product differentiation through sabotage. Impeding access to existing programming does not increase the amount of programming available to consumers and thus has no effect on absolute quality. Rather, the restriction merely alters the relative qualities of the incumbent and entrant in favor of the incumbent. C.f., See Press Release: DirecTV Files Complaint With FCC Against iN DEMAND For Unlawful Pricing Scheme, Discriminatory Pricing Strategy Would Force DirecTV to Pay Three to Four Times What iN DEMAND’s Cable Owners Pay for Same Service (29 June 2005) (http://www.directv.com/DTDAPP/aboutus/headline dsp?id=06_29_2005B).  

3. **Regulatory Entry Costs**

Regulatory entry costs are the result of rules and regulations enforced by government agencies. An excellent example of regulatory entry costs is cable franchise obligations, which often raise entry costs by burdening entrants with build out obligations and other rules that raise entry costs above what is necessary to provide service. In many cases, incumbents make their strategic entry costs more effective by using regulators to enforce duplication of such costs by entrants. Hazlett and Ford (2001), for example, illustrate how level-playing-field laws enacted by some states deter entry in cable television markets by forcing entrants to match the entry costs of incumbent firms. As we will show later in the text, under such a law the incumbent cable operators have a powerful incentive to raise their own entry costs in order to deter future entry. We have already mentioned how public policy reduced the success of DBS providers by failing to address the issue of access to vital programming, thereby shrinking the market of the entrant.

4. **Spillover Effects**

Spillovers are reductions in entry costs arising from the ability of a firm to use its existing assets to provide service in a related market. For example, the local exchange companies were able to enter the data business by upgrading their networks to deliver data over copper wires (Digital Subscriber Line or DSL). Thus, these carriers did not have to build a complete data network from scratch, but simply “spilled over” their existing network into the data market with a marginal investment. Likewise, cable operators upgraded their one-way video networks to become two-way data networks. Similarly, the potential for broadband powerline (“BPL”) “spills over” from the sunk network investment of electric utilities.

Plainly, another firm without a physical distribution network in local markets would have faced much higher entry costs to provide data service to businesses and households in a market. Today, because the FCC and the courts have taken a strong stands toward reducing barriers to entry for cable modem service and VoIP – the cable companies’ primary vehicle into telephony – cable operators are upgrading their networks to provide voice and other enhanced services over

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70 *Supra* n. 30.
their data service. As such, spillovers are very important in communications markets, particularly as new technologies expand the capabilities of existing terrestrial networks. Importantly, spillovers are frequently limited to a few, existing firms, and this limitation gives rise to the concept of the “most likely entrant.”

IV. Modern Communications Policy and the Entry Model: Four Applications

Having explained the various components of our entry model, looking at both profits and entry costs, in this Section IV we apply the model in particular cases to show that policymakers can use the model to draw conclusions. As we do so, remember our basic tenet: firms will enter as long as it is profitable to do so, and the profitability of entry is determined by the difference between gross profits \((d)\) and entry costs \((e)\), where if \(d \geq e\) there is entry.

We provide four applications.

First, we illustrate how the entry model can be used to translate the concept of “convergence” into changes in industry structure. Convergence is an idea that has been bandied about in communications markets since the 1960s, when AT&T argued in FCC proceedings that IBM mainframe computers were operating illegally as common carriers without a license. We show, using the logic of the entry model, what is required for “convergence” to have a meaningful impact on consumers and why only now convergence is only now becoming a reality in communications markets. We also show why convergence does not necessarily lead to a large number of competitors. Convergence typically affects only firms with existing assets, and thus the effect of convergence on industry structure will be limited.

Second, we illustrate why current limitations on the ability of telephone companies to offer video services over their networks will reduce the deployment of advanced communications networks.

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72 Several cable companies who pioneered entry into voice service, such as Cox Communications, provided traditional switched telephony, but are in the process of transitioning transition to VoIP. Joan Engebretson, Analysis: Cox Adopts VoIP at the Core, AMERICA’S NETWORK (19 June 2004).

Third, we illustrate the point that the incumbent always has a greater incentive to deter entry than the entrant has to enter. This analysis is highly relevant to the debate on cable franchising presently underway.

Finally, we use the entry model, slightly adjusted, to evaluate the prospect for collusion among telecommunications carriers and cable operators in a converged world. The entry model is exceptionally useful for this purpose, and provides a compelling argument for why collusion should not be of great concern (at this time).

A. Effect of Convergence on Industry Structure

Convergence loosely implies the marriage of communications and computer technology, or “the coming together of the basic technology that supports voice communications, computer communications, and, more recently, video and home entertainment.”\textsuperscript{74} With all forms of communications reduced to a digital transmission, a single digital network would be capable of delivering a wide array of communications services including voice, video, and data. Typically, commentators have expected convergence to increase competition by allowing all the various digital networks to provide a full suite of communications services.\textsuperscript{75}

But consumers have not seen this form of “true convergence” just yet. In the last few years, rather than converging, communications products have oftentimes diverged, to the point that many well-heeled professionals now subscribe to landline phone, cable service, high-speed Internet, mobile phone, a separate BlackBerry wireless email account, “On-Star” communications services in their car, in addition to owning an iPod and TiVo unit. True convergence of services would create a spillover in which it would be profitable for a firm to sell multiple services over a common network. It is this spillover effect that would allows the industry to move to a more competitive structure. Convergence can

\textsuperscript{74} Steven Titch, Telephony, Defined and Redefined, TELEPHONY (May 1, 1995) at I, 5.

\textsuperscript{75} Id. (“Telephony was once only about a small group of carriers. Now it’s about a universe of carriers.”); but c.f., Jeanette Symons, Let’s Not Go Broke Repaving the Last Mile, IEEE SPECTRUM (Jan 2001) at p. 46 (“It does not take much imagination to see that a single, converged network is the future of voice and data networking.”)
come from unlikely sources – for example, it is expected that mobile telephone makers will sell more cameras in 2005 than the entire photo industry.76

The entry model, slightly adjusted, can be used to illustrate this fact. Say we have two monopolists serving markets A and B with each earning $100. These firms might like to enter one another’s markets, but doing so would require the construction of entirely new networks. Assume, for example, that entry costs are $50 and the (gross) duopoly profit is $40, so neither firm has an incentive to enter the other’s market (because $40 < $50). Thus, each firm enjoys the good life of an unchallenged monopolist. But this good life does not last long – a technological breakthrough allows each of the monopolists to leverage their existing assets to provide service in the other firm’s market. This technological breakthrough creates a spillover that reduces entry costs into their respective markets to $30, but only for these two firms. Now, entry is feasible, since the $40 duopoly profit exceeds the entry cost of $30.

This example reveals a number of very important insights. First, absent the spillover, entry would not have occurred. Entry is an option solely because of a technological change (e.g., VoIP, DSL, Fiber, BPL) that allowed each firm to leverage their existing assets to enter the other market. In the modern lingo of telecommunications, we have convergence – but the technological change only has an effect on industry structure when convergence creates a spillover large enough to alter equilibrium industry structure. Second, only those firms with assets affected by the spillover can afford to enter. “Convergence” does not mean that busloads of new firms can now enter the market – it means that firms already in another, related market can now enter and be profitable. As a result, there is some limit to the benefit of convergence if the generated spillover is restricted to a few firms.

Perhaps the most profound expression of convergence and spillovers today is the deployment of digital telephone service by cable operators. With the substantial improvements and innovations in VoIP over the past few years, the cable industry has now abandoned efforts to offer analog, circuit-switched voice to consumers in favor of leveraging their existing data networks to offer a digital

voice product.\textsuperscript{77} The analog voice market never really developed for the cable operators, but the relatively cheap deployment of digital voice likely will make cable a serious contender in the voice market. Moreover, not only has the FCC taken exclusive Federal jurisdiction over VoIP\textsuperscript{78} (thus preventing a “patchwork” of regulations among the fifty States), but the FCC has explicitly preempted state laws that require new telephone entrants from any “build-out” requirements.\textsuperscript{79} As a result, a cable company can deploy VoIP to whatever customer base it pleases without regulatory consequence. The absence of a build-out requirement for VoIP greatly increases the potential profit for that service.

B. Market Size and the Deployment of Advanced Communications Networks

Nearly all existing networks must be upgraded to take full advantage of “convergence.” Such upgrades can improve the quality of existing services offered by a firm, as well as allow the firm to expand into new services. One example of a radical network upgrade is fiber to the premises, where incumbent telephone companies are replacing their copper distribution plant with fiber optic transmission paths that terminate at the customer’s premises. These advanced networks offer exceptionally high bandwidth and can deliver a wide array of services. The value of network modernization is sizeable, and policymakers should facilitate the deployment of advanced networks.

We can use the entry model to illustrate how policymakers can encourage, and discourage, the deployment of advanced communications networks. Say

\textsuperscript{77} See, e.g., Comcast to Boost Residential Internet Service Speed, WALL STREET JOURNAL (July 12, 2005) at D4 (reporting that Comcast, the nation’s largest cable operator, will automatically begin to upgrade existing subscribers located in Philadelphia, Baltimore, Detroit, New Jersey and Washington, D.C. to six megabits per second for free (or eight megabits per second for an additional $10) during Summer 2005.) Coincidentally, these are the same states where Verizon plans to roll-out its FiOs fiber-to-the home product.

\textsuperscript{78} In the Matter of Vonage Holdings Corporation, Petition for Declaratory Ruling Concerning an Order of the Minnesota Public Utilities Commission, MEMORANDUM OPINION AND ORDER, FCC 04-267, __ FCC Rcd __ (rel. 12 November 2004).

\textsuperscript{79} Significantly, the FCC struck down a competitive local exchange build-out requirement in Texas, noting “build-out requirements are of central importance to competitive entry because these requirements impact the threshold question of whether a potential competitor will enter the local exchange market at all.” In the Matter of The Public Utility Commission of Texas, CCB Pol. Docket Nos. 96-13, 96-14, 96-16 and 96-19, MEMORANDUM OPINION AND ORDER, FCC 97-346 (rel. Oct. 1, 1997) at ¶ 13.
there is a firm with a legacy network that is capable of delivering a service (e.g., voice) that renders $25 in profits over the network’s remaining economic life. A radical upgrade to the network would improve the quality of the existing service, increasing profits to $40. The new network would also be capable of providing another service, also worth $40 in profits. Say the upgrade costs $50 in entry (or upgrade) costs. With gross profits of $80 and an entry costs of $50, the firm chooses to upgrade the network and earns a profit of $30 (a $5 increase over the status quo of $25).

But what if policymakers restrict the firm’s access to the new market? If policy blocks entry into the new market altogether, then the gain to the upgrade of $15 (= $40 - $25) is far below the entry cost of $50. There is no profit in the upgrade, so the upgrade is shelved. Even if policy allows entry, but tacks on an additional $10 in entry costs, then the firm chooses not to upgrade the network (the gain is only 20 = 80 – 50 – 10 < 25).

These examples illustrate how with convergence policymakers must be aware of how entry barriers in related markets can affect primary markets. If network modernization is to occur, then regulatory entry barriers that exist in any market that the network may serve must be eliminated to the greatest extent possible. Similarly, policymakers should not facilitate the creation of strategic entry barriers by incumbent firms.

C. Deterring Entry by Treating Entrants and Incumbents Equally

As noted above, the Federal Communications Commission has explicitly found that the “local franchise process is, perhaps, the most important policy-relevant barrier to competitive entry in local cable markets.”80 Notwithstanding, it is often argued, in the interests of “fairness”, that new entrants should have to overcome and face the same hurdles that an incumbent has faced. We are currently seeing this argument develop in the context of cable franchise and build-out requirements, where incumbent cable companies are insisting that telephone companies that seek to sell video services commit to the same franchise process and build-out requirements that the incumbent cable company had to face.

80 Appendix H, supra n. 27 at ¶ 375 (emphasis supplied); see also Richard Posner, The Appropriate Scope of Regulation in the Cable Television Industry, 3 BELL J. ECON. 98-129 (1972).
But the sequence of entry is critical and an asymmetry arises from the differential treatment of sunk costs by the incumbent and the entrant. To the incumbent, entry costs are sunk and bygone and thus will not affect marginal decisions. However, to the entrant, sunk entry costs are marginal costs (i.e., fixed costs are neither fixed nor sunk until incurred), and thus play a key role in decisions. The incumbent, therefore, considers these entry costs much differently than the entrant, simply because the incumbent need not incur them in the future and what he has spent is sunk. Sunk costs, then, give the incumbent a “first mover” advantage over entrants. The presence of a “first mover” advantage means that requiring a new entrant to bear an entry cost simply because the incumbent has already borne it will have the effect of deterring entry substantially, even if such costs did not deter the incumbent from offering service.

To illustrate the first mover advantage, we simplify the entry model to a case of two firms – an incumbent and one entrant. The incumbent monopolist makes a profit of $m$. If entry occurs, then both the incumbent and entrant make the duopoly profit $d$. Entry requires entry costs equal to $e$, so post-entry the incumbent has profits of $d$ and the entrant has profits of $d - e$. (A numerical example will be provided later in the text). Since the monopoly profit is the largest possible profit, it must be true that $2d - e < m$; in other words, the summed profits of the incumbent and the entrant are less than the monopoly profit (even with perfect collusion due to the presence of $e$).

Assume that the entrant’s post-entry profit is positive ($d - e > 0$) so that it plans to enter. Knowing this, the incumbent decides to voluntarily incur some sunk expenditure $b$ that the entrant must match. The entrant’s entry costs are now $e + b$; post-entry profit for the incumbent is $d - b$ and for the entrant is $d - e - b$.

We have assumed that without the extra entry costs $b$, the entrant would enter. Now, the question is whether or not the incumbent has an incentive to make $b$ large enough to deter entry. The answer is yes.

If entry occurs, then the monopolist’s lost profits are $m - d$. The gain to the entrant from entering the market is $d - e$. But, since $2d - e < m$, the monopolist
loses more than the entrant gains. Thus, the monopolist will be willing to expend more of its profits to deter entry than the entrant can gain in profit by entering. By setting \( b = d - e + g \) (where \( g \) is just a very small number), the monopolist can deter entry and come out ahead.

A numerical example may help. Let the monopoly profit \( (m) \) be $100, the duopoly profit \( (d) \) be $40, and entry costs \( (e) \) be $30. Since the duopoly profit exceeds entry costs \( (40 - 30 = 10 > 0) \), the entrant plans to enter. Prior to entry, the incumbent incurs a sunk expenditure of $11 than the entrant must match. Now, the entrants net gain from entry is -$1 \( (40 - 30 - 11 = -1 < 0) \), so the entrant stays out. Is the incumbent better off? Yes. By deterring entry, the monopolist now earns $89 \( (100 - 11) \). Had entry occurred, the monopolists profit would be $40, so the monopolist chooses to deter entry. If the entrant must match the sunk expenditures of the incumbent, then it will always be rewarding to the incumbent to deter entry, even if that action increases the costs of the incumbent.

Given the condition on joint profits, if entry costs of the entrant must match exactly (or be larger) than the incumbent, then the incumbent always has more incentive to deter entry than an entrant has to enter the same market. An extreme example can illustrate this point. Say the incumbent and entrant plan to collude post-entry so that expected profits are 50 \( (i.e., \frac{100}{2}) \). The entrant needs to incur a technological entry cost of only 1. So, we have a situation with the highest possible post-entry profits and nearly no entry costs. The post-entry profit of the incumbent is $50, and the entrant makes $49 \( (= 50 - 1) \). Note that if the incumbent spends $49.01 in sunk costs that the entrant must match, the incumbent’s profit rises to $50.99 and the entrant’s profit falls to -$0.01. Clearly, it pays for the incumbent to deter entry by raising strategic entry costs, since the incumbent is more profitable without than with entry.

There are three important lessons to be learned from this example, all of which arise from the fact that incumbents and entrants are not equals. First, policymakers should recognize that incumbents can incur more sunk costs than entrants because their profits are higher. In fact, many cable systems were constructed during the era of exclusive franchising, in which a cable company incurred these costs at a time when it was guaranteed a monopoly over cable services in the area. A firm offered a monopoly would readily propose or agree

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81 We can rearrange the condition on joint profits to be: \( d + d - e < m \), or more directly \( d - e < m - d \).
to a higher entry cost than it otherwise would have agreed to in a competitive environment. Second, policymakers should avoid any rule or regulation that requires, out of some concept of “fairness”, entrants to match the sunk expenditures of incumbents. Incumbents and entrants view sunk entry costs differently. This is due to the very nature of sunk costs and sequential entry – once the first firm (the incumbent) has incurred those costs, those costs are sunk and essentially irrelevant to that firm’s subsequent business decisions. For the second firm (the prospective entrant), sunk costs are a marginal cost and before spending them, the prospective entrant will consider other uses of those funds. The incumbent and the entrant will treat sunk costs in different ways: Equal treatment of unequals is not equal treatment. Third, markets with sunk costs have a technological bias against entry, thus providing justification for policymakers to err on the side of making entry easier and less expensive, rather than harder and more costly.

D. What Entry Says About Collusion

When faced with a concentrated market, probably the first concern that comes to the mind of a policymaker is the threat of collusion. We noted supra in Section III.2 at Table 3 that it is easy to confuse collusion with intense price competition, and this confusion arises primarily from a strict adherence to the traditional view that the intensity of price competition rises with the number of firms. Once the effects of sunk costs are incorporated into the model of competition, such a simple notion of competition no longer tells the complete story. But the entry model has more to say about collusion.

Consider the game of reciprocal entry from the previous section on convergence. We have two monopolists serving markets A and B with each earning $100. Entry costs are $50 and the (gross) duopoly profit is $40, so neither firm has an incentive to enter either market. A technological breakthrough allows each of the monopolists to leverage their existing assets to provide service in the other firm’s market, so that entry costs for these firms falls to $30. Entry is now feasible for both firms.

Assume both firms enter each other’s markets. The incumbents earn post-entry profits of $40 in their own market and $10 in profits from the entered market [= 40 – 30], for a total of $50 in profit for each firm. After entry, their profits have fallen from $100 to $50. In retrospect, reciprocal entry, obviously, was not a very good idea. Despite the technological breakthrough and spillover effect of convergence, firms A and B would have been much better off had they ignored the development and stayed in their own respective markets. If A and B
were the only two firms for which the spillover effect of convergence were available (that is, a new firm, C, could not reap those benefits), then there is every reason to believe that this collusion could be sustainable in the long-term.

In our example, the collusive outcome is to ignore convergence and not enter. The converse is also true – if we observe reciprocal entry, then this is solid evidence that collusion is not occurring. The easiest time for firms to collude is before they enter one another’s markets. Today, we observe cable operators moving into the telephone business and the telephone companies moving aggressively into the video business (though the latter is hindered by franchising), and this simple observation alone is strong evidence that collusion is not present. Thus, at present, we believe that policymakers should not focus at present on the possibility of collusion, at least in those markets where reciprocal entry is observed.

An interesting twist to this example of reciprocal entry is one-sided entry. One-sided entry occurs, say, if only one firm experienced the spillover. In this scenario, the advantaged firm would enter the rival market and increase profits to $110 ($100 from the monopoly, plus $10 from the rival market). The profits of the incumbent in the rival market fall to the duopoly level of $40. Since only one firm experienced the spillover, there is no threat of retaliatory entry by the firm unaffected by the spillover. Perhaps the cable industry’s venture into voice services was motivated, in part, by the assurances that cable franchising would effectively deter retaliatory entry by telephone carriers.

V. Conclusion

U.S. telecoms policy now aims to rely upon facilities-based and “inter-modal competition” to benefit consumers in voice, video and data markets. History suggests that a reliance on facilities-based competition implicitly embraces highly concentrated markets, where few firms vie for the patronage of customers. This POLICY PAPER demonstrates that in order to have vibrant inter-

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82 Reciprocal entry might be profitable if the markets are already reasonably competitive (i.e., there is little to give up if reciprocal entry occurs).

83 Once market shares stabilize, probably five to seven years out, then policymakers may wish to revisit the question of collusion.

84 The collusive outcome would involve the incumbent without a spillover paying the other firm to stay out (an amount equal to something between $10 and $60).
modal, facilities-based competition in all communications markets, policymakers
must focus their attention on the consequences of their actions on the entry and
expansion decisions of firms into related markets. This task is simple and
intuitive – if you want there to be more entry, then figure out how to make entry more
profitable, without, of course, harming consumers. In particular, policymakers
should implement policies that increase gross profits (e.g., allow firms to sell as
many services as possible), reduce entry costs (e.g., remove franchising
requirements and “regulatory symmetry” requirements), or, better yet, both.
Assuming policymakers can increase post-entry profits in this way, it is not
unreasonable to expect that facilities-based firms will invest and/or upgrade
their networks to take advantage of true technological convergence and compete
vigorously on both price and product differentiation – a result that is clearly
beneficial to U.S. consumers.
WRITTEN TESTIMONY OF
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APPENDIX C
Phoenix Center Policy Paper Number 22:

The Consumer Welfare Cost of Cable “Build-out” Rules

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Abstract: Firms that wish to offer wireline, multichannel video programming services in direct competition with cable incumbents are being faced with calls by those incumbents and policymakers to “build-out” to entire communities as a precondition of receiving a franchise. This “build-out” requirement is often incorporated into the local cable franchising process, which the FCC over a decade ago called “the most important policy-relevant barrier to competitive entry in local cable markets.” In this POLICY PAPER, we show that build-out mandates are actually counter-productive and serve primarily to deter new entry, increase the profits of incumbents, and harm consumers. With both a theoretical model and an empirical simulation, we show that build-out rules cause new video entrants to bypass certain communities entirely and sharply lower the number of communities in which new network construction would be profitable. We show that consumer welfare is likely to be higher with “free entry” policies that impose no build-out requirement.
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I. Introduction

With the marginal cost of providing a telephone call in a free-fall, video is now the key driver for new fiber deployment in the residential market.¹ Yet, in

¹ According to a 2002 Pew Internet & American Life Project survey, the average household spends $51 per month on multichannel video programming services, which represents a significant portion of their total communications (voice, video, Internet, wireless) spending (which averages about $122 per month per household). J. B. Horrigan, Consumption of Information Goods and Services in the United States, Pew Internet & American Life Project (2003), http://www.pewinternet.org/pdfs/PIP_Info_Consumption.pdf at 28. If a new entrant cannot readily provide consumers multichannel video over an advanced network, then the prospects for success will be diminished substantially due to a reduction in the entrant’s potential revenues. Quite simply, the ability to sell video services over these fiber networks may be a crucial factor in getting those fiber networks deployed.

Regulators are not always sensitive to the importance video availability has on deployment. For example, the New York Public Service Commission issued an order recently that failed to resolve the question as to whether Verizon could sell video services over its new, all-fiber FiOS network, stating that it would resolve that question only after Verizon had constructed the fiber network and stood ready to sell video service. Declaratory Ruling on Verizon Communications, (Footnote Continued. . . .)
order to provide multichannel delivered video programming, a new entrant must first obtain a franchise from the local and county government in every market it wishes to serve. Very often, the franchise contract requires that the new entrant agree to geographic build-out requirements as a pre-condition to receiving a franchise, and this process results in a form of creeping governmental control. As we show in this POLICY PAPER, while these build-out requirements may have altruistic intentions behind them (e.g., preventing a “digital divide” or promoting local economic development), ex ante build-out requirements are, on average, counterproductive and serve to slow down deployment of communications networks. As a result, these build-out mandates actually reduce consumer welfare and increase the profits of incumbent providers in many communities. Build-out requirements are, therefore, a self-defeating exercise.

Inc.’s Build-Out of its Fiber to the Premises Network, Joint Petition of the Town of Babylon, et al., Case Nos. 05-M-0250 and 05-M-0247 (rel. June 15, 2005).


Often an agency with the power to deny an application . . . or to delay the grant of the application will grant approval only if the regulated firm agrees to conditions . . . . The firm will accept the conditions only when they make both it and the agency (representing the public or some other constituency) better off. Still, though, the agency’s options often are potent, and the grant of an application on condition may greatly increase the span of the agency’s control.

D. McCullagh, Bells’ Fiber Plans Spark Political Flame War, CNET News (20 April 2005) (quoting Ranking House Energy and Commerce Committee Member Ed Markey as complaining that “When a cable company wires a community, it must offer service to all households, so why should [new MVPD entrants] be permitted to select which neighborhoods are wired with fiber first?”). However, numerous studies reveal there is little correlation between income and cable penetration. For a review of this literature, see R. Kieschnick and B. D. McCullough, Why Do People not Subscribe to Cable Television? A Review of the Evidence, Unpublished Manuscript (1998) at 7-8 and Appendix A (available at http://www.tprc.org/abstracts98/kieschnick.pdf).


While consumers do have satellite as a possible substitute to the incumbent cable operator, the U.S. General Accounting Office found that the price cuts for video services from wireline competition are approximately three times larger than those from satellite competition. See Direct Broadcast Satellite Subscribership Has Grown Rapidly, but Varies across Different Types of Markets, Report to the Subcommittee on Antitrust, Competition Policy and Consumer Rights, Committee on the Judiciary, U.S. Senate, US Government Accountability Office, GAO-05-257 (2005). As such, consumers clearly benefit significantly from terrestrial MVPD overbuild entry.
reason, it should come as no surprise that the FCC found over ten years ago that
the “local franchise process is, perhaps, the most important policy-relevant barrier to
competitive entry in local cable markets.”

While it may seem to be a counter-intuitive conclusion, it is important that
policymakers understand the consequences that a build-out requirement will
have on the ability of a firm to enter the market. This POLICY PAPER first presents
in Section II a simple conceptual framework to evaluate build-out requirements
in video markets. As we show, for a policymaker, a build-out requirement is a
risky gamble, because while ubiquitous 100% overlap entry is possible on one
hand (clearly a good result for consumers), there still exists the very real
possibility that a new entrant will stay out of the market and bypass the
community altogether (thus leaving consumers with the status quo). Moreover,
our theoretical framework shows that incumbents and consumers cannot both
benefit from a build-out rule, which leaves open the question of why both
incumbents and policymakers advocate such rules.

To generate plausible estimates of the likely effects of build-out requirements
on consumers and firms, Section III sets forth a computer-based simulation based
on the conceptual framework outlined in Section II. This simulation answers the
important empirical questions asked by the conceptual model. Our simulation
reveals, under plausible circumstances, that a build-out rule results in a different
form of “economic redlining” - i.e., the build-out rule has less effect on the
incentives of a firm to serve the most-profitable communities, but a large effect
on deployment in more marginal communities. As such, the simulation leads to
the inexorable conclusion that build-out requirements are, on average, more
likely to benefit incumbent firms than to increase the welfare of consumers, since
such rules deter entry. In short, build-out rules conflict with the stated goals of
federal, state, and local governments regarding the desire to see the construction
of advanced communications networks as quickly as possible.

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6 In re Implementation of Section 19 of the Cable Television Consumer Protection and Competition
Programming, 9 FCC Rcd 7442, Appendix H at ¶ 375 (1994) (hereinafter “Appendix H”) (emphasis
supplied); see also Richard Posner, The Appropriate Scope of Regulation in the Cable Television Industry,

7 FCC Chairman Kevin J. Martin has called “the deployment of new packetized networks
throughout the nation” to be “one of the Commission’s core priorities”. Statement of Chairman
Kevin J. Martin, In the Matter of Petition of SBC Communications Inc. for Forbearance from the
(Footnote Continued. . . .)
II. An Economic Analysis of Build-out Requirements

To study the impact a “build-out” rule has on the deployment decisions of a new entrant seeking to deploy advanced fiber networks, we first outline a simple, stylized economic model of sequential entry. This theoretical approach builds on the analysis of entry that we describe in detail in PHOENIX CENTER POLICY PAPER NO. 21, and it shows that build-out requirements are unambiguously bad for entrants and will make entry more costly and therefore less likely. However, theory alone cannot determine what impact a build-out requirement will have on consumers and incumbents. But this theoretical model does provide guidance on what factors and relationships are important. We provide a more detailed theoretical analysis of build-out requirements in Appendix A, but we limit our attention in this text to the simpler conceptual framework.

A. The Entry Model

In PHOENIX CENTER POLICY PAPER NO. 21, we show that a firm’s decision to enter a market is essentially a function of the potential profits from serving the market and the costs of entering the market. Quite simply, entry will be more widespread if profits are higher and the costs of entering are lower. We now extend the analysis in POLICY PAPER NO. 21 to evaluate build-out requirements.
Say there is a market of $H$ homes served by an incumbent monopolist.\(^9\) The incumbent’s network passes all $H$ homes, but not all homes subscribe to the service. The monopolist earns profit $m$. Costs to construct the incumbents network are sunk, and thus do not affect the marginal decisions of the incumbent. For simplicity, assume the marginal cost of a subscriber is zero and a uniform price is charged across the entire market (i.e., there is no price discrimination in the market).\(^10\)

Now, let there be a firm contemplating entry into this market. The entrant knows that the market price declines as the overlap of the entrant’s and incumbent’s networks rises, and it knows the cost of serving each of the homes.\(^11\) This price will be uniform across the entire market, even if the entrant only serves a part of the market, although the degree of that price competition will, of course, be related to how much overlap there is between the two networks.\(^12\) Post-entry profit (the duopoly profit) of the entrant is $d(h)$, where the entrant passes $h$ of the $H$ homes. Entry requires the entrant to pay entry costs $e$, where entry costs rise with the number of homes passed. We assume the entrant will enter only if net profits are non-negative: $d(h) - e(h) \geq 0$. As the number of homes passed rises, profits fall and entry costs rise, and eventually the cost of adding another home reduces net profits $[d(h^*) - e(h^*) > d(h^* + 1) - e(h^* + 1)]$. At this point, the entrant stops expanding its network and serves $h^*$ homes, where $h^*$ is the number of homes passed that maximizes the entrant’s net profits.

\(^9\) The monopoly assumption is for convenience. There could be more than one incumbent, or an incumbent facing limited competition from a highly differentiated product.

\(^10\) The assumption of zero marginal cost is for convenience. This assumption is equivalent to one where we describe “prices” or “revenues” as being net of variable costs. With zero marginal cost for the incumbent and positive entry cost for the entrant, our simulated markets are natural monopolies (it is always cheaper for the incumbent to provide the service than the entrant). Thus, we do not make total welfare calculations, since total welfare under such circumstances will be lower with entry. Even with these assumptions, the calculation of profits and consumer welfare are legitimate. Eliminating the natural monopoly problem provides nearly no benefit, yet would make the simulation much more complicated.


\(^12\) See Beard, Ford, Hill and Saba, id.
B. Free Entry versus Build-Out Requirements

In the absence of a build-out rule (free entry), the entrant will choose to serve \( h^* \) homes and will therefore earn gross profits of \( d(h^*) \). Consumer surplus rises and incumbent profits fall with entry (since price falls for all subscribers and the entrant acquires market share). Let us assume that in the absence of a build-out rule, the entrant will only serve part of the market (\( h^* < H \)).

Because of the build-out rule, the entrant must construct a larger network to serve all \( H \) homes, instead of the \( h^* \) homes it otherwise would have chosen. Making the entrant build a larger network will reduce its gross profits and raise entry costs. The result is that net will profits unambiguously decline in the presence of this mandate, (that is, \( d(H) - e(H) < d(h^*) - e(h^*) \)), since the addition of homes above \( h^* \) adds more to costs than to gross profits. Thus, at the margin, build-out rules reduce the prospects for entry. The extent of this deterrence will depend on aggregate profits, which we discuss in detail in Appendix A. Thus, the firm enters only if \( d(H) - e(H) \geq 0 \), which is not guaranteed (even though we assume it is profitable for the monopolist to have done so).

An entrant faced with a legally-mandated build-out requirement thus faces a tradeoff – i.e., it is forced to decide whether to enter an entire community by balancing the profits earned serving the \( h^* \) homes versus the losses incurred from serving the remainder of the market (homes \( h^* \) to \( H \)). This tradeoff is illustrated in Figure 1.

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13 This assumption keeps the analysis interesting. If \( h^* = H \), then the build-out constraint is non-binding (has no effect). However, even if the entrant desires to serve the entire market today, the build-out rule is undesirable, since it always forecloses the opportunity to serve less than the entire market.

14 First, if the entrant prefers partial entry (\( h^* < H \)), then the build-out requirement reduces gross profits (by definition). Second, build-out requirements increase entry costs since they require the entrant to build to more homes than the entrant would willingly choose [\( e(h^*) < e(H) \)]. Thus, the build-out rule reduces the prospects for entry by attacking the entrant from all sides, cutting gross profits and raising entry costs.
In the figure, the vertical axis is price and the horizontal axis is the number of homes the entrant will choose to pass with its new network. In this table, we rank homes by entry costs \( e \) (that is, the cost of constructing to a home increases along the horizontal axis). Since the costs of homes are ranked and the demand for the service is randomly distributed, the horizontal axis also measures the degree of system overlap. There are two curves in the figure, average profit per homes passed \( r(h) \) and entry costs \( e(h) \). Without a build-out rule, the entrant will service \( h^* \) homes (the intersection of the two curves). Serving \( h^* \) homes – the number of homes it would serve without a build-out requirement – the entrant will have a net profit equal to the area bounded by points \( twv \), which is clearly positive. Under a build-out rule, the entrant’s net profit is the difference \( uxv - xyz \), which in this case is plainly negative. The area \( uxv \) is positive net profit \( (r > e) \) and the area \( xyz \) is the negative net profits \( (r < e) \). Since \( uxv > xyz \), the entrant would not enter under a build-out rule. Note that whether or not a build-out rule deters entry depends on the shapes of the \( r \) and \( e \) curves.

---

15 Note that \( r(h)h = d(h) \).

16 Net profits are calculated as: \( twv^0 - vwv^0 \).

17 Net profits are calculated as: \( uzH^0 - vyH^0 \).

18 We can easily concoct examples where the build-out rule does not deter entry, which is why theory alone cannot resolve this issue.
C. Summary of Build-out Effects

At this point, the consequences of the build-out rule are readily assessed. Without the build-out rule, there may be partial entry. With partial entry, the entrant will make a positive profit, the incumbent’s profits will be reduced due to competition, and consumers will benefit from lower prices and higher output. The partial entry case is unambiguously better for consumers and unambiguously worse for incumbents.\textsuperscript{19}

But with a build-out rule, entry may still happen, or it may not occur at all. If entry occurs, then consumers will reap the full benefit of the price reduction available from 100% overlap of the networks. The price reduction with complete overlap will be larger than the price reduction consumers would see if the entrant had passed only 50% of the market. But while full entry will provide the greatest benefit to consumers, \textit{consumers will benefit only if entry occurs}. Indeed, \textit{there is a very real risk that the entrant may choose to stay out of the market altogether under a build-out rule}. If the entrant stays out, then the entrant obviously gets no profit, the incumbent’s profits are unchanged, and consumer surplus remains at the monopoly level. A build-out rule that deters entry provides the least benefit to consumers (none), but the most benefit to the incumbent (retention of monopoly profits).\textsuperscript{20}

For a policymaker, a build-out requirement is a risky gamble. The policymaker may be fortunate to be in a community in which certain neighborhoods are so profitable that a new, prospective entrant will build even if a build-out requirement is imposed. In that situation, our model shows that an incumbent cable operator facing a complete “over-build” in its community will face a significant reduction in profits. But what if the policymaker is wrong in this assumption? In that situation, the prospective entrant will bypass the \textit{entire} community if a build-out requirement is imposed. In that latter situation, the only entity that benefits is the incumbent cable operator. Simply given the shape

\textsuperscript{19} We have assumed a uniform price, so all customers in the market will benefit from partial entry, no matter how partial it is.

\textsuperscript{20} For this reason, the FCC determined that competitive local telephone build-out requirements constituted an unlawful barrier to entry. \textit{Texas Build-Out Preemption Order, supra} n. 4 at ¶ 13 (“build-out requirements are of central importance to competitive entry because these requirements impact the threshold question of whether a potential competitor will enter the local exchange market at all”).
of the debate on this topic, in which incumbent cable operators are steadfast proponents of build-out requirements for new entrants, we are inclined to believe that the latter scenario – _entry deterrence_ – is the far more likely in most communities.\(^{21}\) As a result, _build-out rules, while well-intentioned when proposed by city officials and consumers, may in the end do more harm than good._

An alternative summary of the effects of the build-out requirements on the participants is provided by a matrix of preference outcomes. In Table 1, preferences are rated 1, 2, and 3, with 1 being the most and 3 the least preferred outcome. We rank the preferences of consumers, incumbents, and entrants.

<table>
<thead>
<tr>
<th>Participant</th>
<th>Free Entry</th>
<th>Build-out Rule</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Entry</td>
</tr>
<tr>
<td>Consumer</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Incumbent</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

Consumers of course would prefer a build-out rule, but only if entry still occurs. If entry is not assured, then consumers would then clearly prefer free entry to a build-out rule that would deter entry entirely. The worst-case scenario for the consumer is a build-out rule that deters entry. In contrast, the incumbent most prefers a build-out rule with deterred entry, but prefers partial entry to a build-out rule with entry. Free entry is more desirable than a build-out rule with entry, but less desirable than a build-out rule that effectively deters entry.

The conflict between the desires of the cable incumbents and the consumers is again as apparent as it is interesting. Many policymakers and incumbent cable operators advocate build-out rules, but the effect of the rule is to harm one party and help the other, depending on whether entry occurs. _Both groups are taking a gamble with this position_ – policymakers are gambling that entry _will occur_ even with a build-out rule, but the incumbents are gambling that entry _will not occur_ with a build-out rule.

\(^{21}\) Cable operators, alternately, are profit maximizers and should be expected to support only those regulations that increase their profits. Since higher profits for firms means lower consumer surplus (absent quality increases), the build-out rule from the view of the cable firms cannot be welfare improving. Thus, from the perspective of the incumbent cable operators, build-out rules are advocated as a means with which to protect profits from competition.
III. Simulation of Entry under a Build-out Rule

Our entry model reveals that the key question for a policymaker is straightforward: is the entry-deterring effect of a build-out mandate sufficient to deter entry altogether? The simulation described in this Section III provides evidence on the entry deterring effects of build-out rules. Thankfully, the simulation is not the only evidence regarding the entry-deterring effects of build-out rules. Hazlett and Ford (2001) show, using economic theory and a statistical test, that build-out rules significantly reduce entry in cable television markets. Thus, the ability of such rules to deter entry has been plainly demonstrated.

This simulation of sequential entry is based on the entry game from the previous section. We stress to the reader that this is only a simulation, and we adopt a number of simplifying assumptions to ease the implementation and evaluation of the simulation. All the markets evaluated are hypothetical, as are the costs and demand relationships. We do our best, however, to avoid any assumption that will render (or tend to render) misleading inferences, and we try to calibrate the model to known values and relationships in the cable and telecommunications industries. The purpose of the simulation is merely to provide an informed guess of the effects of build-out requirements, and to illustrate clearly the tradeoff between incumbents and consumers. We focus our attention here on the main findings of the simulation, and refer the reader to Appendix B for the details on the simulation.

We are not the first to construct a simulation to evaluate entry and build-out requirements in local communications markets. Faulhaber and Hogendorn (1999) construct a simulation similar to ours, though their approach is more technical. While the focus of that study is on the prospects for a multi-firm equilibrium, the authors did simulate the effect of build-out requirements. They conclude, “[a build-out rule] delays entry, delays competition, [and] actually creates a unnatural (as opposed to natural) monopoly.” Our findings are generally consistent with this earlier research.

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A. Simulation Summary

In the simulation, we have 100 markets with 1000 homes each. The incumbent has constructed network to pass all 1000 homes in all markets. We assume that 50% of households subscribe to the monopolist’s service (a 50% penetration rate). Each home has its own unique capital costs; we calibrate the simulation for an average capital cost of $600, which is consistent with capital costs for a traditional cable network per home passed. These capital costs vary by home, and entry costs are lognormally distributed (similar to the shape in Figure 1). Marginal costs are assumed to be zero for both the entrant and incumbent. The incumbent has already built its network and the costs are sunk.

Now we assume that a prospective entrant is deciding whether to enter this community. In the absence of a build-out requirement, the entrant will build a network to a home as long as its net profits will increase with that construction. We assume that the entrant will take a market share of 35% of the homes it passes that subscribe to the service, which is substantially above the analysts’ estimates of entrant penetration in video markets. (In additional simulations, we contemplate both lower and higher penetrations rates. If the aggregate

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24 The simulation is flexible enough to evaluate different values for both the number of markets and the homes in each. All markets, however, must be of the same size. Changing the number of markets or their size does not affect the results in any meaningful way.

25 The simulation is calibrated so that the incumbent will serve the entire market under a build-out rule, even if the incumbent prefers not to build out (which is typically the case). The 50% penetration is consistent with a major cable provider’s current penetration, but the assumption is primary one of convenience. See Comcast Corporation, 2004 Form 10-K at 3 (Feb. 23, 2005) (noting 52.8% penetration in 2004).

26 T. W. Hazlett and G. Bittlingmayer, The Political Economy of Cable “Open Access” 2003 STANFORD TECHNOLOGY LAW REVIEW 4 (2003); M. Shapiro and D. Gall, The New Economics of Overbuilds, BROADBAND NETWORKS (2000). We recognize that these costs may be lower than current technology, but higher costs only make the deterrent effect stronger, so our assumption is conservative.

27 In effect, our cost function is driven by population density, which is known to be approximately lognormal. J. B. Parr and G. J. O’neill, Aspects of the Lognormal Function in the Analysis of Regional Population Distribution, 21 ENVIRONMENT AND PLANNING at 961-73 (1989). Appendix B contains a detailed description of the cost function.

28 Bank of America Securities, Bell Video – IPTV is Not Yet the Answer, Research Brief (June 2, 2005) (“BOA Bell Video Research Brief”) at 1 (“History has shown on numerous occasions, with limited exceptions, that new entrant linear TV competitors usually reach only 15% market share after 10 years.”).
market penetration is 60%, the entrant serves 21% of homes if it passes all homes.) As we discuss in POLICY PAPER NO. 21, profits are impacted also by the degree of price competition and network overlap. As the overlap of rival networks rises, the market price will decline. Our benchmark assumption is that the full overlap price is 20% lower than the monopoly price. We also assume that as level of overlap between incumbent and entrant decreases, this price decline also will decrease in a linear fashion. It should be noted that in situations where an incumbent cable firm only sees a partial geographic entry in a market, prices are reduced throughout the market, even in areas where the entrant has not built a network. This price reduction is consistent with research of pricing behavior in the few markets that have seen cable overbuilding.29 Alternate assumptions on the expected price decrease are also considered. As prices fall due to competition, market penetration will rise.30

With zero marginal cost, we can interpret “price” to mean the stream of gross profits from the customer (and not the monthly price). In effect, “price” is the (present value) sum of the monthly payments of the subscriber over the life of the network.31 Consumer reservation prices (required for consumer surplus calculations) are set so that at the monopoly price, the penetration rate is 50%. Prices are calibrated so the value of the incumbent’s cable system is $1200 per home passed (consistent with cable industry statistics).32

Household demand for cable service is a function of price alone. Thus, all variations in penetration across markets is based on cost, not demand factors. Therefore, we assume that the entrant will not exclude markets based on household demographics (e.g., income, race, etc.).

29 See Beard, Ford, Hill and Saba, supra n. 11.

30 The demand curve is linear, with an elasticity of -1 at the monopoly price. The change in penetration for a price reduction is measured using the slope of the demand curve. Aggregate penetration at the 20% price reduction is 60%.

31 The assumption is $2400 per subscriber at the monopoly price. The assumption of zero marginal cost is equivalent to an assumption of net price, where net price is the actual price minus variable cost.

B. Results of the Simulation

Table 2 summarizes the results of the benchmark simulation. Prior to entry, the monopolist passes all homes (100⋅1000 = 100,000) and serves all markets.\(^{33}\) Consumer surplus is $60 million and the incumbent’s profits are $120 million.\(^{34}\)

In the free entry equilibrium (i.e., no build-out rule), the entrant will partially enter all 100 markets and pass approximately 60% of all homes at a cost of $18 million. Consumer surplus rises to $75 million and the incumbent’s profits fall to $94 million. Unsurprisingly, entry is good for consumers (+$26M) and bad for the incumbent (-$15M).

<table>
<thead>
<tr>
<th>Table 2. Results of Benchmark Simulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entrant’s Homes Passed</td>
</tr>
<tr>
<td>------------------------</td>
</tr>
<tr>
<td>Monopoly</td>
</tr>
<tr>
<td>Free Entry</td>
</tr>
<tr>
<td>Build-out Rule</td>
</tr>
</tbody>
</table>

Notes: Reported results are based on an average of 10 runs of the simulation. Results are rounded.

With a build-out rule, however, entry is substantially curtailed. The entrant no longer enters all markets and instead now chooses to serve only 15 of the 100 markets, with total homes passed of only 15,000. Thus, 85 of the 100 markets are bypassed entirely by the new entrant, and consumers in those markets see no benefit from competition whatsoever. Consumer welfare is $64 million, down from $75 million in the free entry case.\(^{35}\) This decline in consumer surplus indicates that consumers in the 85 markets “left behind” are harmed by the build-out rule far more than consumers in the other 15 markets benefit from the build-out requirement. As expected, the incumbent cable company’s profits are higher in the presence of a build-out rule than free entry ($113 million to $94 million).

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\(^{33}\) The simulation is calibrated to ensure that it is profitable for the monopolist to wire the entire market under a build-out rule.

\(^{34}\) Consumer surplus the difference between what consumers are willing to pay for a service (i.e., reservation prices) and the market price.

\(^{35}\) The maximum consumer welfare is about $86M (at 100% overlap).
From our benchmark simulation, we see that build-out rules are bad for consumers and good for incumbents. Moreover, this simulation shows that a build-out rule results in a different form of “economic redlining” – i.e., the build-out rule has little effect on the incentives of a firm to serve the most-profitable communities but instead causes more marginal communities to be bypassed entirely.\textsuperscript{36} In our simulation, the build-out rule caused the entrant to build a network that passed only 25% of the homes than it would have built in the absence of such a rule.

C. Sensitivity to Market Share Assumption

In Table 3, we evaluate the simulation results across a range of market shares for the entrant (the benchmark being 35%). Table 3 shows that the entry-deterring effect of a build-out rule is strong even with less-optimistic and more-optimistic market share assumptions. At a 15% market share, the entrant enters all 100 markets and passes 10% of the homes with free entry, on average. If the entrant’s market share rises to 50%, then the entrant passes 79% of homes, on average, in the 100 markets.

Likewise, with higher market shares, the entrant will pass more homes under a build-out rule, though the entrant always passes fewer homes under a build-out rule than under a policy of free entry. Even if the entrant achieves a 50% market share, then the entrant will serve only 65 of the 100 markets. Note that if the entrant only achieves a market share of less than 35%, then the entrant will fail to enter any market if a build-out rule is imposed. One recent analyst report predicts that the telecommunications carriers’ market share of video services will be 15%, so the prospect that entry will not occur because of build-out rules – even for large, well-financed firms like the Bells – is genuine.\textsuperscript{37}

\textsuperscript{36} Red-lining is typically associated with the treatment of different income groups. But, as we illustrate here, partial entry can also be motivated by cost differences even if households do not vary in demand characteristics.

\textsuperscript{37} See BOA Bell Video Research Brief, supra n. 28.
Table 3. Effects of the Entrant’s Market Share

<table>
<thead>
<tr>
<th>Entrant Market Share</th>
<th>Entrant’s Share Homes Passed to Total Homes (100,000)</th>
<th>Entrant’s Markets Served</th>
<th>Entrant’s Investment $Mil</th>
<th>Consumer Surplus $Mil</th>
<th>Incumbent’s Profits $Mil</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Free Entry Build-out Rule</td>
<td>Free Entry Build-out Rule</td>
<td>Free Entry Build-out Rule</td>
<td>Free Entry Build-out Rule</td>
<td>Free Entry Build-out Rule</td>
</tr>
<tr>
<td>0.20</td>
<td>0.10 0.00</td>
<td>100 0</td>
<td>2 0</td>
<td>63 60</td>
<td>117 120</td>
</tr>
<tr>
<td>0.25</td>
<td>0.26 0.00</td>
<td>100 0</td>
<td>7 0</td>
<td>67 60</td>
<td>112 120</td>
</tr>
<tr>
<td>0.30</td>
<td>0.43 0.00</td>
<td>100 0</td>
<td>12 0</td>
<td>71 60</td>
<td>104 120</td>
</tr>
<tr>
<td>0.35</td>
<td>0.60 0.15</td>
<td>100 15</td>
<td>18 6</td>
<td>75 64</td>
<td>94 113</td>
</tr>
<tr>
<td>0.40</td>
<td>0.69 0.36</td>
<td>100 36</td>
<td>22 15</td>
<td>78 69</td>
<td>85 102</td>
</tr>
<tr>
<td>0.45</td>
<td>0.75 0.54</td>
<td>100 54</td>
<td>26 23</td>
<td>80 74</td>
<td>76 90</td>
</tr>
<tr>
<td>0.50</td>
<td>0.79 0.65</td>
<td>100 65</td>
<td>28 30</td>
<td>81 77</td>
<td>71 79</td>
</tr>
</tbody>
</table>

Notes: Reported results are based on an average of 10 runs of the simulation. Results are rounded.

The entrant’s investment is likewise positively related to its market share. What is interesting about the statistics on investment is the relationship between investment in the free entry and build-out scenarios. If the entrant has only a small market share, then investment is higher with free entry. As the entrant’s share rises, investment becomes higher in the build-out case. Note, however, that in every case the number of homes passed falls with the build-out rule. Thus, even though investment may be higher, even significantly so, the increased investment does not lead to more service being provided. At a 50% market share for the entrant, it costs more to serve 18% fewer homes under a build-out rule. Clearly, build-out rules lead to excessive and less productive investment, and are thus socially undesirable.

The final two headings of Table 3 are the most important for deciphering the “consumer welfare” versus the “incumbent profit” justification for a build-out rule. Observe that consumer surplus under the build-out rule is never larger, and typically much smaller, than consumer surplus with free entry.\textsuperscript{38} Thus, we

\textsuperscript{38} It is theoretically possible to get higher consumer surplus with build-out rules, but only under some rather extreme assumptions. Even then, the increase in surplus over the free entry case would be rather small.
find no support here for a consumer justification for build-out requirements. Alternately, the incumbent’s profits are always larger with a build-out rule than with free entry. So, the best argument for a build-out rule seems to be the profit motive – i.e., the role of build-out requirements is to protect the profits of the incumbent.

D. Sensitivity to Price Competition Assumption

In the benchmark case, we assumed price was 20% less than the monopoly price if the rival networks completely overlapped (with prices falling linearly between monopoly and 100% overlap). In Table 3, we present the output of the simulation at price cuts ranging from 0% to 50% off monopoly levels at 100% overlap. For all the simulations summarized in Table 4, the entrant is assumed to have a 35% post-entry market share (as in the benchmark case).

<table>
<thead>
<tr>
<th>Assumed Price Cut at 100% Overlap</th>
<th>Entrant’s Homes Passed to Total Homes (100,000)</th>
<th>Entrant Markets Served</th>
<th>Entrant’s Investment $Mil</th>
<th>Consumer Surplus $Mil</th>
<th>Incumbent’s Profits $Mil</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Free Entry Build-out Rule</td>
<td>Free Entry Build-out Rule</td>
<td>Free Entry Build-out Rule</td>
<td>Free Entry Build-out Rule</td>
<td>Free Entry Build-out Rule</td>
</tr>
<tr>
<td>0.00</td>
<td>0.61 0.23</td>
<td>100 23</td>
<td>19 9</td>
<td>60 60</td>
<td>94 110</td>
</tr>
<tr>
<td>0.10</td>
<td>0.60 0.21</td>
<td>100 21</td>
<td>19 8</td>
<td>68 63</td>
<td>94 111</td>
</tr>
<tr>
<td>0.20</td>
<td>0.60 0.15</td>
<td>100 15</td>
<td>18 6</td>
<td>75 64</td>
<td>94 113</td>
</tr>
<tr>
<td>0.30</td>
<td>0.57 0.04</td>
<td>100 4</td>
<td>18 1</td>
<td>83 62</td>
<td>93 118</td>
</tr>
<tr>
<td>0.40</td>
<td>0.56 0.00</td>
<td>100 0</td>
<td>17 0</td>
<td>90 60</td>
<td>92 120</td>
</tr>
<tr>
<td>0.50</td>
<td>0.53 0.00</td>
<td>100 0</td>
<td>16 0</td>
<td>96 60</td>
<td>91 120</td>
</tr>
</tbody>
</table>

Notes: Reported results are based on an average of 10 runs of the simulation. Results are rounded.

From the table we see that large changes in the price reduction from competition do not have a particularly strong effect on the free entry equilibrium. The percent of homes passed in the free entry equilibrium fall from 61% to 53% as the price cut rises from 0% to 50%, and the entrant’s investment remains relatively stable at just under $20 million. In contrast, the build-out rule is a
much more potent deterrent to entry as price competition intensifies. For example, if the price cut rises from 20% to 30% (a plausible scenario given published estimates of the price effects of cable competition), then the entrant’s homes passed fall from 15% to 4% of homes (15 markets to 4 markets). The entrant does not enter at all under a build-out rule if the price cut is 40% or larger. The role of the intensity of price competition is detailed in POLICY PAPER NO. 21.

While consumer surplus rises with the intensity of price competition in the free entry case, consumer surplus falls toward the monopoly level under a build-out rule with intense price competition. But observe that consumer surplus has a non-linear relationship with the intensity of price competition. At both a 0% and 50% price cut consumer surplus is $60 million (the monopoly level), and between these two extremes consumer surplus is always larger than $60 million. The explanation is simple. If entry does not reduce prices (0%), then consumers gain nothing from entry; but if the combination of aggressive pricing and build-out rules deter entry (+40%), then consumers gain nothing. Intermediate ranges of price cuts allow for some entry, and consumers always benefit from price-reducing entry. Since perfect collusion is practically impossible and the evidence weighs against collusive outcomes, then this simulation reveals that the only certain method of increasing consumer welfare in video markets is to have entry without build-out rules.

The relationship of incumbent profits to price competition is also interesting. With a free entry policy, more intense price competition always reduces the incumbent’s profits. With a build-out rule, however, the incumbent’s profits will rise even if entry would result in intense price competition. While this may seems a bit paradoxical, this apparent anomaly is explained when one recognizes that the prospects for intense price competition serves to retard and deter entry. Stated another way, both the build-out rule and intense price competition work

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40 Id.
together to significantly retard entry. With entry sufficiently deterred, the incumbent will never have to reduce its price significantly.41

Like Tables 2 and 3, the simulation results summarized in Table 4 show that the interests of consumers and incumbents are always in conflict. The fact that both policymakers and incumbents are strong advocates of build-out rules is puzzling, particularly if policymakers are viewed as serving the interests of consumers.

IV. Impact of Build-Out Rules with Defection

Our benchmark simulation above shows that a universal build-out rule has the effect of the entrant bypassing entire communities (77% of the communities in particular). In the current U.S. cable franchise system, build-out requirements are not uniform and many communities have no such requirements. But, for the results summarized in Tables 2 through 4, we have assumed that all markets either have a build-out rule or do not. In reality, some markets will impose the build-out requirement while others will allow for free entry. We can consider the effects of a mix of entry constraints by allowing free entry in some markets while imposing a build-out rule in others.

Communities benefit from defecting from a build-out requirement by increasing their relative attractiveness to entrants. If we assume (plausibly) that the entrant has limited deployment resources, then the entrant will direct its limited resources to their highest-value use.42 As a result, a community can “leap-frog” other communities and make its locality more profitable to the entrant by not imposing a build-out requirements. We can evaluate how a community may be affected by defection using the simulation.

41 Cable operators have already signaled to telecom entrants that competition will be intense. See, e.g., Comcast to Boost Residential Internet Service Speed, WALL STREET JOURNAL (July 12, 2005) at D4 (reporting that Comcast, the nation’s largest cable operator, will automatically begin to upgrade existing subscribers located in Philadelphia, Baltimore, Detroit, New Jersey and Washington, D.C. to six megabits per second for free (or eight megabits per second for an additional $10) during Summer 2005). Coincidentally, these are the same states where Verizon plans to roll-out its FiOS fiber-to-the home product.

42 Note that we are not assuming a capital budget constraint, only that deployment resources such as labor and materials are limited and directed to higher valued uses first.
If we assume, for example, that 25% of the markets do not impose a build-out rule (and the other 75% impose such a requirement), then the average increase in the rank of the “defectors” is 38 places. In other words, a market ranked 50th in terms of profitability with a build-out rule ranks 12th in profitability, on average, if it does not impose a build-out rule. Given that it is the high cost markets that are abandoned by the entrant under a build-out rule, it is these markets that may have the most to gain from this “defection.”

So, in the presence of widespread application of a build-out rule, policymakers (local and state) can increase the probability of their markets being served sooner rather than later by rejecting the requirement for an entrant to serve the entire market.

V. Conclusion

Policymakers have long wished for the nation’s two wireline communications goliaths – the cable and local telephone industries – to compete aggressively for residential consumers over a bundle of voice, video, and data services. The desired outcomes are lower prices that result from head-to-head competition and expanded consumer choice among providers and video line-ups.

That dream is on the brink of becoming a reality. Technological advances and new infrastructure deployment have put the country at the cusp of this inter-modal competition for advanced products and services. Cable companies today are now deploying advanced, Voice over Internet Protocol service that is substantially deregulated and not subject to any build-out commitment. At the same time, telephone companies like Verizon and SBC are aggressively deploying new fiber services, but their ability to sell multichannel video services to residential consumers must pass through a long and torturous local franchise process. There should be no surprise, then, that while cable companies serve over 3.7 million residential consumers with telephone service, incumbent telephone companies only serve a smattering of video customers.43

43 Industry Analysis and Technology Division, Wireline Competition Bureau, FCC, Local Telephone Competition: Status as of December 31, 2004 (July 2005) at Table 5. In the Eleventh Cable Competition Report, the FCC reported that the majority of cable operators offered some form of voice telephone service – in that same report, the FCC observed that telephone company video entry “remains limited”. Eleventh Annual Cable Competition Report, supra n. 32 at ¶¶ 12, 125.
One aspect of the cable local franchising process is the imposition of “build-out” requirements on new video entrants. Authorities that impose such build-out rules perhaps have the best of intentions, which is to assure that all constituents in their community receive the benefits of competition. But we show in this paper that this is a risky gamble – i.e., a build-out rule, in fact, creates a tremendous disincentive for a new entrant to invest and is likely to result in entire communities being bypassed. Our theoretical model shows that a build-out rule will always increase costs and reduce profits of the prospective entrant, and our empirical simulations show that the net result is substantially less deployment. In other words, a build-out rule designed to prevent “economic red-lining” within a community essentially imposes a different form of “economic red-lining” between communities. Further, if entry is deterred by the build-out rule, consumers are denied a price break that they would have otherwise received in the absence of the rule.
APPENDIX A  
THEORETICAL ANALYSIS

We begin with a simple scenario. Let there be two firms, A and B, and two markets, 1 and 2. Firm A is the incumbent and already has sunk investments in both markets. Firm B is contemplating entry in the markets with sunk costs of $K_1$ and $K_2$ (both positive) to enter market 1 and market 2, respectively. There are three possible structures:

Case 1) Firm A is in both markets 1 and 2 operating as a monopolist charging common price $P_A$;

Case 2) Firm A is in both markets 1 and 2, Firm B is in market 1 only, and prices are $P_A$ and $P_B$; and

Case 3) Firms A and B are in markets 1 and 2 and prices are $P_A$ and $P_B$.

For simplicity, let the prices ($P_A$, $P_B$) be net of incremental cost. The demand curves faced by the two firms in each market are:

\[ q_1^A(P_A, P_B), \quad q_2^A(P_A, P_B), \]  
\[ q_1^B(P_B, P_A), \quad q_2^B(P_B, P_A), \]

where $q_i^j$ is equal to the subscribers/customers in market $i$ for firm $j$. Note that each firm charges a uniform price across all markets. For simplicity, let

\[ q_2^A(P_A, P_B) = \lambda q_1^A(P_A, P_B), \]  
\[ q_2^B(P_B, P_A) = \lambda q_1^B(P_B, P_A), \]

where $\lambda$ is an exogenous, non-negative constant. Numerous factors may determine differences across markets, but those differences are summarized by the parameter $\lambda$.

We can now evaluate equilibria under our three possible outcomes. Equilibria are determined under the following assumptions: (a) prices are determined under simultaneous, non-cooperative, one-shot pricing; (b) products are differentiated; (c) firm own-demand elasticities decrease (become more
elastic) as own prices rises, and increase (become less elastic) as the rival’s price rises; and (d) equilibria exist and are unique.

Case 1 Equilibrium:

For Case 1, Firm A operates alone in both markets 1 and 2; Firm B does not offer services. The profit function for A is

\[ \pi^A = P_A(1 + \lambda)q_1^A(P_A, \infty), \quad (A-3) \]

where \( \pi \) is profit. The first order condition for firm A is

\[ 1 + \xi^A(P_A, \infty) = 0, \quad (A-4) \]

where \( \xi^A \) is the own price elasticity of demand. Equation (A-4) is the first-order condition for a monopolist. Let \( \overline{P}_A \) be the monopoly price.

Case 2 Equilibrium:

For Case 2, Firm A operates alone in market 2, but competes with Firm B for customers in market 1. The profit function for A is

\[ \pi^A = P_A q_1^A(P_A, P_B) + \lambda P_A q_1^A(P_A, \infty), \quad (A-5) \]

where \( \pi \) is profit. The first order condition for firm A can be written as

\[ \left[1 + \xi^A(P_A, P_B)\right] + \lambda \left[1 + \xi^A(P_A, \infty)\right] = 0. \quad (A-6) \]

From Equation (A-6), the reaction function of firm A is derived. If \( P_A \) rises when \( P_B \) rises \( (\partial P_A^* / \partial P_B > 0) \), which is a sensible expectation and our assumption, then the reaction function is upward sloping. Note that \( P_A \) and \( P_B \) are strategic complements. Further, \( (\partial P_A^* / \partial \lambda > 0) \), which can be shown by calculus.\(^{44}\)

---

\(^{44}\) See Beard, et al. (2005), supra n. 11, for a detailed exposition on this point.
Firm B is now active in market 1, and his first-order condition can be written as

\[ 1 + \xi^B(P_A, P_B) = 0. \]  \hfill (A-7)

As with Firm A, we have \((\partial P^*_B / \partial P_A > 0)\), but note that \((\partial P^*_B / \partial \lambda = 0)\) so that \(P^*_B\) depends on \(\lambda\) only indirectly through \(P_A\).

In this case, the equilibrium prices are \((P^*_A, P^*_B)\), and it can be shown that \((P^*_A > P^*_B)\). In other words, Firm A’s price falls when B enters market 1. The proof is straightforward. For \(P_B < \infty\), we have

\[ 1 + \xi^A(P_A, P_B) < 1 + \xi^A(P_A, \infty), \] \hfill (A-8)

and we know that

\[ 1 + \xi^A(P_A, \infty) = 0. \] \hfill (A-9)

For \(\lambda > 0\), we must have

\[ 1 + \xi^A(P_A^*, P_B^*) < 0 < 1 + \xi^A(P_A^*, \infty), \] \hfill (A-10)

so we know that \((P_A^* > P_A^*)\), since \(\xi^A(P_A^*, \infty)\) is declining in \(P_A\).

**Case 3 Equilibrium:**

In the final case, Firm B enters both markets. The first order conditions yield

\[ 1 + \xi^A(P_A, P_B) = 0, \] \hfill (A-11)

for Firm A, and

\[ 1 + \xi^B(P_A, P_B) = 0. \] \hfill (A-12)

for Firm B.
Lemma #1. When B enters both markets, the equilibrium prices are \((\bar{P}_A, \bar{P}_B)\), whereas when B entered only market 1 prices were \((P_A^*, P_B^*)\). Then, \((P_A^*, P_B^*) \neq (\bar{P}_A, \bar{P}_B)\).

Proof. Assume that the prices are equal. Then, we have

\[
1 + \xi^A(P_A^*, P_B^*) = 1 + \xi^A(\bar{P}_A, \bar{P}_B) = 0. \tag{A-13}
\]

But we also have

\[
1 + \xi^A(P_A^*, \infty) = 0, \tag{A-14}
\]

which cannot be true since

\[
1 + \xi^A(P_A^*, \infty) > 1 + \xi^A(P_A^*, P_B^*). \tag{A-15}
\]

QED.

Lemma #2. We have either

\[
P_A^* > \bar{P}_A \quad \text{and} \quad P_B^* > \bar{P}_B, \quad \text{or} \tag{A-16}
\]

\[
P_A^* < \bar{P}_A \quad \text{and} \quad P_B^* < \bar{P}_B. \tag{A-17}
\]

Proof. Obvious based on derivatives.

We now turn to the main result on prices. We have

Result:

\[
\bar{P}_A < P_A^*, \tag{A-18}
\]

\[
\bar{P}_B < P_B^*. \tag{A-19}
\]

Proof. The proof comes from the following: (a) assume equilibria are unique; (b) recall that \(\frac{\partial P_A^*}{\partial \lambda} > 0\) and the reaction function of B is upward sloping; and (c)
notice that $\tilde{P}_A = P^*_A$ and $\tilde{P}_B < P^*_B$ when $\lambda = 0$. Start at $\lambda = 0$ and let $\lambda$ rise; both $(P^*_A, P^*_B)$ rise above $(\tilde{P}_A, \tilde{P}_B)$, which do not depend on $\lambda$. Other proofs are possible.

Application:

From the above analysis, we see that

$$\tilde{P}_A > P^*_A > \tilde{P}_A \quad (A-19)$$

and

$$\tilde{P}_B = \infty > P^*_B > \tilde{P}_B . \quad (A-20)$$

This ordering of prices implies

$$\pi_B(\tilde{P}_A, \infty) > \pi_B(P^*_A, P^*_B) > \pi_B(\tilde{P}_A, \tilde{P}_B) . \quad (A-21)$$

where $\pi$ is gross (or variable) profit. In all, for Firm B, the net profit order depends on $K_1$ and $K_2$. Firm B will enter both markets if

$$\pi_B(\tilde{P}_A, \tilde{P}_B) - K_1 - K_2 > 0 , \quad (A-22)$$

and will enter only market 1 if

$$\pi_B(P^*_A, P^*_B) - K_1 > 0 , \quad (A-23)$$

$$\pi_B(\tilde{P}_A, \tilde{P}_B) - K_1 - K_2 < 0 . \quad (A-24)$$

In this latter case, a rule requiring that Firm B enter both markets would lead to no entry, whereas the absence of such a rule results in B’s entry to market 1.
APPENDIX B
A SIMULATION OF SEQUENTIAL ENTRY

In this Appendix, we describe the details of the simulation of sequential entry. The simulation is programmed and run using the statistical software package Eviews 5.1 (www.eviews.com). A spreadsheet could be used, but the simulation would be exceedingly slow and clumsy given the large number of calculations and random numbers generated for the simulation.

There are four fundamental components of the simulation: (a) demand; (b) costs; (c) entry decision; and (d) defection. We describe each in turn, though the first three are jointly determined to some extent.

**Demand:**

The demand curve in all markets is identical. In each market, we have uniformly distributed reservation prices between $4800 and $0. Since marginal costs are zero, the monopoly price is $2400, where the own-price demand elasticity is -1.0 and market penetration (homes buying divided by homes passed) is 50%. The demand curve is

\[ p = 4800 - 4800q \]  

(B-1)

where \( p \) is price and \( q \) is the penetration rate (0 \( \leq \) \( q \) \( \leq \) 1). The demand curve is calibrated so that the average sale price of cable system would be, on average, approximately $1200 per home-passed, which is consistent with industry statistics.\(^4^5\)

Prices are uniform across the market and across the incumbent and entrant. Market price falls as the entrant passes more homes (i.e., overlap), and \( q \) rises as \( p \) falls as indicated by the demand curve. We assume a benchmark price reduction from monopoly to 100% overlap of 20%.\(^4^6\)

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\(^{45}\) Eleventh Annual Cable Competition Report, supra n. 32 at Table 5.

\(^{46}\) GAO Report, supra n. 39.
Consumer surplus in each market is calculated as \((4800 - p^*)q^*/2\), where \((p^*, q^*)\) are the relevant equilibrium quantities. Monopoly profits in each market are simply \(2400 \cdot 0.5 \cdot 1000 = 1.2\text{M}\), or $120M across all 100 simulated markets.

\textbf{Costs:}

Entry costs are computed for each home in each market using the function

\[k_{i,m} = A \exp(1 + r_{i,m} \cdot s_m)\]  \hspace{1cm} (B-2)

where \(k_{i,m}\) is the capital entry costs for home \(i\) in market \(m\), \(A\) is constant, \(r\) is a standard normal random variable unique for each home, and \(s\) is scale parameter unique to each market. The constant \(A\) is set so that the average cost per home passed across all markets is $600, which is consistent with industry statistics. Equation (B-2) renders variation both within and across markets, with \(r\) determining within market variation and \(s\) determining across market variation.

The scale parameter \(s\) is set such that \(0.5 \leq s \leq 1.5\), where this range was based on an evaluation of the distribution of loop costs across census block groups using the HAI 5.0 TELRIC cost model. The range for \(s\) was determined by estimating the following regression for a number of states:

\[
\ln L = \beta_0 + \beta_1 R + \varepsilon
\]  \hspace{1cm} (B-3)

where \(L\) is ordered loop costs and \(R\) is an ordered standard normal random variable. The estimated coefficient \(\beta_1\) is an estimate of \(s\), and we found that the estimated parameter typically fell between 0.50 and 1.5.

We can interpret the term \([1 + \exp(r \cdot s)]\) as market density, where costs are a direct function of density. Research shows that population density is approximately lognormal, which explains our choice of functional form.

\textbf{Entry:}

A home is passed if

\[E(r_g) > k_i \]  \hspace{1cm} (B-4)

where \(E(r_g)\) is the expected revenue per home passed if \(g\) are homes passed and \(k_i\) is the entry costs of home \(i\). Expected revenues for the entrant are simply the market price multiplied by the product of the entrant’s market share and the
aggregate market penetration. With a build-out requirement, the entrant serves the entire market if the entrant’s revenue at 100% overlap exceeds the sum of $k$ for the market. Investment is simply the sum of per-home capital costs for whatever number of homes the entrant chooses to serve or is forced to serve under the build-out requirement.

**Defection:**

The change in profit rank from defection is easily computed. First, we assign a rank to the build-out profit for each market. We then select $f$ markets for defection, and replace the build-out profit for each of the $f$ markets with their respective free entry profits. We then re-rank the profits and compute the mean change in rank.
ADDENDUM (July 20, 2005)

This POLICY PAPER was initially released on July 19, 2005. We since found an error in the simulation related to the computation of the value of a monopoly system. Since this value was an important calibration point for the simulation, we re-ran all the simulations using the correct calculation. The changes to the initial document are only in the tables and discussion thereof, and in Appendix B (in the Demand section). The error in the simulation produced too much entry in the build-out case, since the error led to an over-valuation of the monopoly system (i.e., a larger demand for service).

If you would like to see the initial version of the paper, please send an email to lspiwak@phoenix-center.org.
WRITTEN TESTIMONY OF
LAWRENCE J. SPIWAK

APPENDIX D
The Impact of Video Service Regulation on the Construction of Broadband Networks to Low-Income Households

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(September 2005)
Abstract: This policy paper demonstrates that policies that hinder a new entrant’s ability to sell video programming, such as forcing entrants to obtain a local cable franchise agreement, will strongly diminish that entrant’s incentive to deploy fiber to low-income households. Using publicly-available data from the U.S. Census Bureau, we employ a simple graphical analysis and a simulation of network deployment to show that a new entrant will pass substantially more households – and in particular low-income households – if that entrant can readily offer video with voice and broadband Internet access services than it will if its ability to sell video services is sharply curtailed or delayed. In our simulation, video service takes on the role of a “silver bullet” – i.e., when the network firm can bundle video, the percentage of poverty and minority homes with access to the network rises significantly. Accordingly, our analysis indicates that policies that make video competition more difficult will lead to significantly lower deployment of advanced broadband networks in low-income areas than would occur with pro-entry video policies.

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Appendix A: Sensitivity Analysis .............................................................................. 24
I. Introduction

Modern communications policy in the United States is focused on fostering and encouraging the widespread deployment of advanced communications networks to all American households. President George W. Bush has established a goal of “universal, affordable access for broadband technology by the year 2007,” and influential policymakers, both Republican and Democrat, almost universally share the aspiration that no community or group of citizens should be without robust broadband network alternatives.

While policymakers have zealously focused on the availability of “broadband” functionality (e.g., faster Web surfing capability) to households, many have failed to grasp that fiber will not be widely deployed solely to provide Internet access. In fact, revenue streams from other types of communications services are critical for the construction of advanced broadband networks. This POLICY PAPER explains how policies which ensure that entrants can readily provide video programming services along with voice and data services will contribute substantially to the widespread deployment of advanced communications networks, particularly in low-income neighborhoods. In so doing, our findings provide empirical support for the assertion by FCC Chairman Kevin J. Martin that additional multichannel video competition also would “stimulate broadband deployment.”

Ever since the Internet and the World Wide Web developed into a significant business and mass-market phenomenon, there has been a strong concern that a “digital divide” would emerge between rich and poor, or urban and rural, that

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2 Concern over a “digital divide” appears to be bipartisan. A recent report by the Congressional Research Service lists more than a dozen legislative proposals, introduced by Republicans and Democrats alike, that share the goal of promoting more broadband deployment, particularly in disadvantaged areas. CONGRESSIONAL RESEARCH SERVICE, Broadband Internet Access: Background and Issues, IB10049 (June 9, 2005).

3 Leslie Cauley, FCC Chief Considers Forcing Cable TV Competition, USA TODAY (22 August 2005).
will consign the digital “have-nots” to a backward, pre-Information Age subsistence. Similar concerns about whether certain neighborhoods or groups would be left behind resulted in “build-out” and “anti-redlining” rules that became conditions of granting monopoly cable franchises. But when applied to new entrants, these altruistic requirements can be self-defeating and often erect insurmountable barriers to entry for new firms. Build-out and anti-redlining requirements are not imposed on new entrants in any other sector of the telecommunications industry and are certainly not the general rule in the U.S. economy – for example, a firm that wants to compete with Wal-Mart is not required to build a store in every town where a Wal-Mart exists.

Instead of extending anti-redlining and build-out requirements to new entrants, public policy can combat the threat of a “digital divide” and ensure more widespread deployment of advanced communications networks by allowing entrants the freedom to offer video with a broadband offering. Adding video to the product mix increases the revenue potential of the network, thereby increasing entry. Expanding the product mix to include video also substantially reduces the payback period on the network investment. A shorter payback period makes network investment less risky, so the firm will incur a lower cost of capital (e.g., it can borrow at lower interest rates) and can invest in more network building. Since low-income households subscribe to video service at roughly the

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same rate as higher income households, the ability of entrants to offer video services substantially improves the financial case for fiber deployment in low-income neighborhoods.

Our graphical analysis and simulation of network deployment in the State of Texas shows that a new entrant will pass substantially more low-income households if that entrant can readily offer video with voice and broadband Internet access services than if its ability to sell video services is sharply curtailed or delayed. In our simulation, video service takes on the role of a “silver bullet” – i.e., when the network firm can bundle video, the percentage of poverty and minority homes with access to the network rises substantially. Because we use a number of simplifying assumptions, our simulation results should not be used to assert that a certain level of penetration is achievable within any particular time period. But our simulation certainly indicates that policies making video competition more difficult will lead to significantly lower deployment of advanced communications networks in low-income areas than will pro-entry video policies.

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7 Texas recently passed a law that abolishes local franchise requirements in favor of a single, state-wide franchise. Act Relating to Furthering Competition in the Communications Industry, S.B. 5, 79th Leg., 2d Sess. (Texas 2005). Critics of the Texas law contend that the legislation will “damage . . . communities”, see Complaint, Texas Cable & Telecommunications Ass’n v. Perry, et al., Case No. A05CA721-LY (W.D. Tex.), filed Sept. 8, 2005 at ¶ 23, and “divid[es] communities into the ‘haves’ and the ‘have nots’ of advanced technologies.” Press Release, Texas Cable & Telecommunications Association, TCTA Sues State of Texas over New Telecom Law (September 8, 2005) (available at http://www.txcable.com/News/PressReleases/PressRelease20050908.asp). In our research, we find no evidence, theoretical or empirical, to support this claim. The opposite, in fact, is true – removing the franchise barrier to entry will lead to more network deployment, particularly to low-income households.

8 Franchising, through both inherent bureaucratic delay and the extraction of political concessions, is not the only barrier to entry in video markets. Other potential hindrances to entry include the lax regulatory oversight over access to video programming, particularly programming with vertical relationships with incumbent cable operators. See James W. Olson and Lawrence J. Spiwak, Can Short-Term Limits on Strategic Vertical Restraints Improve Long-Term Cable Industry Market Performance? 13 Cardozo Arts & Ent. L.J. 283 (1995) (http://www.phoenix-center.org/library/ prog_access.doc). Policymakers should not only focus on removing legal barriers to entry like franchising, but they also should focus on breaking down economic and operational barriers to entry, such as access to programming.
This POLICY PAPER is outlined as follows. In Section II, we present a simple conceptual analysis showing the role bundling can have in driving network deployment, particularly to low-income households. We then present a computer simulation of network deployment to illustrate and quantify the importance to network deployment of having the ability to sell multichannel video in a “triple-play” bundle. Concluding comments are in the final section.

II. Income and Access: A Conceptual Discussion

As we discussed in PHOENIX CENTER PUBLIC POLICY PAPER NO. 21, the U.S. telecommunications industry is entering an era in which policymakers have chosen to rely on so-called “inter-modal” competition between facilities-based, broadband networks that can support a number of different services – most notably, video, voice and broadband Internet access.9 Two theoretical observations from that PAPER are highly relevant to the present analysis. First, markets with greater potential revenues can support more facilities-based entry.10 Since multichannel video is a highly-valued and widely Consumed service, public policies that impede the sale of video services by prospective entrants over new, multi-service networks will unambiguously reduce entry. Second, entry is facilitated when new technology permits owners to convert what traditionally were “single-use” networks into “multi-use” networks and leverage their assets to “spill over” into related markets, because such spillovers reduce entry costs. The combination of larger markets and spillovers can produce substantially more entry.11 For the same reasons, public policy that denies access to particular markets or otherwise limits the potential revenues in serving a market will curtail network construction.


10 More precisely, when we refer to revenue streams, we are talking about contributions to net income, by which we mean incremental cash receipts exceeding incremental cash expenditures.

11 Bundling also reduces risk and, thus, promotes entry in at least two other ways. Adding service offerings to the network increases the chance that customers will purchase at least one service from a network that passes their homes, so there is less downside risk to building the network. Moreover, by offering multiple services, the provider faces less risk of being unable to recover its investment should customers cease to be interested in a particular service (as has happened with stand-alone long distance service, for example).
To illustrate further, we start our analysis with a simple proposition: in a market economy, a firm will construct an advanced, multi-service broadband network to a household (or group of households) if the expected net revenues from the household (or group of households) exceed the costs of deploying and providing access to that network. Symbolically, if a household is expected to generate \( r \) in net revenues and the up-front cost of access to the network is \( k \), then access will be provided when \( r \geq k \). As described in POLICY PAPER NO. 21, access is more widely available as \( r \) becomes larger relative to \( k \) (\( r \) rises, \( k \) constant; \( k \) falls, \( r \) constant).

For many goods and services in the economy, and especially for broadband Internet access, consumption rises with income (\( y \)). For our purposes, we denote this relationship as \( r(y) \) – in other words, the revenue a network owner can expect to receive from a household (or group of households) is a function of that household’s income (in this case, a positive function of income). A household (or group of households) will be offered service only if \( r(y) > k \), and this condition is more easily satisfied, \( k \) constant, as income (\( y \)) increases.

Policymakers worried about a “digital divide” are, in essence, postulating their concern that \( r(y) \) at low incomes will consistently fall below \( k \), so that a profit-maximizing firm will not provide service in low-income areas. We illustrate the situation in Figure 1. In the figure, dollars are on the vertical axis and income is on the horizontal axis. As indicated in the NTIA NATION ONLINE REPORT, revenues for broadband Internet access services rise with income, as shown by the line labeled \( r(y) \). For some capital cost \( k \) (which is unrelated to income here), customers living in geographic areas with average incomes less than \( y^* \) will not be offered service, while those consumers living in areas with average incomes larger than \( y^* \) will be offered services (that is, their homes will be “passed” by the new fiber network). Note that the seller need not be driven by any ill motive to avoid low-income areas – it is simply engaging in profit-

---

12 Note that \( r \) is the present value of revenues over the investment horizon and are net of marginal costs, and all capital investments \( k \) are up-front, one-time expenditures.

13 We do not mean to imply that income is the only factor that impacts a household’s spending on communications services. As the NTIA NATION ONLINE REPORT shows, supra n. 4, there are several other factors, most particularly family size and age of children. But we focus on household income because it is that demographic with which many policymakers are particularly concerned.

14 Supra n. 4.
maximizing behavior encouraged by a capitalist economy. Nevertheless, policymakers may be legitimately concerned about whether households with incomes less than $y^*$ will have access to broadband services for social and economic reasons that cannot be captured by the seller.

![Figure 1. The “Digital Divide” Concern](image)

The single-service analysis in Figure 1 is too simple for modern communications networks. Firms today can build robust, multi-service fiber networks that provide not only broadband Internet access service but also video and voice services. The ability of these networks to support services in addition to high-speed Internet access influences the deployment of these networks and, as a result, the availability of high-speed Internet access. Notably, the availability of multiple services increases the potential revenues that a network owner can receive from every household, even the poorest of households. The simple ability to sell multiple products on a network will decrease the potential for a “digital divide.”

---

15 We do not adopt the term “redlining” here. Redlining is typically associated with geographic discrimination. In our model, there is no discrimination per se, since the firm provides service as long as $r(y) > k$ regardless of race, religion, or any other factor. Redlining is a more meaningful concept in mortgage markets, where the lender may base decisions not on a customer’s actual financial status but rather on the customer’s particular geographic location (say, a financially successful individual living in a low-income neighborhood).

16 Our simulation below shows that a crucial component of this bundle is the availability of multichannel video services. These services generate a lot of revenue for a network provider - as a result, the $r(y)$ for every household, rich or poor, will be larger if multichannel video is part of the “bundle.”
Figure 2 demonstrates the impact of bundling on network deployment. Assume that $k$ is the cost of providing broadband service; if the firm provides video services, then capital costs increase by $d$. As a result, the total capital cost per household to the firm for providing the bundle is $k + d$. If we assume that the consumption of broadband (Good 1) and video (Good 2) have identical average expenditures and income relationships ($r_1 = r_2$), then revenues for the “double play” bundle will be $r_{12} = 2r_1 = 2r_2$. In Figure 2, we add to Figure 1 the revenue line for the bundle of broadband and video ($r_{12}$).  

In Figure 2, if $d = k$, then we have the line labeled $k + d = 2k$, and the equilibrium income level for service will again be $y^*$ (as in Figure 1). If $d < k$ (that is, if there is a “spillover” effect, which we often observe in multi-service fiber-rich networks), then the intersection of $k + d$ and $r_{12}$ will lie to the left of $y^*$. For example, if the cost of deploying the second service is one-half the cost of deploying the first service, as with line $k + d/2$, then the average household income level at which service will be provided falls from $y^*$ to $y'$. Figure 2 shows that as long as some “spillover” effect reduces the investment needed for the second service compared with providing it on a stand-alone basis (that is, $d < k$), a firm will build out to more lower-income households if it can sell a bundle than if it were limited to offering only one of the two products. The ability to bundle

\[ \text{Figure 2. Multi-Service Networks} \]

\[ \text{Combat the “Digital Divide”} \]

\[ k+d=2k \]

\[ k+d/2 \]

\[ k \]

\[ r_{12} \]

\[ r_1=r_2 \]

\[ y' \]

\[ y^* \]

\[ y \]

\[ y^* \]

17 In the figures, we assume the two goods are bundled. But, the same effect can occur even if the goods can be purchased as a bundle or individually as long as some households purchase as a bundle (or Good 2 has a higher average revenue than Good 1).
Goods 1 and 2 increases the potential market size, which shrinks any potential for a "digital divide."  

Figure 2 shows that, because of supply-side “spillover” effects, bundling multiple services will result in a network owner passing more lower-income households (homes with incomes less than $y^*$) with broadband Internet access than if the network owner were not permitted to offer both services. But with regard to bundles involving multichannel video services in particular, an important demand-side factor is also at play: some studies have shown that demand for video is far less tied to household income than broadband Internet access service.  

Figure 3 demonstrates this phenomenon. In Figure 3, $r_{12}$ is the same as in Figure 2 (that is, $r_1 = r_2$). The curve $r_{12b}$ represents the revenue-income relationship for the broadband/video bundle in the situation in which the expenditures for Good 2 are not income sensitive (illustrated by the flat line labeled $r_{2b}$). In this case, $r_{2b} + r_1 = r_{12b}$, which is a significantly flatter curve than $r_{12}$ – meaning that expenditures on the bundle of Good 1 and Good 1 is less-responsive to income than in the previous example (line $r_{12}$). Observe that if the capital cost of the bundle is less than $2k$ (that is, if there are supply-side “spillover” effects) then more low-income homes have access with $r_{12b}$ than with $r_{12}$. For example, at cost $k+d$, redlining falls to $y''$ with revenues $r_{12b}$ versus $y'$ with revenues $r_{12}$. Thus, including a service with relatively low income responsiveness in the bundle will lead to higher deployment to low-income households.

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18 More widespread deployment is theoretically unambiguous. Since the goods can always be sold separately, there can be no diminution in availability.

19 Kieschnick and McCullough (1998), supra note 6 (“We find little evidence to support the argument that many of the people who do not subscribe to cable television services do so because they are unable to afford these services. We find that while there is a positive relationship between household income and household expenditures on cable television, this positive relationship is fairly small and largely reflects the purchase of additional cable services, and not the initial decision to subscribe to cable”). The General Accountability Office (“GAO”) estimates a negative income elasticity for cable service. See Direct Broadcast Satellite Subscribership Has Grown Rapidly, but Varies across Different Types of Markets, Report to the Subcommittee on Antitrust, Competition Policy and Consumer Rights, Committee on the Judiciary, U.S. Senate, US Government Accountability Office, GAO-05-257, Table 3 (2005) (reporting a statistically significant income elasticity for cable service of -0.3974).
These examples show that, as a matter of theory, broadband Internet access services will become more widely available to low-income households when service providers gain the ability to sell additional products over their broadband networks. This model also shows that including multichannel video programming service in particular bundle can play a significant “balancing” role, because consumption of multichannel video is less sensitive to household income than is the consumption of broadband Internet access. Simply put, the ability to sell video services over a multi-service broadband network increases the revenue potential from low-income households relatively more than from higher income households and, therefore, it will stimulate relatively more deployment in lower-income areas. Thus, bundling video with broadband service has a rather pleasant impact on any “digital divide” – while video may be a significant reason why a firm may deploy fiber deployment to lower-income neighborhoods, citizens in those neighborhoods will also gain access to broadband Internet access services over that same network.

The converse is, of course, sadly true. If a firm is effectively denied or delayed in the ability to sell video services over a broadband network (through regulatory barriers like franchising or weak program access rules), then it will have less incentive to build that broadband network in less-affluent areas. Quite frankly, video revenues are vital to the prospect that firms will rapidly deploy new, fiber-based networks in poor and low-income neighborhoods in significant quantities, as required by the nation’s goal of universal access by 2007.
III. Simulation

The effect described above can be further illustrated through a computer simulation. Using publicly available data published by the U.S. Census Bureau and a forward-looking cost model of telecommunications plant, we can evaluate the relationship between services bundling, subscriber income and service availability. While the simulation could be performed on any state (or multiple states), our focus for this analysis is the State of Texas.\(^{20}\) We initially chose Texas because of its size and geographic and income diversity. This choice was somewhat fortuitous since while conducting our research the Texas Legislature passed a law that makes it significantly easier for new entrants to provide video programming services in that state.\(^{21}\) The new Texas law ends the local franchise process and provides a simple and streamlined statewide video provider authorization process. Moreover, the law does not impose a “build-out” requirement on new video programming entrants in Texas.\(^{22}\) As we show in PHOENIX CENTER PUBLIC POLICY PAPER NO. 22, “build-out” rules can significantly increase the costs of a new video entrant and therefore make video entry substantially less likely.\(^{23}\)

Our simulation is designed to examine the relative relationship between video service availability and the construction of fiber-rich, multi-service broadband networks. As a result, it makes a number of simplifying assumptions and it should not be used to argue or assert that any particular level of build-out or penetration by any particular firm is achievable or profitable in any particular time frame. The simulation models simultaneous entry by two firms that construct advanced communications networks capable of delivering (at least) three services (broadband, digital telephony, and multichannel video). For simplicity, we assume that the two networks enter at the same time and are symmetric (i.e., serving exactly the same areas and dividing the market evenly). Our simulation does not formally model synergies or scope economies available

\(^{20}\) We consider the SBC region only, since it alone provides nearly 15,000 Census Blocks for analysis (which is more than adequate for our purposes).

\(^{21}\) See supra n. 7.

\(^{22}\) In doing so, the law brings the Texas multichannel video industry in line with existing federal policy that prohibits “build-out” requirements for new entrants into the local telephone industry. See In the Matter of The Public Utility Commission of Texas, CC Policy Docket Nos, 96-13, 96-14, 96-16 and 96-19, Memorandum Opinion and Order, FCC No. 97-346 (rel. Oct. 1, 1997).

\(^{23}\) See supra n. 5.
to existing firms deploying new networks, but that does not mean such synergies cannot be inferred (i.e., the effect would be lower costs). Since synergies lower costs, the presence of such synergies would result in more deployment.

We make a number of other simplifying assumptions (such as ignoring market growth and assuming instant subscription). Our focus is upon residential customers only. Since we are attempting to examine the extent to which network construction would occur “naturally” without any external regulation, we assume that there are no build-out requirements on either entrant. Demographic data for the model is Census Block Data for the State of Texas, which allows us to simulate income-sensitive revenues. Finally, we use 1990 Census data because that data aligns with the network cost model that we use, HAI Model 5.0a, which has been employed (in various forms) by many state public utility commissions in setting rates.

Because of these simplifying assumptions, we do not (indeed, we cannot) project any particular level of availability or penetration in today’s environment. Our simulation is simply that – a simulation. One should not infer from this simulation or the tables that follow that a particular penetration rate will be realized, as a number of other factors are at work. Importantly, in today’s environment, the vast majority of households receive multichannel video from the incumbent cable company, and many of those incumbent cable companies have vertical programming relationships with the most-popular cable programming networks. Our simulation does not attempt to model the challenges that this situation presents for a new, fiber-based entrant. Moreover, it is not the purpose of this study to show that a “digital divide” is either present currently or eliminated by any particular set of policies.

That said, our analysis does show that – without question – a new entrant will deploy broadband Internet access services more widely in low-income neighborhoods if that entrant can freely bundle multichannel video and voice services with broadband Internet service. This result is undeniable as a matter of theory (as illustrated in the previous section) and the simulation shows that this effect is significant.

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24 The simulation evaluates Census Blocks in Texas using the 1990 STF3 data. From the STF3 files, we extract households, white households, poverty households, and median income.
In the following sections, we outline our benchmark case and present the results of the simulation. Appendix A contains sensitivity analysis on many of the inputs.

A. Supply Side

The purpose of the simulation is to evaluate the role of bundling multiple services on household access to advanced communications services, with a focus on access differentials by income. We begin by specifying the supply-side of the simulation. At present, there are no highly-disaggregated cost studies of advanced communications networks. We do have, however, forward-looking cost estimates for traditional, copper-based telephone networks and these models provide estimates down to the Census Block level. While the level of cost for such networks may not be appropriate for a fiber-rich network, such models likely render acceptable approximations of relative costs across geographic areas. If so, then we can scale the level of cost from these models to match better the advanced communications network.

Say, for example, we know that is the true mean cost of the fiber-optic network, but we do not have the distribution of across Census Block Groups (the for all blocks). We do have disaggregated estimates of costs from a forward-looking cost model for a copper-based network (with mean cost ). Assuming that the relative cost across Block Groups is the same for both and if we then scale the cost estimates by the ratio , then we have legitimate disaggregated cost estimates . This approach is employed here.

We divide capital costs into two major categories. First, we assume the average cost to pass a home () is $600, and these costs vary across Census Blocks according to forward-looking cost estimates. For Texas, these costs range from $61 to over $32,000, depending on population density and other relevant characteristics. In addition, we assume that each house connected to the network

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25 For this study, we use the Census Block Group estimates of loop costs from the HAI Model 5.0a.
26 We use loop costs to proxy relative cost differentials.
27 While this method is not perfect, it is likely to produce sufficiently good approximations of the cost distribution for the purposes of this simulation. Again, we are simply trying to illustrate the importance of adding video to the suite of services offered by an advanced communications network, not attempting to provide accurate forecasts of terminal penetration rates.
costs the firm an additional $1000 in labor and materials.\footnote{This puts average cost for a connected home of $1600, which is consistent with recent studies on the cost of fiber networks. These figures are based on various estimates of the cost of FTTP/FTTH deployment. See, e.g., \textsc{Fiber-To-The-Home, the Third Network}, FTTP/FTTH 2004/2005, Render, Vanderslice & Associates (December 2004); \textsc{FTTP: Going Strong for 2005}, IPI Group (May 2005); C. Mattey, Deloitte & Touche LLP, \textit{Are Multiple Broadband Infrastructures Sustainable: Key Characteristics of Competing Broadband Platforms}, presentation before the Columbia Institute for Tele-Information, New York (June 23, 2005); A. Banerjee and M. Sirbu, \textit{Towards Technologically and Competitively Neutral Fiber to the Home (FTTH) Infrastructure}, Unpublished Working Paper, Carnegie Mellon University (2003): \url{http://itc.mit.edu/itel/docs/2003/banerjee_sirbu.pdf}; K. Poul tin, \textit{The Palo Alto Fiber to the Home Trial: A Work in Progress}, Presentation at the CANARIE's 5th Annual Advanced Networks Workshop (November 1999).} For other services, we assume telephone investment is $100 per household, and that the incremental investment to add video to bundle is $200 per household (from above, these costs are indicated by the variable $d$).\footnote{See, e.g., G. Blackwell, \textit{IPTV: The Big Picture}, ISP-PLANET (April 15, 2005) (available at: \url{http://www.isp-planet.com/research/2005/iptv.html}) and Mattey (2005), supra note 28.} For our simulation, the per-home incremental capital cost for broadband service ($k$) averages $1600 by design, $1800 for broadband and video, $1700 for broadband and telephone, and $1900 for all three services. We account for operating costs using margin assumptions as detailed in the next section. A sensitivity analysis of the effects of costs is provided in Appendix A.

B. Demand Side

The revenue-income relationships for our three goods (broadband, voice and multichannel video) are from published information. Expected revenue per household is computed as $p\cdot e\cdot f$, where $p$ is the probability of purchase (the penetration rate in the block), $e$ is annual expenditures, and $f$ is a present value factor. Both $p$ and $e$ can be functions of income, and $f$ is the discount factor for 15 years at a rate of 10\% (so $f = 7.61$).

For broadband, the relevant demand-side relationships are

\begin{align*}
p_b &= (-1.548+0.2024\ln y)/2 \\
e_b &= (240+0.0033y)^{0.5} \\
f &= 7.61 \\
r_b &= p_b \cdot e_b \cdot f.
\end{align*}
where both \( p_b \) and \( e_b \) are functions of income \((y)\). For the calculation of \( p_b \), the numerator is aggregate penetration, so we divide by two to reflect the entry of two firms.\(^{30}\) Expenditures average $20 at the lowest income level rising linearly to an average of $60 at the highest income level.\(^{31}\) The profit margin (or contribution to fixed costs) is set at 50% of gross household expenditures, explaining the 0.5 scalar in the \( e_b \) calculation.

For multichannel video, the demand-side relationships are

\[
\begin{align*}
  p_v &= 0.70/2 \\
  e_v &= (2253.71 + 314.869 \ln y) \cdot 0.5 \\
  f &= 7.61 \\
  r_v &= p_v \cdot e_v \cdot f.
\end{align*}
\]

where only \( e_v \) is a function of income. Econometric studies consistently show a weak relationship (if any) between income and basic cable demand, and we incorporate this finding in our simulation.\(^{32}\) Again, we have (symmetric) duopoly, so the assumed aggregate penetration of 70%, which two firms evenly share, is divided by 2.\(^{33}\) Some surveys indicate that expenditures on multichannel video, however, do typically rise with income (but others find no relationship).\(^{34}\) To be conservative, we specify the expenditure level \( e_v \) to be a

\(^{30}\) The function for \( p_b \) is from an informal “best fit” analysis of penetration/income data presented in the NTIA NATION ONLINE REPORT, supra note 4, at Table 1. We use “all Internet use” for the penetration rate, explaining the $20 monthly revenue for the lowest income groups.

\(^{31}\) Broadband providers today offer bandwidth options for users. See also Mattey, supra n. 28 (listing ancillary services for broadband connections).

\(^{32}\) See Kieschnick and B. D. McCullough (1988), supra n. 6, and GAO 2005 Study, supra n. 19.

\(^{33}\) The National Cable Telecommunications Association website claims that the average household penetration of cable systems is 66.8%, http://www.ncta.com/Docs/PageContent.cfm?pageID=86.

\(^{34}\) Kieschnick and McCullough (1998), supra n. 6. A recent survey by the Pew Internet & American Life Project indicates that minority households spend more on multichannel video than white households. Since, on average, white incomes are higher than minority incomes, this finding suggest that low-income households may actually spend more on multichannel video than high-income households. Thus, our assumptions are conservative in relation to the effect of video on deployment. See J. B. Horrigan, Consumption of Information Goods and Services in the United States, Pew Internet & American Life Project (2003).
function of income.\textsuperscript{35} The profit margin (or contribution to fixed costs) is 50% of gross household expenditures, explaining the 0.5 scalar in the $e$ calculation.\textsuperscript{36}

For telecommunications service, we assume that average monthly revenues are $20 per household, and that 80% of homes that buy either broadband or video service also purchase telephone service in a bundle.\textsuperscript{37} Income has no effect, which is plausible with a low-priced ($20), unlimited calling package. The profit margin on the service is 30%.

\begin{itemize}
  \item The expenditure function $e$ is an informal “best fit” least squares estimation using data from Kieschnick and McCullough (1998), \textit{supra} n. 6, which we scale so that the simple average expenditure is $80 per month. We use only income groups with an upper income bound (an use that bound in the analysis). The mean of $80 matches reported average revenue per subscriber in Horrigan (2003), \textit{id}. Statistics on the NCTA website indicate a mean of $95 per cable subscriber, adjusting out revenues from broadband and telephone services (assuming $50 per unit). Cablevision, Inc., reports average revenue per video subscriber of $87.17. Cablevision Systems Corporation, SEC Form 10-K at 4 (March 16, 2005). This mean includes an adjustment for advertising revenue. NCTA reports advertising revenue is about 25% of industry revenue. The household-weighted average revenue per subscriber in the simulation is $74.
  \item Publicly-traded cable operators report gross profits and EBITDA margins in the 40-65% range.
  \item Cable systems currently offer digital telephone service for about $40, and reputable VOIP operators offer a full suite of digital telephone services for about $25 to $35 per month. See, e.g., \url{www.vonage.com} and \url{www.att.com}. We assume 80% of subscribers to voice service purchase it from the wireline duopolists in our simulation, leaving the remainder of the voice market to wireless and other carriers (such as VoIP retailers). See, e.g., \textit{Telcos Stake Their Claim in the VoIP Market}, Sun Microsystems (December 2004) (“people will tend to buy VoIP service from their broadband provider, it’s just a logical progression”): \url{http://www.sun.com/solutions/documents/articles/te_voip_aa.xml?facet=-1}.
\end{itemize}
Table 1. Descriptive Statistics
(1990 Census Data)

<table>
<thead>
<tr>
<th>Median Income Range</th>
<th>Homes</th>
<th>Poverty Homes</th>
<th>Minority Homes</th>
<th>(k^{pass})</th>
<th>Median Income</th>
</tr>
</thead>
<tbody>
<tr>
<td>(y &lt; 20,000)</td>
<td>1,155,258</td>
<td>398,950</td>
<td>439,657</td>
<td>628</td>
<td>14,772</td>
</tr>
<tr>
<td>(20,000 &lt; y &lt; 30,000)</td>
<td>1,586,374</td>
<td>230,077</td>
<td>355,874</td>
<td>672</td>
<td>24,679</td>
</tr>
<tr>
<td>(30,000 &lt; y &lt; 40,000)</td>
<td>1,086,930</td>
<td>81,544</td>
<td>164,243</td>
<td>584</td>
<td>34,352</td>
</tr>
<tr>
<td>(40,000 &lt; y &lt; 50,000)</td>
<td>626,473</td>
<td>25,585</td>
<td>77,614</td>
<td>512</td>
<td>44,095</td>
</tr>
<tr>
<td>(50,000 &lt; y &lt; 60,000)</td>
<td>284,354</td>
<td>7,715</td>
<td>22,053</td>
<td>483</td>
<td>54,012</td>
</tr>
<tr>
<td>(60,000 &lt; y &lt; 70,000)</td>
<td>153,034</td>
<td>3,601</td>
<td>9,572</td>
<td>483</td>
<td>64,025</td>
</tr>
<tr>
<td>(70,000 &lt; y &lt; 80,000)</td>
<td>79,172</td>
<td>1,520</td>
<td>3,864</td>
<td>449</td>
<td>74,775</td>
</tr>
<tr>
<td>(80,000 &lt; y &lt; 90,000)</td>
<td>33,438</td>
<td>480</td>
<td>1,534</td>
<td>463</td>
<td>83,600</td>
</tr>
<tr>
<td>(90,000 &lt; y &lt; 100,000)</td>
<td>14,976</td>
<td>368</td>
<td>458</td>
<td>457</td>
<td>93,633</td>
</tr>
<tr>
<td>(100,000 &lt; y &lt; 125,000)</td>
<td>16,444</td>
<td>234</td>
<td>573</td>
<td>428</td>
<td>108,583</td>
</tr>
<tr>
<td>(125,000 &lt; y &lt; 150,000)</td>
<td>7,808</td>
<td>107</td>
<td>180</td>
<td>428</td>
<td>134,951</td>
</tr>
<tr>
<td>(y &gt; 150,000)</td>
<td>6,251</td>
<td>183</td>
<td>148</td>
<td>435</td>
<td>150,001</td>
</tr>
</tbody>
</table>

In Table 1, we present some descriptive statistics including \(k^{pass}\) estimates by income group. The table shows that \(k^{pass}\) is inversely related to income (\(\rho = -0.84\), based on the table values); lower income households are generally located in higher costs areas. So, to some extent, higher costs and not simply lower revenues may explain reduced access to the network in low-income areas.

C. Results

Whether or not advanced communications are available to a particular household (or, more appropriately for the simulation, a group of homes in a Census Block) depends on whether the total revenue from homes in the Census Block exceeds the total investment required to serve the Block. On a per-household basis, this implies that a Census Block has access if the average

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38 This high correlation coefficient is, in part, due to the aggregation into groups. For the individual Census Blocks, there is virtually no linear correlation between income and cost (\(\rho = -0.064\), but there may be a non-linear relationship (thus causing the correlation in aggregate data).

39 In many New England states, the correlation is reversed, with poorer homes being located in the more densely populated urban centers.
expected revenues exceed the average expected investment \((i.e., r > k\) from Section II).

For the benchmark case, the results of the simulation are in Table 1, where we present the results as the percent of households passed by income group for four service offerings: (a) broadband service alone; (b) broadband and telephone service; (c) broadband and video service; and (d) all three services. All results are, of course, conditional on our benchmark assumptions. Appendix A contains a sensitivity analysis of key assumptions.

Table 1 shows a great deal of variability in service availability depending on the components of the service offering. Under our benchmark assumptions with broadband only, the two networks serve very few homes, and the networks pass no homes in areas with median incomes of less than $50,000. Obviously, the “broadband only” option leads to a sizeable “digital divide.” Even at higher income levels, network coverage is limited for the broadband-only option.

As more services enter the firm’s product mix, however, the role of income as a determinant of availability diminishes. If telephone service is bundled with broadband, then availability rises sharply across many income groups. Yet, a substantial “digital” divide remains. No home in a Census Block with a median income of less than $40,000 would have access to the network, and only about half of the homes in Blocks with median incomes in the $70,000 to $80,000 range would have access.

The most sizeable impact on network coverage happens when the network provider adds video services to its product mix. An offering of video and broadband services shrinks the potential for a “digital divide” considerably. In our simulation, 84% of the lowest-income Census Blocks have access to the multi-service broadband network, and neighborhoods with median incomes of more than $40,000 have near ubiquitous access (98% or more).

A bundle of all three services – voice, data, and video – does even more to eliminate the potential for a “digital divide.” Homes in the lowest income group have an 88% access rate, and virtually every Census Block with a median income of $40,000 or more has access. The difference in availability between the three-service bundle and a “broadband only” offering is staggering. With a “triple play,” all income groups have very good coverage, and low-income households have substantially more access than they would have if video services were not offered. The simulation illustrates clearly the importance and value of bundling video and other services as an antidote for the “digital divide.”
<table>
<thead>
<tr>
<th>Block Groups by Median Income Range</th>
<th>(a) Homes Passed (%)</th>
<th>(b) Homes Passed (%)</th>
<th>(c) Homes Passed (%)</th>
<th>(d) Homes Passed (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>y &lt; 20,000</td>
<td>-</td>
<td>-</td>
<td>0.84</td>
<td>0.88</td>
</tr>
<tr>
<td>20,000 &lt; y ≤ 30,000</td>
<td>-</td>
<td>-</td>
<td>0.88</td>
<td>0.90</td>
</tr>
<tr>
<td>30,000 &lt; y ≤ 40,000</td>
<td>-</td>
<td>-</td>
<td>0.93</td>
<td>0.95</td>
</tr>
<tr>
<td>40,000 &lt; y ≤ 50,000</td>
<td>-</td>
<td>0.04</td>
<td>0.98</td>
<td>0.99</td>
</tr>
<tr>
<td>50,000 &lt; y ≤ 60,000</td>
<td>0.01</td>
<td>0.09</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>60,000 &lt; y ≤ 70,000</td>
<td>0.02</td>
<td>0.20</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>70,000 &lt; y ≤ 80,000</td>
<td>0.09</td>
<td>0.54</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>80,000 &lt; y ≤ 90,000</td>
<td>0.14</td>
<td>0.76</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>90,000 &lt; y ≤ 100,000</td>
<td>0.34</td>
<td>0.92</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>100,000 &lt; y ≤ 125,000</td>
<td>0.83</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>125,000 &lt; y ≤ 150,000</td>
<td>0.97</td>
<td>0.97</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>y &gt; 150,000</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
</tbody>
</table>

A review of the detailed simulation results indicates that a lack of access to the network when video is provided is driven more by costs than income (the latter being the sole driver of revenues). The average annual expected net revenues for those homes passed versus those not passed is only 7% larger ($265 versus $247).\(^{40}\) In contrast, the cost difference between the groups is enormous. Between the two groups, the average \(k\) is $857 in served areas whereas the average \(k\) for areas not served is $2685 (a 213% difference).\(^{41}\) Obviously, cost – and not income – is the primary driver of a lack of access in the simulation.

Another interesting statistic from the simulation is the recovery speed of the upfront investment. If the firm is able to offer all three services over that network, then the firm recoups its upfront investment in about one-third of the time that it would recoup from a “broadband-only” build. (We note, however, that our simulation shows that the new entrant still must take several years in many areas to build its network.) Accelerated cost recovery improves the

\(^{40}\) The average is computed as a household weighted average.

\(^{41}\) These cost figures are average capital cost per home, so the connection and incremental service costs are weighted by the expected penetration.
business case for building a broadband network and substantially reduces the risk of the endeavor.

The increased deployment due to the firm expanding its product mix to include video is particularly significant for low-income and minority households. Figure 4 summarizes availability of service for households with income below the poverty line and minority homes.42 “Digital divide” studies often report access statistics based these demographic traits. If multichannel video services cannot be sold over the broadband network, then our simulation shows the potential for a significant “digital divide”, with only a small percentage (less than 1%) of poor and minority homes with access to the advanced communications network. Even adding telephone service to the product mix does not improve penetration for these households. But, adding video to the product mix makes for a dramatic change in the availability of service to poverty and minority homes. Video service takes on the role of a “silver bullet” – i.e., in our simulation, when the network firm can bundle video, the percentage of poverty and minority homes with access to the network rises from nearly zero to about 90%. The impact of video on access by poor households to broadband is considerable and cannot be ignored by policymakers.

42 These figures are based on the relevant household count from Table 1 and the penetration rates from Table 2.
Reviewing the results summarized in Table 2 and Figure 4, the simulation clearly illustrates the point that offering video with broadband service will expand availability across income groups. While we cannot claim a high degree of accuracy on the reported terminal penetration rates from the simulation, the expansion effect predicted by the simulation is substantial and undeniable. These results are unsurprising, given that video services generate expected revenues that, on average, are much larger than the expected revenues from broadband services.

Unlike mandatory build-out requirements, which deter entry, allowing entrants easy access to multichannel video services has no downside. Therefore, a public policy of free entry into video markets seems to be a more logical first step in ensuring the more widespread deployment of broadband networks. Further, mandatory build-out requirements may be senseless in the context of statewide or nationwide franchise arrangements, or when the entrant is an existing network provider (such as a local phone company). In Texas, for example, there are about 60 local phone companies.\textsuperscript{43} It would be ludicrous to require all 60 carriers to build-out to the entire state, since it would not be

\begin{table}[h]
\centering
\begin{tabular}{|c|c|c|}
\hline
 & Poverty Homes & Minority Homes \\
\hline
Broadband & 87% & 90% \\
Broadband Telephony & 88% & 91% \\
\hline
\end{tabular}
\caption{Percent of Below-Poverty and Minority Homes Passed}
\end{table}

profitable for the firms to do so. Nor does it make sense to require a region-wide build-out, since some entrants may be entirely new to the market and not have existing networks in a “region.” Additionally, local telephone exchanges and cable television franchise markets are not geographically identical. Thus, a build-out requirement based on existing cable franchise boundaries may raise entry costs by forcing a telephone company entrant to expand well beyond its existing markets and infrastructure (which would rob the system of its spillover).\footnote{C.f., WHL LINK, LLC v. City of Otsego, 664 N.W.2d 390 (Minn. Ct. App. 2003).} Entry-promoting policies for video services, alternately, have a powerful effect on broadband network deployment and carry no baggage.

D. Sensitivity Analysis

All these reported results are the consequence of the particular assumptions and algorithms of the simulation. In an effort to illustrate the effects of particular assumptions, we summarize a sensitivity analysis in Appendix A. We do not provide sensitivity analysis for a number of key assumptions, such as simultaneous entry and symmetric firms. Some features of the simulation are too complex to evaluate using sensitivity analysis, and quantifying their effect would require a new, more sophisticated simulation. That said, the driving forces of this simulation and any other reasonable simulation of this issue should produce very similar results in a general sense. Accordingly, any simulation, no matter how simple or complex, should indicate that if a firm can provide more services over a network, then the profit opportunities of the firm are enhanced and, as a consequence, the geographic coverage of the network is expanded.

We do not devote much attention to the results of the sensitivity analysis – the results are as expected (and robust). Higher revenues and lower costs increase network deployment, and lower revenues and higher costs reduce network deployment.

IV. Conclusion

Republicans and Democrats alike are nearly unanimous in arguing that all Americans should have access to broadband Internet access services. Policymakers fear that consumers that do not have access to this service will increasingly be “passed by” the Information Age – and that those consumers and
their children will lose critical educational, employment, and entertainment opportunities.

In this POLICY PAPER, without disputing the social value of ubiquitous broadband deployment, we show that there is an important linkage between the bundling of video programming services and broadband Internet access services. The right set of policies – i.e., policies that facilitate and promote the ability of broadband networks to provide video directly to consumers – will result in wider deployment of broadband Internet services, and, in particular, wider deployment in low-income neighborhoods.

The theory demonstrating this relationship builds upon the key insight that the more potential revenues that the network can generate in a household, the more likely it is the network will be built to that household. As a result, it is readily apparent that video can be the key driver in making deployment profitable, and video capability will in turn make broadband Internet access services over that same network platform more-readily available. It follows, therefore, that any policy that makes it difficult or costly for a network firm to sell multichannel video services, through either an onerous local franchising process or lax program access regulations will – without a doubt – result in less deployment of advanced communications services, including broadband Internet access. Further, these hindrances to offering video services are particularly detrimental to deployment in low-income areas.
APPENDIX A: SENSITIVITY ANALYSIS

A sensitivity analysis of core simulation assumptions is summarized in the tables below. The labels of the columns match that of Table 2. All simulations assume “other things constant.”

<table>
<thead>
<tr>
<th>Percent of Homes Passed</th>
<th>( k_{\text{pass}} = 700 )</th>
<th>( k_{\text{pass}} = 500 )</th>
</tr>
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<tr>
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<td>-</td>
</tr>
<tr>
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<td>-</td>
<td>-</td>
</tr>
<tr>
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<td>-</td>
<td>-</td>
</tr>
<tr>
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</tr>
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<td>0.83</td>
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<td>0.97</td>
</tr>
<tr>
<td>( y &gt; 150k )</td>
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\[
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\hline
\text{Income Range} & \multicolumn{4}{c|}{k_{\text{connect}} = 1200} & \multicolumn{4}{c}{k_{\text{connect}} = 800} \\
\hline
\text{ } & (a) & (b) & (c) & (d) & (a) & (b) & (c) & (d) \\
\hline
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\text{20k < y < 30k} & - & - & 0.88 & 0.89 & - & 0.02 & 0.89 & 0.91 \\
\text{30k < y < 40k} & - & - & 0.92 & 0.94 & - & 0.05 & 0.94 & 0.95 \\
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\text{60k < y < 70k} & - & 0.05 & 1.00 & 1.00 & 0.07 & 0.47 & 1.00 & 1.00 \\
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\text{90k < y < 100k} & 0.20 & 0.58 & 1.00 & 1.00 & 0.59 & 0.92 & 1.00 & 1.00 \\
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Percent of Homes Passed

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<th>All Revenue +10% (c)</th>
<th>All Revenue +10% (d)</th>
<th>All Revenue -10% (a)</th>
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<th>Video Share = 40% (d)</th>
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### Percent of Homes Passed

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<table>
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<td>y &gt; 150k</td>
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</tbody>
</table>
WRITTEN TESTIMONY OF
LAWRENCE J. SPIWAK

APPENDIX E
FRANCHISE FEE REVENUES AFTER VIDEO COMPETITION:
THE “COMPETITION DIVIDEND” FOR LOCAL GOVERNMENTS

Abstract: In response to federal efforts to reform the local cable franchise process, state and local governments have argued that proposed legislation will reduce local franchise fee revenues by at least $300 million per year. As demonstrated in this POLICY BULLETIN, however, the introduction of competition for multichannel video services promises to significantly increase gross industry revenues and therefore could substantially increase local franchise fee collections. Specifically, this POLICY BULLETIN finds that if wireline, local telephone company entry into the multichannel video industry is successful, then gross taxable revenues from the wireline multichannel video industry will increase by an estimated 30%. Commensurately, effective pro-entry video policies would allow the local franchise fee percentage cap to be lowered (or the revenue base narrowed) significantly without doing any harm to local government franchise collections. This POLICY BULLETIN estimates that a reduction in the franchise fee cap from 5% to 3.7% would be revenue neutral. However, this “competition dividend” will only occur if wireline entry happens and, therefore, reform of the cumbersome and anticompetitive video franchising process is crucial to ensuring that such entry occurs.

I. Introduction

State and local governments have historically imposed a “franchise fee”, or tax, on the provision of cable television services. In 2004, state and local governments collected approximately $2.4 billion in these franchise fees, slightly more than $37 per year from every
household that subscribes to cable.¹ Proponents justify these fees based on the argument that cable television networks use public “rights-of-way” (such as streets and easements) to build their networks and that these fees constitute a form of rent or compensation for these uses. However, state and local governments have attempted to impose these fees or their equivalent on all providers of video programming, including entities like private apartment complexes that do not use public rights-of-way, but to date, only wireline video providers are generally subjected to these fees.²

As discussed below, federal law has historically been concerned about how the local cable franchise process affects the nation’s communications networks and has regularly intervened to preempt and limit this franchise authority. The FCC recognized the impact that these local taxes could have on network deployment, and implemented rules to limit these taxes in 1972. Since 1984, federal statute has capped franchise fees at 5% of gross cable industry revenues.³

In the last few months, federal authorities have once again focused attention on the local cable franchising process and the role it is playing in delaying or shaping the construction of new, multi-service broadband networks. President Bush has established a goal of achieving universal broadband Internet access by 2007, and we have shown in POLICY PAPER NO. 23 that there is a strong link between the availability of broadband services to disadvantaged areas and the ability to provide multichannel video service over that same network.⁴ As a result, a tax on multichannel video service similarly levies a tax on broadband service, a decision that will inevitably affect fiber optic deployment.

As a result, Congress is once again looking at further federal intervention into the state and local franchise fee arrangements. Several different bills have been introduced or discussed that recognize the need to reform or modify the current franchise fee cap. Reaction to these proposals by state and local governments has been fierce. NATOA has argued that one bill, S. 1504 (Ensign-McCain), “gives away all of the rights of a community to protect its citizens” and “provides unprecedented tax benefits to the telecommunications industry without any concurrent benefit to the public.”⁵ NATOA has asserted – without support – that adoption of S.

² § 602 of the 1996 Telecommunications Act.
1504 “would immediately cost local governments on the order of $300 million per year in lost franchise fees alone, and much more in the future.”

In arguing that the Ensign-McCain bill will cost them at least $300 million per year, state and local government advocates have missed one key point: the introduction of competition for multichannel video services promises to significantly increase gross industry revenues and therefore could substantially increase local franchise fee collections. If wireline, local telephone company entry into the multichannel video industry is successful, then we estimate a 30% increase in gross taxable revenues from the wireline multichannel video industry. If the 5% gross revenues franchise tax remains in place (as proposed by House Commerce Committee staff and other legislative proposals), then local franchise fee collections would leap by the same 30%.

Commensurately, effective pro-entry video policies would allow the local franchise fee cap to be lowered (or the revenue base narrowed) significantly without doing any harm to local government franchise collections. We estimate that revenue neutrality entails a reduction in the franchise fee from 5% to 3.7% of gross revenues. However, this “competition dividend” will only occur if wireline entry happens. As we have discussed in POLICY PAPER NO. 21, 22 and 23, reform of the cumbersome and anticompetitive video franchising process is crucial to ensuring that such entry occurs.

II. Proposed Federal Legislation on Local Cable Franchise Fees

A new wireline provider of video programming is subject to a local franchise fee if is declared to be a “cable television system” under current law. Federal law currently authorized state and local governments to assess this fee, payable by the cable provider, up to 5% of cable service revenues. Franchise fees receipts currently stand at $2.4 billion per year, an average of $37 annually for each household that subscribes to cable.

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8 Supra n. 3.
9 Supra n. 1.
Federal authorities have historically been concerned about the adverse interstate economic impact of state and local government franchise fees. As a result, the federal government has already limited the ability of state and local governments to impose these fees pursuant to their police power. As early as 1972, the FCC had recognized the adverse effect that these franchise taxes could have on the development of the cable industry, and the FCC had an established policy of reviewing franchise fees greater than 3% of gross revenues if it believed that the fee would impair the growth of the cable industry. Since 1984, federal statute has directly capped these franchise taxes at 5% of gross cable system revenues.

Section 13(b)(A) of S. 1504 (Ensign-McCain) would limit the franchise fee to any “reasonable fee” that compensates the local government for the cost of managing its rights of way. This provision would effectively prohibit a franchising authority from raising funds for general revenues by means of a tax directed solely at multichannel video services. Local government representatives, in contrast, argue that they have the right to collect a franchise fee that bears no relationship to the costs of managing and maintaining their rights-of-way.

Other pending legislation does not present radical reform of local franchising fees but makes clear that new video networks constructed by local telephone companies would effectively be subject to the same franchise fees as current cable incumbents. The House Commerce Committee staff has circulated a comprehensive discussion draft bill that also addresses local franchise fees. The House Commerce Committee staff draft removes state and local franchising obligations from “broadband video service providers”, but section 303(b) of the draft makes it clear that state and local governments may impose a 5% gross revenue fee on those companies. Similarly, S. 1349 (Smith-Rockefeller) and H.R. 3146 (Blackburn-Wynn) also reform and simplify the local franchising process for new telephone company entrants but make clear that the current 5% franchise fee would apply to telephone company video enterprises.

10 Cable Television Report and Order, 36 F.C.C. 2d 143, 204-10, 219-20, recon., 36 F.C.C. 2d 326 (1972). In setting that policy, the FCC described “a deliberately structured dualism” in which it respected the role of state and municipal governments yet retained the final say in prescribing rules that set forth “at least minimum standards for franchises issued by local authorities.” Id. at 207 ¶ 177.


12 See, generally, Frederick E. Ellrod II & Nicholad P. Miller, Property Rights, Federalism, and the Public Rights-of-Way, 26 Seattle Univ. L. Rev. 475 (2003). It is beyond the purpose of this POLICY BULLETIN to debate whether franchising serves a purpose beyond rights-of-way management. However, we note that efforts by a municipality to effectively “auction off” its rights-of-way to the highest telecom industry bidder could present significant legal issues under Section 253 of the Act, which preempts all local actions regarding that have the effect of limiting the availability of any telecommunications service except those that relate to rights-of-way management.

Many state and local governments have been opposed to any change in the video franchising process and have cited the maintenance of franchise fee revenues as a crucial revenue stream. Local government representatives have indicated that revenue neutrality is a “key state and local principle.” These advocates have also argued – without support or explanation – that S. 1504 (Ensign-McCain) would immediately “cost local governments on the order of $300 million per year in franchise fee revenues alone and much more in the future.”

However, local government advocates have missed one important point – by virtue of demand characteristics, successful entry by telephone companies will increase total video service revenues by a substantial amount, so much that a 5% revenue tax will provide substantially more revenues for state and local government if telephone company video entry is successful. As discussed below, we estimate that extending of the current 5% fee to successful new entrants (as S. 1349, H.R. 3146 and the House Commerce draft all do) will provide a multimillion dollar “competition dividend” to local government coffers. If successful pro-entry policies are enacted, then the franchise fee level or revenue base could be sharply curtailed while leaving local governments revenue neutral.

III. If Industry Revenues Increase, Franchise Fee Receipts Will Increase

The franchise fee operates like any other sales tax – if revenues increase, then the same tax rate will collect more revenues for the local government. Telephone company entry into the video market has the promise to upend the current market structure significantly and substantially increase total industry revenues. Any examination as to whether any of the franchise fee equivalents in pending legislation are “revenue neutral” must consider this impact on revenues.

Currently, according to the Government Accountability Office (“GAO”) and the FCC, the multichannel video market is dominated by cable television incumbents, two direct broadcast satellite providers (DirecTV and Echostar), and a smattering of wireline competitive providers. Importantly, the two satellite providers do not pay a franchise fee to local governments – as a result, any customer that DirecTV or Echostar takes away from cable potentially decreases franchise fee receipts for local government. At the same time, the GAO has found that satellite television competition does not cause considerable price cuts from the incumbent cable

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operators, but that direct, head-to-head wireline competition does result in substantial price competition (with rate cuts of 16% on average).\textsuperscript{16}

Successful telephone company entry into the video market will substantially alter this industry structure. Most notably, based on the GAO studies, we would expect telephone company entry to result in significant price competition between the two wireline providers.\textsuperscript{17} As we show below, these price cuts will result in \textit{more} consumption of video services by consumers, so that total industry revenues will increase. As we also show below, this increased competition should increase total industry revenues and therefore result in a substantial increase in local franchise fee receipts.

\textbf{IV. Own-Price Elasticity of Demand for Multichannel Video Programming}

Basic economics teaches that quantity and price are inversely related (\textit{i.e.}, demand slopes downward). Whether or not the product of price and quantity, or total revenue, increases or decreases when price changes depends on how sensitive quantity is to price. Economists measure this sensitivity as the \textit{own-price elasticity of demand}.\textsuperscript{18} The own-price elasticity of demand is defined as the percentage change in the quantity demanded of a good ($Q$) divided by the percentage change in the \textit{own} price of the good ($P$), or\textsuperscript{19}

$$\frac{\% \Delta Q}{\% \Delta P} = E,$$  \hfill (1)

\textsuperscript{16} These price differences can be computed from the reported econometric results. For the DBS price change, a 100\% reduction from the mean (22\%) DBS penetration is equivalent to eliminating the DBS providers from the market. The coefficient is -0.0476, which is roughly equal to 5\% (the effect of DBS is measured as \(-0.0476 \times 100\% = -0.0476\)). The coefficient on a terrestrial overbuild is -0.1694, and the percentage change in price is measured as $\exp(-0.1694) - 1 = 15.6\%$. \textit{See Direct Broadcast Satellite Subscribership Has Grown Rapidly, but Varies across Different Types of Markets, Report to the Subcommittee on Antitrust, Competition Policy and Consumer Rights, Committee on the Judiciary, U.S. Senate, US Government Accountability Office, GAO-05-257 (2005) ("GAO 2005 Study") at Appendix III, Table 3.}

\textsuperscript{17} Colloquial evidence supports the GAO's observation. Jerri Stroud, \textit{Verizon fires first shot in battle with Charter for TV customers;" ST. LOUIS POST-DISPATCH} (Sept. 24, 2005) (noting break-out of price competition in Keller, Texas after telephone company entry).

\textsuperscript{18} See, \textit{e.g.}, R. B. Ekelund Jr. and R. D. Tollison, \textit{ECONOMICS 4th} (1994), at Ch. 5.

\textsuperscript{19} The \textit{cross-price elasticity of demand} measures the relationship of the quantity demanded of good X to the price of good Y (the \textit{cross price}).
where $E$ is negative since prices and quantities are inversely related.\footnote{See Ekelund and Tollison, supra n 19. In many cases, the absolute value of $E$ (or $|E|$) is used for expositional convenience, so the own-price elasticity of demand is sometimes reported as being positive. Interchanging the sign of $E$ is unproblematic since we know that $E$ is always negative.} If $E$ is more negative than -1.0, then demand is said to be elastic, implying a high sensitivity to price. Alternatively, demand is inelastic if $E$ is less negative than -1.0, indicating quantity is not very responsive to price. If $E$ is equal to -1.0, then demand is unit elastic, and the percentage change in quantity will exactly equal the percentage change in price.

These three classifications of demand elasticity correspond to the directional relationship of total revenues to price changes, where total revenue is simply the product of price and quantity (i.e., $PQ$).\footnote{Id. at 124.} If demand is elastic, then a price reduction increases total revenue, and a price increase reduces total revenue. For an inelastic demand, a price decrease reduces total revenue, but a price hike increases to revenue. In the case of unit elasticity, total revenue is unchanged when price changes.

A little algebra reveals that the percentage change in total revenue ($TR = PQ$) for a given percentage change in price is

\[
\%\Delta TR = (E + 1) \cdot \%\Delta P. \tag{2}
\]

Since the franchise fee applies to total revenues from video services, we can rewrite Equation (2) in terms of the tax base ($TB = TR$) to which the franchise fee applies:

\[
\%\Delta TB = (E + 1) \cdot \%\Delta P. \tag{3}
\]

From Equation (3) we see that any given percentage price decline ($\%\Delta P$), the tax base ($TB$) will rise as long as demand is elastic ($E$ is smaller, or more negative, than -1). If $E$ = -3, for example, then a 1% decline in price will increase the tax base by 2% [$= (-3+1)(-0.01)$].\footnote{Say price is $1 and quantity demanded is 100 units so that total revenue is $100. If price falls to $0.99 (a 1% reduction), then quantity demanded rises to 103 (a 3% increase, as implied by the elasticity of -3). Now, total revenue is $102 – a 2% revenue increase. For large price changes, it is better to use the arc elasticity formula (where percent changes are measured from the averages of the quantities and prices). Id.} Alternately, if $E$ = -0.5, which indicates inelastic demand, then that same 1% decline in price will shrink the tax base by 0.5% [$= (-0.5+1)(-0.01)$]. If the demand elasticity is -1.0, then total revenue is unaffected by the price change [$= (-1+1)(-0.01) = 0$].
Obviously, the impact of pending legislation on franchise fee revenues for local governments depends, in part, on the own-price elasticity of demand for multichannel video service. Presumably, the legislation facilitates entry in the multichannel video market, and entry leads to lower prices. In turn, these lower prices for video services affect the franchise fee tax base. So, an important question is: What is the own-price elasticity of demand for multichannel video service?

Recent studies consistently show that the own-price elasticity of demand for multichannel video service is elastic. Table 1 summarizes a few published estimates of the own-price elasticity of demand for cable television service in the past decade, including recent studies by the GAO.

<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
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<tr>
<td>GAO</td>
<td>2005</td>
<td>-2.7</td>
</tr>
<tr>
<td>GAO</td>
<td>2003</td>
<td>-1.5</td>
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<td>GAO</td>
<td>2002</td>
<td>-2.1</td>
</tr>
<tr>
<td>GAO</td>
<td>2000</td>
<td>-3.2</td>
</tr>
<tr>
<td>Beard, et al.</td>
<td>2005</td>
<td>-2.7</td>
</tr>
<tr>
<td>Chipty</td>
<td>2001</td>
<td>-5.9</td>
</tr>
<tr>
<td>Ford, et al.</td>
<td>1997</td>
<td>-2.4</td>
</tr>
<tr>
<td>Rubinovits</td>
<td>1993</td>
<td>-1.5</td>
</tr>
</tbody>
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In every study listed, the demand elasticity is elastic (smaller than -1), and significantly so (more negative than -2). The implication is clear: competition-induced price reductions for multichannel video service should expand the franchise fee tax base, and, as a consequence, franchise fee revenues. This expanded tax base is a significant part of the competition dividend created by the pending legislation.

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The figures in Table 1 do not tell the whole story. In a 2005 study by the GAO, the agency applied advanced econometric techniques to assess the nature of competition among terrestrial and DBS multichannel video providers. The results from the study are interesting. The GAO shows that DBS providers are not as effective as terrestrial providers in reducing cable television prices. Additionally, the GAO 2005 Study shows that DBS penetration is lower in markets with two terrestrial competitors, indicating that wireline competition in video markets steals market share from DBS providers. This gain in share by wireline services is important, since this shift of subscription from DBS providers to franchise fee-paying, wireline providers expands the tax base even further than the own-price demand elasticity suggests. In the next section, we use the GAO 2005 Study to approximate these dual effects on the tax base from wireline competition in multichannel video markets, and reveal that the basic elasticity calculation alone substantially understates the effect of the pending legislation on franchise fee revenues.

V. Estimating the Competition Dividend for Local Governments from Successful Wireline Video Entry

Based on the GAO 2005 Study, we can estimate the potential size of the “competition dividend” to local governments if telephone companies successfully enter the multichannel video market. We begin by computing the market demand for terrestrial cable systems and do so by multiplying the sample mean subscriber count (27,498) by the product of the mean overbuild statistic of 0.22 and the coefficient on the overbuild dummy variable of -1.42 \[= \exp(-1.42 \cdot 0.22) - 1\]. This calculation renders an average market quantity of 34,876 subscribers. Based on the \textit{mutatis mutandis} (or equilibrium) effects of a terrestrial overbuild, DBS penetration

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24 The NCTA has criticized a sophisticated 2003 GAO study of overbuilding on the basis that it only examined prices in a handful of areas where cable overbuild competition existed. See, e.g., NCTA October 11, 2005 Reply Comments filed in FCC Docket No. MB 05-255, \textit{In re Annual Assessment of the Status of Competition in the Market for the Delivery of Video Programming} (available at: http://www.ncta.com/pdf_files/101105_05-255_replies.pdf). The 2005 GAO Study, however, examined 113 overbuild situations and found significant price decreases from wireline-wireline competition. A draft of the 2005 GAO Study was made available by the GAO to the NCTA for comment, but NCTA did not provide (and still has not provided) any response or rebuttal to that study. GAO 2005 Study at 16 ("We provided a draft of this report to the National Cable and Telecommunications Association (NCTA) and the Satellite Broadcasting and Communications Association (SBCA) for their review and comment. NCTA provided no comments.").

25 \textit{Supra} n. 17.

26 \textit{Id.} at 15 ("The DBS penetration rate is lower in areas with wire-based cable competition, compared with areas without wire-based competition. In particular, we found that DBS penetration rates are about 37 percent lower in areas with wire-based cable competition compared with areas without wire-based competition.").
falls by about 15,256 subscribers (off a base of about 37,876 subscribers, a 40% reduction).  

Giving these defecting DBS subscribers back to the cable systems requires an adjustment. The cable penetration for the wireline cable system is about 15% in the GAO study, whereas the typical cable system penetration rate is about 60%. This discrepancy is not the result of a peculiar sample of cable systems, but rather a consequence of the GAO’s definition of franchised area. Our adjustment simply allocates these 15,000 subscribers across four cable systems (assuming a penetration for cable systems of about 60%).  

We add these additional subscribers to the average system (about 3,800 subscribers) in addition to the elasticity effect (based on the own-price elasticity of demand -2.626) from the equilibrium price reduction of 11.5% (for an elasticity effect of about 10,500 more subscribers). Thus, a terrestrial entrant reduces price by about 11.5% and increases quantity by about 41%. So, the quantity response to terrestrial competition in multichannel video markets is equivalent to an own-price demand elasticity of approximately -3.6 [= 0.41/-0.115].

With these inputs and Equation (3), we compute that the tax base for franchise fees will grow by about 30% [= (-3.6 + 1)(-.115)]. As a result, local franchise fee receipts would also rise by about 30% if the current franchise fee structure were maintained and successful wireline video competition occurs. Revenue neutrality in franchise tax revenues could be obtained by a tax of approximately 3.7% of gross revenues.

One benefit of a lower tax rate for revenue neutrality is the effect of taxes on entry. Taxes reduce the profits of firms, and, as we show in POLICY PAPER NO. 21, lower profits reduce the incentive to enter markets. Thus, reducing the maximum franchise fee to 3.7% may hold franchise fee revenues constant and encourage entry into video markets.

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27 The ceteris paribus effect of the overbuild is a price reduction of about 15.6% [= exp(-0.1694)-1]. But, the overbuild competition reduces quantity, increases quality, and affect DBS penetration, all of which affect, in turn, price. The mutatis mutandis (or equilibrium) effects are computed following the method prescribed in G. S. Ford and J. D. Jackson, On the Interpretation of Policy Effects from the Estimates of Simultaneous Systems of Equations, 30 APPLIED ECONOMICS 995-999 (1998). These effects include all the feedback effects across the four equations in the GAO’s econometric model. The mutatis mutandis price reduction (after all the feedback effects) is about 11.5%.

28 This is a conservative adjustment, since allocating the entire quantity of subscribers to a single cable system renders a much larger “elasticity.”

29 This approximation includes an adjustment for the expanded tax base due to the lower franchise tax (i.e., lower end-user prices).

30 Supra n. 7.
VI. Conclusion

The potential for a 30% rise in local franchise fee receipts due to new wireline video competition has two implications for policymakers considering changes to the nation’s communication laws:

First, applying the same franchise fee 5% rate to new wireline entrants, provided for in several bills pending before the 109th Congress, is far from “revenue neutral” and instead could swell the coffers of state and local governments. Critics who charge that pending legislation would harm local government tax revenues seem to have ignored this “competition dividend” entirely. A franchise fee level established with the expectation of only one monopoly provider must be re-examined when competition is introduced, as studies indicate that competition will vastly increase video industry revenues. To be truly revenue neutral, the federal government should consider lowering the current 5% to about 3.7%. Another way to ensure revenue neutrality after increased competition would be to limit the size of the tax base. Lower taxes induce entry, and entry in video markets is a worthwhile social goal.

Second, the size of the “competition dividend” depends on whether wireline video competition by telephone companies succeeds. Simply extending the tax to telephone company video services will not increase tax revenues unless competition succeeds and the result is an increase in total consumer video expenditures. As we have shown in other research, wireline video entry is tremendously hard to achieve, as a significant market share is needed in order to fund network investment in fiber. In order for local governments to reap the potential “competition dividend,” policymakers need to take a serious look at barriers like build-out requirements, the franchising process, and program access.

As a result, an approach that couples pro-entry policies with franchise fee reform could result in tremendous consumer benefits without necessarily reducing state and local tax revenues. Moreover, local government defenders perhaps have trained their sights on the wrong target – a more real threat to state and local franchise fee receipts may instead be the availability of subscription video streaming over the Internet that are not necessarily subject to franchise fees. The process of introducing competition to a market like multichannel video service calls for aggressive policies and approaches. As Congress debates the future legal structure of the multichannel video industry, state and local government advocates have argued for ostensibly-neutral policies that would extend current obligations on incumbent firms to new video entrants. This short analysis of the franchise fee shows that “neutrality” is, in fact, a moving target – applying the same 5% franchise fee to new telephone video entrants could increase state and local tax receipts significantly. Simply applying “the same old rules” to the new communications environment of today can have expected and unexpected consequences and be self-defeating. Accordingly, in setting video policy for new, multi-service fiber networks, policymakers should move forward with policies designed to encourage entry and choices for consumers.