

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554**

In the Matter of)	
)	
Special Access for Price Cap Local Exchange Carriers)	WC Docket No. 05-25
)	
AT&T Corporation Petition for Rulemaking to Reform Regulation of Incumbent Local Exchange Carrier Rates for Interstate Special Access Services)	RM-10593
)	

DECLARATION OF STANLEY M. BESEN AND BRIDGER M. MITCHELL

January 27, 2016

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**DECLARATION OF
STANLEY M. BESEN AND BRIDGER M. MITCHELL**

I. QUALIFICATIONS

1. My name is Stanley M. Besen. I have published widely on telecommunications economics and policy, intellectual property, and the economics of standards and have consulted to many companies in the telecommunications and information industries. I have served as a Brookings Economic Policy Fellow, Office of Telecommunications Policy, Executive Office of the President (1971-72); Co-Director, Network Inquiry Special Staff, Federal Communications Commission (1978-80); Coeditor, RAND Journal of Economics (1985-88); Senior Economist, RAND Corporation (1980-92); a member of the Editorial Board of Information Economics and Policy (1992-2004); and Vice President, Charles River Associates (1992-2008). I currently serve as a member of the Editorial Board of Economics of Innovation and New Technology. I have taught at Rice University (1965-1980), where I was the Allyn R. and Gladys M. Cline Professor of Economics and Finance; Columbia University (1988-1989), where I was the Visiting Henley Professor of Law and Business; and the Georgetown University Law Center (1990-1991), where I was Visiting Professor of Law and Economics. I hold a Ph.D. in Economics from Yale University (1964). My CV is included as Attachment A to this Declaration.
2. My name is Bridger M. Mitchell. I am an expert in competition and pricing in the telecommunications industry and have provided expert testimony, litigation support, and economic consulting services to numerous business and government clients. My research on major regulatory issues encompasses the theory and practice of telecommunications pricing, competition, and equal access in local telephone markets, interconnection in telecommunications networks, international telephone rates, pole attachment rates, and

broadcasting and cable television. I have developed pioneering models of the cost structure of a cable television firm and the incremental costs of local telephone networks. I taught economics at Stanford University, as Assistant Professor of Economics from 1966 to 1971 and as Acting Associate Professor of Economics in 1976, and at UCLA from 1973 to 1975 as Lecturer in Economics. From 1972 to 1994, I served as Senior Economist, RAND Corporation. From 1994 to 2008, I was a Vice President of Charles River Associates and, from 2008 to 2015, was a Senior Consultant to the firm. I hold a Ph.D. in Economics from the Massachusetts Institute of Technology. My CV is included as Attachment B to this Declaration.

II. OVERVIEW AND SUMMARY OF CONCLUSIONS

3. In order to “advance the public interest goals of just, reasonable, and nondiscriminatory rates,”¹ the Federal Communications Commission (“FCC” or “Commission”) implemented a system of price cap regulation for special access services provided by the largest incumbent local exchange carriers (“ILECs”) because it had concluded that ILECs dominated the provision of these services.² In the late 1990s, however, the Commission granted pricing flexibility to ILECs in limited geographic areas that were identified using “competitive showings (also referred to as ‘triggers’).”³ These triggers

¹ *Special Access for Price Cap Local Exchange Carriers*, Report and Order and Further Notice of Proposed Rulemaking, 27 FCC Rcd 16318, ¶ 2 (2012) (“2012 Data Collection Order” or “Further Notice”).

² *Policy and Rules Concerning Rates for Dominant Carriers*, Second Report and Order, 5 FCC Rcd 6786, ¶¶ 257-59 (1990), *aff’d*, *Nat’l Rural Telecom Ass’n v. FCC*, 988 F.2d 174 (D.C. Cir. 1993).

³ *Special Access for Price Cap Local Exchange Carriers*, Report and Order, 27 FCC Rcd 10557, ¶ 11 (2012) (“2012 Report and Order”) (describing grants of pricing flexibility).

were based not on the existence of actual competition but instead on predictions of future entry by new facilities-based suppliers in a sufficient number of ILEC wire centers in a Metropolitan Statistical Area (“MSA”). The Commission has now recognized that its triggers have resulted in granting ILECs pricing flexibility in areas that were not, in fact, competitive. In particular, the Commission has concluded that using an MSA as the geographic area to which to apply a trigger was too broad and, as a result, often contained areas where ILECs did not face significant competition.⁴ The Commission has also concluded that competitive conditions can vary greatly among different types of special access service⁵ and that the predictive judgments inherent in its triggers were flawed.⁶

4. Specifically, in its *Qwest Forbearance Order* in 2010, the Commission found that:
 - (a) wholesale loops and local transport are in separate markets;⁷
 - (b) circuits of differing capacities are likely to constitute separate markets;⁸
 - (c) each customer location is a separate market, although customers facing similar competitive choices could be aggregated “for reasons of administrative convenience”;⁹
 - (d) there were barriers to

⁴ *Id.* ¶¶ 35, 45 (finding that its “rules permitted MSA-wide relief on the basis of extremely concentrated demand in many instances” and noting that “contrary to the Commission’s prediction in 1999, MSAs have generally failed to reflect the scope of competitive entry,” which has been “far smaller than predicted”).

⁵ *See Petition of Qwest Corporation for Forbearance Pursuant to 47 U.S.C. § 160(c) in the Phoenix, Arizona Metropolitan Statistical Area*, Memorandum Opinion and Order, 25 FCC Rcd 8622, ¶ 49 (2010), *aff’d*, *Qwest Corp. v. FCC*, 689 F.3d 1214 (10th Cir. 2012) (“*Qwest Forbearance Order*” or “*Qwest*”).

⁶ *See generally 2012 Report and Order.*

⁷ *Qwest Forbearance Order* ¶ 48.

⁸ *Id.* ¶ 49.

⁹ *Id.* ¶ 64.

entry in the provision of special access services.¹⁰ Although the Commission found that there were insufficient data to identify the locations of competitive facilities or to calculate market shares for wholesale markets, it concluded, nonetheless, that there were no “significant alternative sources of wholesale inputs” in the Phoenix MSA.¹¹ It also found that there were many routes for which Qwest was the only provider¹² and that “Qwest [had] not demonstrated that there exists significant actual or potential competition for enterprise services by competitors that rely on their own last-mile connections to serve customers” in the Phoenix MSA.¹³

5. Having recognized the disparate nature of competitive supply within MSAs, as well as the need to distinguish among different types and capacities of special access services, the Commission proposes as one step in this proceeding to undertake a traditional market power analysis.¹⁴ This requires “a thorough analysis, which traditionally begins with a delineation of the relevant product and geographic markets, and then considers market characteristics, including market shares, the potential for the exercise of market power, and whether potential entry would be timely, likely, and sufficient to counteract the exercise of market power.”¹⁵

¹⁰ *Id.* ¶ 72.

¹¹ *Id.* ¶¶ 70, 76.

¹² *Id.* ¶ 77.

¹³ *Id.* ¶ 87.

¹⁴ *2012 Data Collection Order* ¶ 66.

¹⁵ *Qwest Forbearance Order* ¶ 28.

6. In order to carry out the traditional market power analysis, the Commission required special access providers and purchasers to submit a significant amount of data.¹⁶

Analyses of these data should enable the FCC to more accurately distinguish products and geographic areas where ILECs are subject to effective competition from products and geographic areas where ILECs retain significant market power.

7. In turn, the Commission will be able to make any necessary changes to its existing pricing regulations, or to develop new policies, that ensure that special access prices are just, reasonable, and nondiscriminatory. As the Commission has stated:

Once the data are collected and analyzed, we may modify the existing pricing flexibility rules or adopt a new set of rules that will apply to requests for special access pricing flexibility. . . . [W]e propose to adopt rules that will allow for the relaxation or even the elimination of price cap regulation where we find the presence of actual or potential competition sufficient to ensure that rates, terms and conditions for special access services remain just and reasonable. . . .¹⁷

The Commission also sought comment on “what steps the Commission should take where relief has been provided under our existing rules and where the data and our analysis demonstrate that competition is not sufficient to discipline the marketplace.”¹⁸

8. In this Declaration, we begin by discussing the conclusion, reached by the Commission and others, that special access product and geographic markets should be narrowly defined for purposes of measuring their competitiveness. We then summarize the results

¹⁶ See generally *2012 Data Collection Order*.

¹⁷ *Id.* ¶ 80.

¹⁸ *Id.* ¶ 57.

of our analyses of the data¹⁹ that have been submitted to the Commission and released for review by approved parties in the Secure Data Enclave.²⁰

9. We first report data on the *number* of competitive local exchange carriers (“CLECs”)²¹ that provide special access service both at individual locations and in census blocks. We then report *market shares* that are based on the *quantities* of special access services sold and on *revenues* from the sale of special access services. Based on our analyses of these data, we conclude that the vast majority of special access product and geographic markets are not effectively competitive.

III. THE RELEVANT PRODUCT AND GEOGRAPHIC MARKETS FOR SPECIAL ACCESS SHOULD BE DEFINED NARROWLY

10. In this Section, we describe the appropriate product and geographic markets for the purpose of our structural analysis of the data collected by the Commission. These market definitions follow the methodology used by the Commission and the antitrust agencies for competitive analysis. In particular, we emphasize the importance of analyzing, where possible, various separate special access product markets. We also stress the importance of analyzing geographic markets at a granular level, initially the individual building location, because use of overly broad geographic areas would significantly overestimate competition in many areas.

¹⁹ We have carried out our analyses in conjunction with the Brattle Group and SMG Consulting, who have filed a separate declaration that provides additional detail about the data sources that they have employed and the calculations that they have performed. Declaration of William P. Zarakas and Susan M. Gately (“Zarakas/Gately Decl.”).

²⁰ Because of concerns about the privacy of respondents and critical infrastructure security issues, not all of the data that the Commission collected were made available to reviewing parties.

²¹ See Zarakas/Gately Decl. ¶ 12.

11. **Product Markets.** As Mitchell has explained in this proceeding, for a special access customer, “channel termination and channel mileage are not substitutes . . . [and] therefore [are] distinct product markets.”²² Mitchell further has explained that “[c]hannel termination and channel mileage products are also distinguished by differences in capacity.”²³ DS1 and DS3 services, which are provided using TDM technology, are effectively in separate product markets because, at the normally prevailing market prices, a small but significant and non-transitory increase in the DS1 price would not cause purchasers of DS1 service to substitute purchases of DS3 service.²⁴
12. Although special access services historically have been circuit-based, carriers are increasingly using packet-based services, such as Ethernet products, to supply dedicated access links. Where carriers offer packet-based services that users regard as substitutes for TDM-based circuits they should be considered part of the same product market. Moreover, if, in response to a price increase by a hypothetical monopolist of DS3 service, enough customers would choose to purchase packet-based service in lieu of purchasing one or more TDM-based DS3 circuits and thereby make the price increase

²² Declaration of Bridger M. Mitchell, attached to Comments of Sprint Nextel Corporation, WC Docket No. 05-25, ¶ 50 (Jan. 19, 2010) (“2010 Mitchell Decl.”). Note that special access backhaul service supplied at the cell sites of wireless carriers is in the same product market as special access service of similar bandwidth supplied to other purchasers in the same geographic market.

²³ *Id.* ¶ 51.

²⁴ Competitive supply of stand-alone DS1 channel terminations is rarely economic. However, a DS3 circuit is functionally equivalent to 28 DS1 circuits and, if a carrier has DS3 channel termination facilities, it can channelize them to provide DS1 service. Thus, the availability of DS3 services in a geographic market can potentially constrain DS1 channel termination prices.

unprofitable, the products should be viewed as part of the same relevant market.

Conversely, at the point at which differences between a packet-based service and a high-capacity circuit-based service are so substantial that enough customers would not switch services in response to a price increase to make the increase unprofitable, the products should not be considered to be in the same antitrust market.

13. Note that, for the purpose of determining actual or potential competition, it does not matter whether circuit-based and packet-based services are in the same market if the ILEC is the only provider of both services or is one of a small number of providers and has very large market shares of both services. In that circumstance, Commission intervention would be needed to prevent the exercise of market power with respect to both types of service.
14. The conclusions we set forth above are based on the widely accepted conclusion that different special access products should be treated as different relevant antitrust product markets. As previously noted, the Commission found in *Qwest* that: (a) loops and dedicated local transport are in distinct product markets;²⁵ and (b) circuits of differing capacities are likely to be in separate product markets.²⁶ Similarly, in connection with the AT&T/BellSouth merger, the Commission noted that the “services provided over different segments of special access (*e.g.*, channel terminations and local transport) constitute separate relevant product markets, which may be subject to varying levels of

²⁵ *Qwest Forbearance Order* ¶ 48.

²⁶ *Id.* ¶ 49.

competition . . . [and that], in general, different capacity circuits are likely to constitute separate relevant product markets as well.”²⁷

15. This view also has been expressed by others that have analyzed the supply of special access services. For example, the Government Accountability Office (“GAO”) analyzed prices in the special access marketplace separately for channel terminations, interoffice mileage, DS1, and DS3 service.²⁸ In a later report, the National Regulatory Research Institute (“NRRI”) “found that . . . the level of competition varies by location, circuit capacity, and service component.”²⁹
16. Note that services provided on a “best-efforts” basis are not regarded by most purchasers as substitutes for special access dedicated circuits at guaranteed service levels.³⁰ Thus, “best efforts” services should not be included in the special access product market.
17. **Geographic Markets.** The Commission has concluded that analyzing competitive conditions for special access service in MSAs can be highly misleading because these

²⁷ *AT&T Inc. and BellSouth Corporation, Application for Transfer of Control*, Memorandum Opinion and Order, 22 FCC Rcd 5662, ¶ 30, n.94 (2007).

²⁸ United States Government Accountability Office, *FCC Needs to Improve Its Ability to Monitor and Determine the Extent of Competition in Dedicated Access Services*, GAO-07-80, at Appendix II, *Analysis of Average Revenue Data and List Prices* (Nov. 2006) (“GAO Report”).

²⁹ P. Bluhm and R. Loube, *Competitive Issues in Special Access Markets*, National Regulatory Research Institute, at iii (rev. ed. first issued Jan. 21, 2009), attached to Letter from James Bradford Ramsay, National Association of Regulatory Utility Commissioners, to Marlene H. Dortch, FCC Secretary, WC Docket No. 05-25 (June 12, 2012). The authors also concluded that the “FCC should . . . recognize that circuit capacity is an important variable in competition, differentiate between markets for channel terminations and markets for interoffice transport, and adopt a finer geographic scale than the MSA for measuring the competitiveness of special access markets.” *Id.* at v.

³⁰ *See, e.g.*, Declaration of James A. Anderson, ¶ 10, attached to Comments of XO Communications, WC Docket No. 05-25 (Feb. 11, 2013).

large areas often contain smaller geographic areas across which competitive conditions are widely disparate. For example, the Commission noted in its *UNE Order* that it had:

[P]reviously determined that a geographic area as large as a MSA is so large and varied that such a grouping is prone to significantly overbroad impairment determinations . . . [and that], even if transport facilities are widely deployed throughout part of an MSA . . . , it would be inappropriate to infer a lack of impairment on every route in every part of that MSA. . . . Due to the wide variability in market characteristics within an MSA, MSA-wide conclusions would substantially over-predict the presence of actual deployment, as well as the potential ability to deploy.³¹

18. In the same *Order*, the Commission concluded that “an MSA-wide approach . . . would require an inappropriate level of abstraction, lumping together areas in which the prospects for competitive entry are widely disparate.”³² Similarly, in the *2012 Report and Order*, the Commission found that “highly concentrated demand [occurs] in areas far smaller than the MSA.”³³

19. As Mitchell previously noted, the appropriate geographic market for analyzing special access channel terminations is the building location:

The Merger Guidelines’ test suggests that the relevant special access geographic market for channel termination service is the building in which the customer is located. . . . A larger area – multiple buildings or the area served by a wire center – would be excessively large, because the customer’s cost of switching to service available at a different building would not prevent the hypothetical monopoly supplier of the building from sustaining a price increase in that building.³⁴

³¹ *Unbundled Access to Network Elements; Review of the Section 251 Unbundling Obligations of Incumbent Local Exchange Carriers*, Order on Remand, 20 FCC Rcd 2533, ¶ 82 (2005).

³² *Id.* ¶ 155.

³³ *2012 Report and Order* ¶ 36.

³⁴ 2010 Mitchell Decl. ¶ 35.

20. There is broad agreement with this position. For example, in the *Further Notice*, the Commission reiterated that “[c]ompetition in the provision of special access appears to occur at a very granular level – perhaps as low as the building/tower.”³⁵ Similarly, the Commission has concluded that:

[T]he relevant geographic market is a particular customer’s location, because it would be prohibitively expensive for an enterprise customer to move its office location in order to avoid small but significant and nontransitory increases in the price of special access services, and because there are significant entry barriers to putting competitive last-mile facilities into place.³⁶

21. The GAO also concluded that “the FCC’s competitive triggers – which look at competition at the wire center level – may not adequately predict competition at the building level throughout an MSA” and therefore that “the extent of competitive entry in a market [should be analyzed] at the level of individual buildings.”³⁷

IV. A TRADITIONAL MARKET POWER ANALYSIS DEMONSTRATES THAT ILECS DO NOT FACE EFFECTIVE COMPETITION IN THE VAST MAJORITY OF SPECIAL ACCESS PRODUCT AND GEOGRAPHIC MARKETS

22. Below, we report the results of our market power analysis. In particular, we set forth the results of various analyses that we undertook to measure the presence of suppliers of special access services and to calculate their market shares for these services. All of these analyses resulted in the same finding, namely that, in the vast majority of special access product and geographic markets, the incumbent LECs do not face effective competition.

³⁵ *Further Notice* ¶ 22.

³⁶ *Wavecom Solutions Corporation, Transferor, and Hawaiian Telcom, Inc., Transferee, Applications for Consent to Transfer Control*, Memorandum Opinion and Order and Declaratory Ruling, 27 FCC Rcd 16081, ¶ 12 (2012). *See also, e.g., Qwest Forbearance Order* ¶ 64.

³⁷ GAO Report at 19, 22.

23. We have attempted to perform our analyses for product and geographic markets that conform to markets that would be appropriate for a traditional market power analysis. However, in some cases, the manner in which the data were reported to the Commission made it necessary for us to report results for markets that are somewhat more aggregated than would be ideal. For that reason, the shares that we report below are for markets that we have been able to define using the data that the Commission has collected. For example, although we had originally intended to analyze separate markets for channel termination and channel mileage, we were unable to do so because of the nature of the data submitted to the Commission.³⁸ However, based on the fact that, *in all cases*, the more aggregated markets that we have examined are highly concentrated, it is unlikely that our finding would be different if we had analyzed markets that were more narrowly defined.

A. The Presence of Suppliers of Special Access Services

24. The Commission has concluded that information on the location where an end user customer is connected “is critical in determining how and where competition for special access services exists or is likely to develop.”³⁹ It has further concluded that

³⁸ For a more complete discussion, the reader is referred to the Zarakas/Gately Declaration.

³⁹ See *Special Access for Price Cap Local Exchange Carriers*, Report and Order, 28 FCC Rcd 13189, ¶ 20 (2013). Note that some connections identified by the Commission may in fact be “idle” – *i.e.*, they are links to customer locations that have not been purchased. In such cases, the connections are sources of potential competition. According to the Commission’s data request, “*Location* means a building, other man-made structure, a cell site on a building, a free-standing cell site, or a cell site on some other man-made structure where the *End User* is connected.” *Special Access for Price Cap Local Exchange Carriers*, Order on Reconsideration, 29 FCC Rcd 10899, App. A, § 1 (2014) (“*2014 Order on Reconsideration*”). A *Location* is distinguished from a “*Node* [which] is an aggregation point, a branch point, or a point of interconnection on a *Provider*’s network, including a point of interconnection to other *Provider* networks.” *Id.* Indeed, the data request makes clear that “a *Node* is not a *Location*.” *Id.*

competition from providers that own facilities is necessary to discipline market prices. For example, in *Qwest*, the Commission specifically noted Qwest’s failure to demonstrate actual or potential competition from competitors “that rely on their own last-mile connections to serve customers.”⁴⁰ For this reason, we considered only facilities-based – or “owned” – connections in the analyses below.⁴¹

25. *CLECs with Competing Facilities at Purchaser Locations.* We begin by analyzing the number of CLECs that report facilities at a special access purchaser location.

Table 1
Percentage of CLEC Providers at Purchaser Locations⁴²

ILEC Only	*** BEGIN HIGHLY CONFIDENTIAL ***	
ILEC and 1 CLEC		
ILEC and 2 CLECs		
ILEC and 3+ CLECs		

*** END HIGHLY CONFIDENTIAL ***

26. We find that *** BEGIN HIGHLY CONFIDENTIAL *** [REDACTED] *** END HIGHLY CONFIDENTIAL *** of special access purchaser locations are served by a single ILEC with no other facilities-based supplier reported present.

Locations where there are only two suppliers with special access facilities – an ILEC

⁴⁰ *Qwest Forbearance Order* ¶ 87.

⁴¹ In all calculations reported in this Declaration, Indefeasible Right of Use (“IRU”) facilities are treated as CLEC-owned and Unbundled Network Element (“UNE”) and Unbundled Copper Loops (“UCL”) facilities are treated as ILEC-owned.

⁴² See Zarakas/Gately Decl., Panel 5B. Purchasers are entities that buy a Dedicated Service in a price cap area and include “ILECs, [CLECs], cable system operators, wireless providers, satellite service providers, international service providers to and from points in the United States, interconnected and non-interconnected VoIP providers, and certain information service providers such as Internet access providers.” *2014 Order on Reconsideration* at App. C.

and a competing carrier – account for *** BEGIN HIGHLY CONFIDENTIAL ***

*** END HIGHLY CONFIDENTIAL *** of purchaser locations.⁴³

Thus, almost all purchaser locations, *** BEGIN HIGHLY CONFIDENTIAL ***

*** END HIGHLY CONFIDENTIAL ***, are served by only one or two

suppliers. At only *** BEGIN HIGHLY CONFIDENTIAL ***

END HIGHLY CONFIDENTIAL *** of all locations are there as many as three

suppliers, and at *** BEGIN HIGHLY CONFIDENTIAL ***

END HIGHLY CONFIDENTIAL *** are there four or more suppliers.

- 27. *CLECs with Nearby Purchasers.* Even if one were to expand the geographic market to the census block level to account for potential competition, there still would be few areas in which there are four or more suppliers.

Table 2
Percentage of Census Blocks with ILECs and CLECs Providing Service⁴⁴

ILEC Only	*** BEGIN HIGHLY CONFIDENTIAL ***	
CLEC Only		
ILEC and 1 CLEC		
ILEC and 2 CLECs		
ILEC and 3+ CLECs		

*** END HIGHLY CONFIDENTIAL ***

Note: Percentages do not sum to 100% because of rounding.

⁴³ Calculations that report overall ILEC shares include data for all ILECs, not only those for which individual shares are reported.

⁴⁴ Zarakas/Gately Decl., Panels 4A & 4B.

28. Specifically, the proportion of census blocks in which the ILEC is the only supplier is

*** BEGIN HIGHLY CONFIDENTIAL *** [REDACTED] *** END

HIGHLY CONFIDENTIAL ***.⁴⁵ CLECS are the only supplier in *** BEGIN

HIGHLY CONFIDENTIAL *** [REDACTED] *** END HIGHLY

CONFIDENTIAL *** of census blocks. Similarly, *** BEGIN HIGHLY

CONFIDENTIAL *** [REDACTED] *** END HIGHLY

CONFIDENTIAL *** of census blocks are served by an ILEC and a single CLEC and

*** BEGIN HIGHLY CONFIDENTIAL *** [REDACTED] *** END

HIGHLY CONFIDENTIAL *** of census blocks are served by an ILEC and two

CLECs. *** BEGIN HIGHLY CONFIDENTIAL *** [REDACTED] *** END

HIGHLY CONFIDENTIAL *** of census blocks have four or more suppliers of

special access services.

29. For purposes of this analysis, we conservatively treat all CLECs that offer service to a single location in a census block as serving the entire block. We note, however, that this approach is likely to overstate potential competition at many purchaser locations. The provision of service to some purchasers in a census block is not necessarily an indication that a competitor can serve all buildings in that census block, or even that the “potential competitor” provides the same special access service as the ILEC.

30. Moreover, use of the data compiled by the Commission from facility maps submitted by CLECs, which simply provide information about the census blocks in which a CLEC

⁴⁵ When the FCC data are organized by bandwidth, the ILECs are the only suppliers of bandwidth in *** BEGIN HIGHLY CONFIDENTIAL *** [REDACTED] *** END HIGHLY CONFIDENTIAL *** of all census blocks in which they provide service. See Zarakas/Gately Decl., Table 6.

has fiber-optic facilities (“fiber”), similarly would be inappropriate for purposes of assessing potential competition. A CLEC may have installed fiber in a census block but may not be able to serve any locations therein because, for example, it may not operate an interconnection point within the census block. Moreover, a CLEC’s network facilities often may be located at such a distance from the customer that the CLEC would be unable to recoup the costs of extending its network facilities from future sales.⁴⁶ Notably, we find that in fewer than ***** BEGIN HIGHLY CONFIDENTIAL ***** of the census blocks in which the FCC reports that at least one CLEC has fiber does any CLEC actually provide service to a purchaser.⁴⁷

31. Collectively, the analyses outlined above demonstrate that, in the vast majority of purchaser locations and census blocks, there are fewer suppliers of special access service than are necessary for a fully competitive outcome. We base this conclusion on the observation that the presence of more than two suppliers is necessary to achieve a competitive outcome. We describe how the economic literature supports this conclusion

⁴⁶ The distance of a CLEC fiber node from a customer location would provide useful information about potential competition. For that reason, we will supplement our analysis by analyzing data on the proximity of customer locations to the facilities of competitive suppliers if the Commission decides to provide the data necessary to perform this analysis in this proceeding. Our current analysis overestimates potential competition because it assumes that a CLEC with customers anywhere in a census block is a potential competitor for any building in that census block.

⁴⁷ The Commission reports CLEC fiber facilities in ***** BEGIN HIGHLY CONFIDENTIAL ***** census blocks, while we find that CLECs actually serve purchasers in ***** BEGIN HIGHLY CONFIDENTIAL ***** census blocks. *See* Zarakas/Gately Decl., Table 8.

below.⁴⁸ Both the Commission⁴⁹ and the Department of Justice⁵⁰ have indicated that at least four suppliers are necessary for competition, and we generally have employed this threshold in discussing our results. Our conclusion, however, would be little changed if instead we had assumed that only three competitors were sufficient to achieve competitive outcomes. In *** **BEGIN HIGHLY CONFIDENTIAL** *** 

⁴⁸ See discussion *infra* at ¶¶ 45-47.

⁴⁹ See, e.g., *Policies Regarding Mobile Spectrum Holdings, Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions*, Report and Order, 29 FCC Rcd 6133, ¶ 1 (2014) (“Today, 92 percent of non-rural consumers, but only 37 percent of rural consumers, are covered by *at least four* 3G or 4G mobile wireless providers’ networks. The policies that we adopt today aim to address this discrepancy and ensure that all Americans, regardless of whether they live in an urban, suburban, or rural area, can *enjoy the benefits that competition provides.*”) (emphasis added); *Applications of AT&T Inc. and Centennial Communications Corp.; For Consent to Transfer Control of Licenses, Authorizations, and Spectrum Leasing Arrangements*, Memorandum Opinion and Order, 24 FCC Rcd 13915, ¶ 76 (2009) (“After performing a market-by-market analysis, we find, in the great majority of the 27 markets identified by the initial screen, no competitive concerns requiring remedy. For instance, in most of these markets, there would be *four or more competitors* present post-transaction with thoroughly built-out networks and the ability to offer competitive services.”) (emphasis added); *Application of AT&T Mobility Spectrum LLC and Consolidated Telephone Company for Consent to Assign Licenses*, Memorandum Opinion and Order, 30 FCC Rcd 9797, ¶ 19 (2015) (“We find that, notwithstanding the fact that AT&T would hold more than one-third of the below-1-GHz spectrum post-transaction in this local market, the likelihood of competitive harm is low when evaluating the particular factors ordinarily considered. The *three other nationwide service providers*, Sprint, T-Mobile, and Verizon Wireless, each have significant market shares in this rural market.”) (emphasis added).

⁵⁰ Complaint, *U.S. v. AT&T, Inc.*, No. 1:11-CV-01560, ¶ 41 (D.D.C. filed Aug. 31, 2011) (“In the national market for mobile wireless telecommunications services provided to enterprise and government customers, the proposed transaction effectively would reduce the number of significant competitors *from four to three*. . . . The reduction in the number of bidders for enterprise and government contracts *to three* . . . significantly increases the risk of anticompetitive effects.”) (emphasis added); *Ex Parte* Submission of the United States Department of Justice, GN Docket No. 09-51, at 15 (Jan. 4, 2010) (“Based in large part on its extensive experience in evaluating horizontal mergers, the Department [of Justice] starts from the presumption that in highly concentrated markets consumers can be significantly harmed when the number of strong competitors declines from *four to three*, or three to two. This same experience teaches us that consumers can enjoy substantial benefits when the number of strong competitors rises from two to three, or *three to four*, especially if the additional competitor offers products based on a new and distinct technology.”).

██████████ ***** END HIGHLY CONFIDENTIAL ***** of census blocks in which special access service is supplied, fewer than three facilities-based providers had any special access purchasers, and there is little need to consider the competitiveness of a marketplace in which only two suppliers are present. As the Commission noted in *Qwest*, the assumption “that a duopoly always constitutes effective competition and is necessarily sufficient to ensure just, reasonable, and nondiscriminatory rates” is “inappropriate.”⁵¹ Moreover, fewer than three facilities-based providers supplied service at ***** BEGIN HIGHLY CONFIDENTIAL ***** ██████████ ***** END HIGHLY CONFIDENTIAL ***** of purchaser locations.

B. Special Access Share Analysis

32. Although counts of the number of CLECs *that serve any purchasers* using their own facilities are better measures of competitiveness than are counts based on whether a CLEC has facilities in an area, they provide little information about the extent to which CLECs have *actually captured market share*. In particular, the fact that a CLEC serves at least one purchaser in a census block gives no indication of the magnitude of that CLEC’s sales volumes and revenues within that area.
33. In attempting to measure competitiveness, we were able to assign a large percentage of special access purchasers to census blocks. This enabled us to calculate market shares based on the *quantities*, measured by total bandwidth, of special access services sold at the census block level.
34. We also were able to calculate revenue-based market shares for the areas comprised by the footprint (the total area in which the ILEC is the incumbent local carrier) of each of

⁵¹ *Qwest Forbearance Order* ¶ 29.

the major ILECs, both for all special access services sold and for individual special access services.⁵² Within the footprint of a single ILEC, the presence of CLEC facilities varies greatly. Thus, these ILEC-footprint revenue-based shares are likely to overstate significantly the extent of competition in many smaller geographic areas.

35. In performing our calculations of both bandwidth-based and revenue-based market shares, we assigned to CLECs only the sales that were made using their own facilities.
36. ***Bandwidth-Based Concentration.*** For the analysis set forth below, we used data on the total bandwidth that was supplied to customer locations that could be determined.

⁵² Because we found that a very large percentage of the carrier *billing* data that were collected by the Commission were missing usable purchaser location data, we were unable to calculate market shares based on *revenues* at the census block level. Although we believe that some of these data are for interoffice transport with no identifiable locations, the ILECs' "explanatory notes" indicate that the ILECs themselves do not know many purchaser locations. As a result, we do not know which missing locations to assign to transport and which to treat as unknown. For that reason, we are unable to calculate revenue-based market shares at a more granular geographic level at this time.

**Table 3
Distribution of Firm Concentration (HHI) Based on Bandwidth Sold⁵³**

Census Blocks in Which an ILEC Provides Special Access		All Census Blocks in Which Special Access Is Provided	
HHI	Number	Percentage	Percentage

***** BEGIN HIGHLY CONFIDENTIAL *****



***** END HIGHLY CONFIDENTIAL *****

37. We find that, in all census blocks where special access service is provided by an ILEC, the Herfindahl-Hirschman Index (“HHI”) is 10,000 in ***** BEGIN HIGHLY CONFIDENTIAL ***** of census blocks; between 7,500 and 10,000 in ***** BEGIN HIGHLY CONFIDENTIAL *****; between 5,000 and 7,500 in ***** BEGIN HIGHLY CONFIDENTIAL *****; and between 2,500 and 5,000 in ***** BEGIN HIGHLY CONFIDENTIAL *****. Thus, the HHI exceeds 5,000 in ***** BEGIN HIGHLY CONFIDENTIAL *****.

⁵³ See Zarakas/Gately Decl., Panels 7A & 7B.

CONFIDENTIAL *** of census blocks. Importantly, the Merger Guidelines characterize a market with an HHI above 2500 as “Highly Concentrated,” and the HHIs in *** **BEGIN HIGHLY CONFIDENTIAL** *** [REDACTED] [REDACTED] *** **END HIGHLY CONFIDENTIAL** *** census blocks exceed this threshold, in most by a very substantial amount.⁵⁴

38. Moreover, these measures of concentration change very little when one also takes into account census blocks in which CLECs are the only provider(s). Specifically, we find that, in all census blocks where special access service is provided by either a CLEC or an ILEC, the HHI is 10,000 in *** **BEGIN HIGHLY CONFIDENTIAL** *** [REDACTED] [REDACTED] *** **END HIGHLY CONFIDENTIAL** *** of census blocks; between 7,500 and 10,000 in *** **BEGIN HIGHLY CONFIDENTIAL** *** [REDACTED] [REDACTED] *** **END HIGHLY CONFIDENTIAL** ***; and between 5,000 and 7,500 in *** **BEGIN HIGHLY CONFIDENTIAL** *** [REDACTED] [REDACTED] *** **END HIGHLY CONFIDENTIAL** ***. Thus, the HHI exceeds 5,000 in over *** **BEGIN HIGHLY CONFIDENTIAL** *** [REDACTED] [REDACTED] *** **END HIGHLY CONFIDENTIAL** *** of census blocks. Again, *** **BEGIN HIGHLY CONFIDENTIAL** *** [REDACTED] [REDACTED] [REDACTED] *** **END HIGHLY CONFIDENTIAL** *** census blocks exceed the threshold for being deemed “Highly Concentrated.”
39. **Revenue-Based Shares.** As noted, we calculated revenue-based shares at the “footprint” level for each of the major ILECs both for all special access services sold and for five bandwidth “buckets.” This degree of aggregation was necessary due to the manner in

⁵⁴ U.S. Department of Justice and the Federal Trade Commission, *Horizontal Merger Guidelines*, ¶ 5.3 (Aug. 19, 2010), <http://www.justice.gov/atr/horizontal-merger-guidelines-08192010>.

which the data were supplied to the Commission and is likely to overestimate competition in many smaller geographic areas.

Table 4
ILEC Share of Special Access Revenues in Its Territory⁵⁵

ILEC	Revenue Share
Verizon	*** BEGIN HIGHLY CONFIDENTIAL ***
AT&T	
CenturyLink	
Frontier	
Windstream	
Others	
Weighted-Average ILEC Share	*** END HIGHLY CONFIDENTIAL ***

40. These data show that the weighted-average ILEC share of revenues of all special access services combined is *** BEGIN HIGHLY CONFIDENTIAL *** with a relatively small variation among carriers.⁵⁷ For example, Verizon’s share is *** BEGIN HIGHLY CONFIDENTIAL

⁵⁵ See Zarakas/Gately Decl., Panel 3F. The revenues of an ILEC-owned CLEC entity that operates in that ILEC’s footprint have been included in the ILEC’s revenues. See *id.* ¶ 11(c).

⁵⁶ As noted in the Zarakas/Gately Declaration, the calculation of the total ILEC revenue percentage included all CLEC circuits that could not be mapped to an ILEC footprint. As a result, the total ILEC share is less than the weighted average of the individual ILEC shares.

⁵⁷ Note that a share of *** BEGIN HIGHLY CONFIDENTIAL *** implies an HHI no smaller than *** BEGIN HIGHLY CONFIDENTIAL *** – that would be the case if there were a very large number of CLECs none of which had a significant market share – but the HHI in a “typical” market is almost certainly substantially higher.

*** [REDACTED] *** END HIGHLY CONFIDENTIAL *** and
Windstream’s share is *** BEGIN HIGHLY CONFIDENTIAL *** [REDACTED]
[REDACTED] *** END HIGHLY CONFIDENTIAL *** AT&T’s share is about ***
BEGIN HIGHLY CONFIDENTIAL *** [REDACTED] *** END HIGHLY
CONFIDENTIAL ***

Table 5
ILEC Share of Special Access Revenues by Bandwidth⁵⁸

Bandwidth	ILEC Share of Revenues
0-10 Mbps	*** BEGIN HIGHLY CONFIDENTIAL *** [REDACTED]
10-50 Mbps	[REDACTED]
50-200 Mbps	[REDACTED]
200-800 Mbps	[REDACTED]
Above 800 Mbps	[REDACTED]

*** END HIGHLY CONFIDENTIAL ***

41. When disaggregated into bandwidth “buckets,” ILEC revenues account for about ***
BEGIN HIGHLY CONFIDENTIAL *** [REDACTED] *** END HIGHLY
CONFIDENTIAL *** of special access revenues for 0-10 Mbps service, *** BEGIN
HIGHLY CONFIDENTIAL *** [REDACTED] *** END HIGHLY
CONFIDENTIAL *** for 10-50 Mbps, *** BEGIN HIGHLY CONFIDENTIAL
*** [REDACTED] *** END HIGHLY CONFIDENTIAL *** for 50-200 Mbps,
*** BEGIN HIGHLY CONFIDENTIAL *** [REDACTED] *** END HIGHLY
CONFIDENTIAL *** for 200-800 Mbps, and *** BEGIN HIGHLY

⁵⁸ Zarakas/Gately Decl., Table 3.

CONFIDENTIAL *** [REDACTED] *** END HIGHLY CONFIDENTIAL *** for

bandwidths greater than 800 Mbps. As discussed in somewhat more detail below,⁵⁹ the fact that CLECs have captured a portion of revenues from the provision of special access services should not be interpreted to mean that they act as a significant constraint on ILEC prices for those services.

42. As noted above, irrespective of the way in which special access services are assigned to antitrust markets, the same findings emerge: each of these services is supplied in markets that are highly concentrated and the ILECs generally face little or no competition in their provision of special access services. In particular, the data that we have analyzed support the following conclusions. First, in many areas, there are no providers with facilities that can provide special access services that compete with those of the ILEC.⁶⁰ Second, even in areas where CLEC providers have facilities, many have failed to acquire any special access purchasers.⁶¹ Third, CLECs with purchasers of special access services tend to be few in number in many areas,⁶² such that the competition faced by the ILECs is often not as intense as they claim.⁶³ Fourth, the

⁵⁹ See ¶ 48 *infra*.

⁶⁰ See ¶ 28 *supra* (showing that there is a single facilities-based supplier in the majority of census blocks).

⁶¹ See ¶ 30 *supra* (showing that there are no CLECs with customers in many census blocks where CLEC fiber is present).

⁶² See ¶ 28 *supra* (showing that, even in census blocks where CLECs have customers, they tend to be few in number).

⁶³ See, e.g., Letter from Keith M. Krom, AT&T General Attorney & Associate General Counsel, to Marlene H. Dortch, FCC Secretary, WC Docket No. 05-25, at 2 (filed Oct. 13, 2015) (asserting that there are “many alternatives to price cap LEC offerings” and that “evidence abounds that special access competition has become even more intense”); Letter from Diane Griffin Holland and Patrick S. Brogan, USTelecom, to Marlene H. Dortch, FCC Secretary, WC Docket No. 05-25, at 2 (filed Sept. 24, 2015) (claiming that “the marketplace for special access and high-capacity services is robust and highly-competitive”); Letter from Curtis L. Groves,

ILECs still continue to capture a very large share of all special access service volumes in the great majority of census blocks, which is a further indication of the limited competition that they often face.⁶⁴

V. THE ECONOMIC LITERATURE CONCLUDES THAT SEVERAL PROVIDERS ARE NEEDED TO CONSTRAIN PRICING

43. A substantial body of empirical evidence concludes that high firm concentration often leads to higher prices. The preponderance of this evidence suggests that markets with a small number of firms, or markets in which a few firms have very large market shares, tend to have higher prices than those in which concentration is lower. As we have shown above, in the case of special access, the ILEC is the only service provider in the vast majority of building locations and there are no more than two facilities-based providers in the vast majority of significantly larger census block areas.
44. Schmalensee succinctly summarizes the results of this literature: “In cross-section comparisons involving markets in the same industry, seller concentration is positively related to the level of prices.”⁶⁵ Similarly, Sutton observes that the idea that “a fall in concentration will lead to a fall in prices and price-cost margins is well supported both theoretically and empirically.”⁶⁶ Pautler observes that “several studies of price/concentration relationships indicate that prices are higher where concentration is

Verizon, to Marlene H. Dortch, FCC Secretary, WC Docket No. 05-25 (filed Sep. 24, 2015) (describing extensive competition from cable providers, CLECs, and fixed wireless providers).

⁶⁴ See n.45 *supra*.

⁶⁵ R. Schmalensee, “Inter-Industry Studies of Structure and Performance,” *Handbook of Industrial Organization*, Vol. II, R. Schmalensee and R.D. Willig (Editors), Amsterdam: North-Holland, 1989, p. 988.

⁶⁶ J. Sutton, “Market Structure: Theory and Evidence,” in *Handbook of Industrial Organization*, Vol. III, M. Armstrong and R.H. Porter (editors), North-Holland, 2007, p. 2307.

higher or the number of sellers is lower.”⁶⁷ Finally, Coates and Hubbard note that “empirical studies of auction markets and various industries, such as airlines, railroads, books, and pharmaceuticals, show prices declining as the number of bidders or rivals increases and as concentration of sales in a few firms declines.”⁶⁸

45. With respect to the number of competitors that are needed to discipline pricing effectively, the economic literature generally supports a finding that many competitors are required and that each additional competitor’s incremental effect on price diminishes as the number of competitors increases. For example, in food retailing, Lamm found that “it is clear that growth in the 3 largest firms’ shares have a significant positive effect on prices,” while “an increase in the market share of the *fourth largest firm* causes a reduction in food prices.”⁶⁹ Similarly, in a recent analysis of the determinants of the sale prices of condominium apartments, Hungria-Gunnelin found that the “effect of the number of bidders . . . is strongly significant” – “starting at one bidder, the increase in price when adding one more bidder is 3.9 percent and the corresponding increase when going from five to six bidders is 1.9 percent.”⁷⁰ Brannman, Klein and Weiss found “a systematic tendency for the winning bid to decline as the number of bidders [to

⁶⁷ P.A. Pautler, “Evidence on Mergers and Acquisitions,” *The Antitrust Bulletin*, 2003, pp. 188-89.

⁶⁸ J.C. Coates and R.G. Hubbard, “Competition in the Mutual Fund Industry: Evidence and Implications for Policy,” John M. Olin Center for Law, Economics, and Business, Harvard University, Discussion Paper No. 592, August 2007, p.11.

⁶⁹ R.M. Lamm, “Prices and Concentration in the Food Retailing Industry,” *Journal of Industrial Economics*, 1981, p. 75 (emphasis added).

⁷⁰ R. Hungria-Gunnelin, “Impact of Number of Bidders on Sale Price of Auctioned Condominium Apartments in Stockholm,” *International Real Estate Review*, Vol. 16, No. 3, pp. 274-95.

underwrite tax exempt bonds] increases”⁷¹ and that even the effect of adding an 8th bidder was statistically significant.⁷²

46. Using a different approach, Geithman, Marvel, and Weiss attempted to identify a “critical” level of concentration, the level at which prices begin to increase in particular industries.⁷³ In gasoline retailing, they found a critical two-firm concentration ratio of about 35 percent and a critical four-firm ratio of about 50 percent⁷⁴ and in general obligation bond underwriting they found a critical four-firm concentration ratio of about 50 percent.⁷⁵
47. These studies all support the unsurprising conclusion that multiple providers are needed to ensure that a competitive outcome is achieved. While the exact number may be different in different industries, based on their different cost and demand characteristics,

⁷¹ L. Brannman, J.D. Klein, and L.W. Weiss, “The Price of Effects of Increased Competition in Auction Markets,” *Review of Economics and Statistics*, 1987, p. 27.

⁷² *Id.* at Table 1. Note, however, that Kwoka found that, although more than two competitors were needed in a market to effectively discipline pricing, “[l]arge market shares for the two leading firms seem most decisive for industry price-cost margins, with a depressing effect from a sufficiently large third share.” J.E. Kwoka, “The Effect of Market Share Distribution on Industry Performance,” *The Review of Economics and Statistics*, 1979, p. 108. This result suggests that there may be circumstances in which the presence of a strong third firm may lead to lower prices and that the presence of additional firms beyond the three largest may have little or no effect. However, Mueller and Greer, who re-analyzed Kwoka’s data, found that “the fourth firm as well as groups of firms below the top two possess characteristics similar to that of the third firm.” W.F. Mueller and D.F. Greer, “The Effect of Market Share Distribution on Industry Performance: Re-Examined,” *The Review of Economics and Statistics*, 1984, p. 357. That is, they found that the presence of additional firms beyond the three largest may lead to lower prices.

⁷³ F.E. Geithman, H.P. Marvel, and L.W. Weiss, “Concentration, Price, and Critical Concentration Ratios,” *Review of Economics and Statistics*, 1981.

⁷⁴ *Id.* at 349-52. The four-firm concentration ratio is the proportion of total industry sales accounted for by the four largest firms and the two-firm concentration ratio is the proportion accounted for by the two largest firms.

⁷⁵ *Id.* at 348.

it is likely that four – and certainly more than two – providers are needed to give a competitive outcome in the special access markets under consideration in this proceeding. Under any of the approaches described above, the critical thresholds are not satisfied in almost all of the special access markets that we have analyzed. As detailed herein, in the great majority of instances, the number of CLECs – whether measured by the number providing special access service at a purchaser location or the number having special access purchasers in a census block – generally falls short of the number that is usually required to achieve the lowest prices in a market. Similarly, the market shares of the ILECs – whether measured by their shares of special access capacity sold in a census block or their shares of special access revenues in their respective footprints – generally far exceed the levels at which large firms are able to raise prices above competitive levels. On the basis of this evidence, it is reasonable for the Commission to conclude that the structures of most special access product and geographic markets are unlikely to result in the prices that would prevail in a competitive marketplace.

48. We further note that our findings are not affected significantly by the fact that CLECs have captured some purchasers of special access services. This is so for several reasons. First, at almost all purchaser locations that are served by an ILEC there are very few CLECs with competing facilities and the number is still very small if one counts CLECs with customers in the same census block as the ILEC. Moreover, the facilities of many of these “nearby” CLECs are likely to be at some distance from, and require costly extensions to serve, the locations of many purchasers. As a result, a purchaser faced with an ILEC price increase may have few if any alternatives to which to turn. Second, CLECs may not be able to provide services that are comparable to those of the ILEC in

many of these areas and, even if they could, they may face significant difficulties in expanding their capacity to do so. As a result, CLECs may be limited in their ability to absorb customers who wish to shift their special access purchases from an ILEC.

Finally, terms and conditions in ILEC contracts impede customers from shifting more than a small portion of their purchases to a CLEC without experiencing a substantial increase in the costs of their remaining purchases. For all of these reasons, it is unlikely that the elasticity of demand faced by an ILEC is so high that it severely limits the ILEC's ability to raise prices.

APPENDICES

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EDUCATION

City College of New York

B.B.A., Economics (1958)

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Ph.D., Economics (1964)

PROFESSIONAL EXPERIENCE

2008- Senior Consultant, Charles River Associates

1992-2008 - Vice President, Charles River Associates

1980-1992 - Senior Economist, The Rand Corporation

1990-1991 - Visiting Professor of Law and Economics, Georgetown University Law Center

1988-1989 - Visiting Henley Professor of Law and Business, Columbia University

1985-1988 - Coeditor, Rand Journal of Economics

1978-1980 - Co-Director, Network Inquiry Special Staff, Federal Communications Commission

1971-1972 - Brookings Economic Policy Fellow, Office of Telecommunications Policy, Executive Office of the President

1965-1980 - Assistant Professor, Associate Professor, Professor of Economics, Allyn R. and Gladys M. Cline Professor of Economics and Finance, Rice University

1963-1965 - Economist, Institute for Defense Analyses

1962-1963 - Acting Assistant Professor of Economics, University of California, Santa Barbara

CONSULTANCIES

The Rand Corporation, 1972-1978

Office of Telecommunications Policy, Executive Office of the President, 1972-1977

Department of Defense, 1967

PROFESSIONAL ACTIVITIES/HONORS

Member, National Research Council Board on Earth Sciences and Resources, Division on Earth and Life Studies, Committee on Licensing Geographic Data and Services, 2002-2004

Member, The National Academies, Computer Science and Telecommunications Board of the Division on Engineering and Physical Science, Committee on Internet Navigation and the Domain Name System, 2001-2004

Member, Editorial Board, Economics of Innovation and New Technology, 1989-present

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Member, Editorial Board, Information Economics and Policy, 1992-2004

Member, U.S. National Committee on Data for Science and Technology (CODATA), National Academy of Sciences/National Research Council, 1993-1996

Member, Office of Technology Assessment Advisory Panel on Communications Systems for an Information Age, 1986-1988

Member, Regional Telecommunications Planning Advisory Committee, City of Cincinnati, 1985

Member, Office of Technology Assessment Advisory Panel on Intellectual Property Rights in an Age of Electronics and Information, 1984-1985

Expert, World Intellectual Property Organization/UNESCO Meeting on Unauthorized Private Copying of Recordings, Broadcasts and Printed Matter, 1984

Listed in *Who's Who in America*, 1982–1983, 1984–1985, 1986–1987, 1988–1989, 1990–1991, 1992–1993, 1994-; *Who's Who in Science and Engineering*, 2010, 2011-2012, 2016-2017; *Who's Who in the East*, 2001; *Who's Who in Finance and Industry*, 1991; *Who's Who in Finance and Business*, 2005, 2007, 2009; and *Who's Who in the World*, 2014, 2016.

Member, Editorial Board, Southern Economic Journal, 1979-1981

Member, Task Force on National Telecommunications Policy Making, Aspen Institute Program on Communications and Society, 1977

Brookings Economic Policy Fellow, 1971-1972

Member, Technical Advisory Committee on Business Development, Model City Program, City of Houston, 1969-1971

Wilson University Fellow, 1959-1961

Overbrook Fellow, 1958-1959

Beta Gamma Sigma, 1958

PUBLICATIONS

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Affidavit of Stanley M. Besen, Robert J. Larner, and E. Jane Murdoch filed before the Federal Communications Commission, February 23, 1995. *In the Matter of the Petition of the People of the State of California and the Public Utilities Commission of the State of California to Retain State Regulatory Authority Over Intrastate Cellular Service Rates.*

“Concentration, Competition, and Performance in the Mobile Telecommunications Services Market,” Appendix to Comments of GTE Mobilnet September 9, 1994 *In the Matter of Equal Access and Interconnection Obligations Pertaining to Commercial Mobile Radio Services*, Federal Communications Commission CC Docket No. 94-54.

Report of Charles River Associates in the Matter of the Petition of the People of the State of California and the Public Utilities Commission of the State of California to Retain State Regulatory Authority Over Intrastate Cellular Service Rates. With R. J. Larner and E. J. Murdoch. To the Federal Communications Commission on behalf of the Cellular Telecommunications Industry Association, September 19, 1994. *FCC GN Docket No. 93-252, In the Matter of the Petition of the People of the State of California and the Public Utilities Commission of the State of California to Retain State Regulatory Authority over Intrastate Cellular Service Rates, August 8, 1994*

“A Competitive Markup Approach to Establishing Rates When Adding Cable Program Services,” Appendix to Comments of Tele-Communications, Inc. June 29, 1994. With J.R. Woodbury. *In the Matter of Implementation of Sections of the Cable Television Consumer Protection and Competition Act of 1992, Rate Regulation, Fifth Notice of Proposed Rulemaking.*

“Results of a Survey of Commercial Rates Charged by Overbuilt Cable Systems,” Appendix to Comments of Tele-Communications, Inc. June 29, 1994. With J.R. Woodbury. *In the Matter of Implementation of Sections of the Cable Television Consumer Protection and Competition Act of 1992, Rate Regulation, Fifth Notice of Proposed Rulemaking.*

Affidavit of Stanley M. Besen filed before the District of Columbia Office of Cable Television on behalf of District Cablevision, January 4, 1994. *In the Matter of Benchmark Cable Rate Regulation.*

“An Antitrust Analysis of the Market for Mobile Telecommunications Services,” Appendix A to Petition for Reconsideration of the Cellular Telecommunications Industry Association. December 8, 1993. With W.B. Burnett. *In the Matter of Amendment of the Commission’s Rules to Establish New Personal Communications Services.*

“An Analysis of the FCC’s Proposed Cable Cost-of-Service Backstop,” Attachment A to Comments of Tele-Communications, Inc. August 25, 1993. With J. R. Woodbury.

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Implementation of Sections of the Cable Television Consumer Protection and Competition Act of 1992, Rate Regulation.

“A Further Analysis of the FCC’s Cable Television Benchmark Rates,” Attachment to Reply Comments of Tele-Communications, Inc. July 2, 1993. With J.R. Woodbury. *Implementation of Sections of the Cable Television Consumer Protection and Competition Act of 1992, Rate Regulation.*

“An Analysis of the FCC’s Cable Television Benchmark Rates,” Appendix to Comments of Tele-Communications, Inc. June 17, 1993. With J.R. Woodbury. *Implementation of Sections of the Cable Television Consumer Protection and Competition Act of 1992, Rate Regulation, Further Notice of Proposed Rulemaking.*

“An Economic Analysis of the FCC’s Proposed Cable Ownership Restrictions,” Attachment to Comments of Tele-Communications, Inc. February 9, 1993. With S.R. Brenner and J.R. Woodbury. *In the Matter of Implementation of Sections 11 and 13 of the Cable Television Consumer Protection and Competition Act of 1992, Horizontal and Vertical Ownership Limits, Cross-Ownership Limitations and Anti-trafficking Provisions.*

“The Cellular Service Industry: Performance and Competition,” Appendix to Reply Comments of the Cellular Telecommunications Industry Association. January 1993. With R.J. Larner and J. Murdoch. *In the Matter of Amendment of the Commission’s Rules to Establish New Personal Communications Services.*

“An Analysis of Cable Television Rate Regulation,” Attachment to Comments of Tele-Communications, Inc. January 27, 1993. With S.R. Brenner and J.R. Woodbury. *Implementation of Sections of the Cable Television Consumer Protection and Competition Act of 1992, Rate Regulation.*

“Exclusivity and Differential Pricing for Cable Program Services,” Attachment to Comments of Tele-Communications, Inc. January 25, 1993. With S.R. Brenner and J.R. Woodbury. *Implementation of Sections of the Cable Television Consumer Protection and Competition Act of 1992, Development of Competition and Diversity in Video Programming Distribution and Carriage.*

“An Economic Analysis of Entry by Cellular Operators into Personal Communications Services,” Attachment A to Comments of the Cellular Telecommunications Industry Association. November 1992. With R.J. Larner and J. Murdoch. *In the Matter of Amendment of the Commission’s Rules to Establish New Personal Communications Services.*

Statement of Stanley M. Besen on behalf of the National Cable Television Association, Federal Communications Commission. August 3, 1989. *Policy and Rules Concerning Rates for Dominant Carriers*, CC Docket No. 87-313,

Declaration of Stanley M. Besen on behalf of Sunbeam Television Corporation, Federal Communications Commission. March 19, 1987. *In Re Application of General Electric Property Management Company For Transfer of Control of WBC Associates, L.P. et al.*

REDACTED – FOR PUBLIC INSPECTION

Declaration of Stanley M. Besen, on behalf of Turner Broadcasting System, Inc., Federal Communications Commission. June 18, 1985. *In Re Applications of Turner Broadcasting System, Inc. For Transfer of Control of CBS Inc.*

Statement of Stanley M. Besen on behalf of the American Telephone and Telegraph Company, Federal Communications Commission. June 4, 1984. *In the Matter of Long-Run Regulation of AT&T's Basic Domestic Interstate Service*, CC Docket No. 83-1147.

Economic Analysis of the Showtime/The Movie Channel Joint Venture, submitted to the United States Department of Justice on behalf of the proposed Joint Venture. April 4, 1983. With R. G. Noll, S. R. Brenner, and D. W. Webbink

“An Economic Analysis of the Hughes Satellite Transponder Sale Proposal,” submitted on behalf of Home Box Office, Inc., Federal Communications Commission. March 15, 1982. *In the Matter of Domestic Fixed-Satellite Transponder Sales*, CC Docket No. 82-45.

BRIDGER M. MITCHELL

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Ph.D. Economics,
Massachusetts Institute of Technology

A.B. Economics
Stanford University

Bridger M. Mitchell is an independent economics consultant. He is an expert in competition and pricing in the telecommunications industry and is the author of five books and numerous articles in professional journals. He has researched regulatory issues involving the theory and practice of telecommunications pricing, competition, and equal access in local telephone markets, interconnection of wireless and wire line telecommunications networks, international telephone rates, internet peering, and broadcasting and cable television. Dr. Mitchell has testified and/or consulted on a number of litigation and regulatory matters involving telecommunications, including market definition, interconnection costing and pricing, leasing of rights-of-way, incentive regulation, anticompetitive behavior, telecommunications cost modeling, and fair cost distribution, as well as damages from breach of contract and misappropriation of trade secrets. At Charles River Associates he was a vice president and head of the Palo Alto office and served as head of CRA's auction practice and co-authored reports on improved designs for spectrum auctions. Prior to joining CRA, he taught economics at Stanford University and UCLA, and was a senior economist at the RAND Corporation. Dr. Mitchell's international experience includes projects in Argentina, Australia, Brazil, Canada, Hong Kong, India, Jamaica, Malaysia, Mexico, New Zealand, Peru, Thailand, Trinidad and Tobago, the United Kingdom, and the European Union; residence at research centers in Berlin and Delft; as well as consulting assignments with the World Bank.

PROFESSIONAL EXPERIENCE

- | | |
|-----------|---|
| 2008-2015 | <i>Senior Consultant</i> , Charles River Associates, Oakland, CA |
| 1994–2008 | <i>Vice President</i> , Charles River Associates, Palo Alto, CA |
| 1972–1994 | <i>Senior Economist</i> , Social Policy Department, RAND Corporation, Santa Monica, CA |
| 1977–1979 | <i>Research Fellow</i> , International Institute of Management, Science Center, Berlin |
| 1976 | <i>Acting Associate Professor of Economics</i> , Stanford University |
| 1973–1975 | <i>Lecturer in Economics</i> , UCLA |
| 1972 | <i>Director</i> , National Health Insurance Analysis Staff, Department of Health, Education, and Welfare, Washington, D.C. |
| 1971–1972 | <i>Brookings Economic Policy Fellow</i> , Office of the Secretary, Department of Health, Education, and Welfare, Washington, D.C. |

REDACTED – FOR PUBLIC INSPECTION

1971–1972 *Economic Policy Fellow, The Brookings Institution, Washington, D.C.*

1966–1971 *Assistant Professor of Economics, Stanford University*

RESEARCH AREAS

Telecommunications

Analysis of interconnection of telecommunications networks.

Analysis of competition and equal access in local telephone markets.

Comprehensive study of theory and practice of telecommunications pricing.

Methodology for estimating the incremental costs of local exchange telephone service.

First model of the cost structure of a cable television firm.

Analysis of major regulatory issues in broadcasting and cable television.

Studies of costs and benefits of usage-sensitive pricing for local telephone service.

Comparative international study of telephone rates.

Evaluation of peak-load and capacity pricing for network services.

Economics of universal service in email networks.

Energy

Studies of consumer demand for electricity and forecasts of electricity demand.

Analysis of structure of electric utility rates in the United States and abroad.

Assessment of peak-load pricing in electric utilities in six European countries and its potential effects in the United States.

Co-direction of a major five-year experiment to test the costs and benefits of peak-load electricity rates for residential customers in Los Angeles.

Analysis of results from electricity rate structure experiments for the design of new tariffs.

Health

Development of demand model for employer-provided health insurance.

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Study of alternative methods of financing national health insurance plans and distribution of the costs and insurance benefits across consumer groups.

Analysis of effect of national insurance financing on unemployment and federal expenditures.

Economic evaluation of national health insurance legislation.

Economic Regulation

Analysis of federal regulation of cable television.

Assessment of effects of copyright requirements on cable television service.

Econometrics

Development of new methods for estimating large-scale simultaneous equation models.

Time-series analysis of economic data.

Design of experiment for time-of-day electricity pricing.

Measurement of technological change.

PROFESSIONAL ORGANIZATIONS

American Economics Association.

International Telecommunications Society

Member, Editorial Board, Information Economics and Policy, 1985–2004

Member, Organizing Committee, Telecommunications Policy Research Conference, 1990

Chair, Organizing Committee, Telecommunications Policy Research Conference, 1991–1993

Chair, Board of Directors, Telecommunications Policy Research Conference, 1993–1994

HONORS

Phi Beta Kappa, 1962

Danforth Fellow, 1962–1966

Woodrow Wilson Fellow, 1962–1963

REDACTED – FOR PUBLIC INSPECTION

National Science Foundation Research Fellow, 1965–1966

Brookings Economic Policy Fellow, 1972–1972

German Marshall Fund Fellow, 1977–1979

Alexander von Humboldt Foundation Research Fellow, 1977–1979

CONSULTANCIES

World Bank, 1991–1994

California Public Utilities Commission, 1992

Social Security Administration, 1977–1978

Office of Telecommunications Policy, 1976–1978

Department of Health, Education, and Welfare, 1972–1978

Various law firms, corporations, and banks, 1965–1994

PUBLICATIONS

Books

Telecommunications Competition: The Last Ten Miles. With I. Vogelsang. Cambridge, MA: MIT Press and AEI Press, 1997. (Also published in Korean, Korean Information Society Development Institute, 1998.)

Universal Access to E-Mail: Feasibility and Societal Implications. With R. H. Anderson, T. K. Bikson and S. A. Law. Santa Monica, CA: RAND, 1995.

Telecommunications Pricing: Theory and Practice. With I. Vogelsang. Cambridge: Cambridge University Press, 1991. (Also published in Japanese, Tuttle-Mori Agency, Inc., Tokyo, 1995.)

Regulated Industries and Public Enterprise: European and United States Perspectives. Editor. With P. R. Kleindorfer. Lexington, MA: Lexington Books, 1980.

Peak-Load Pricing: European Lessons for U.S. Energy Policy. With J. P. Acton and W. G. Manning, Jr. Cambridge, MA: Ballinger Publishing Company, 1978.

Articles and Refereed Chapters in Books

“Bill-and-Keep and the Economics of Interconnection in Next-Generation Networks.” With Moya Dodd, Astrid Jung, Paul Paterson, Paul Reynolds. *Telecommunications Policy*, (33) June-July 2009.

“Emerging Network Technologies.” With D. Hatfield and P. Srinagesh. *Handbook of Telecommunications Economics, Vol. 2*, S. K. Majumdar, M. Cave, I. Vogelsang, (eds.), 2005.

“Advances in Routing Technologies and Internet Peering Agreements.” With S. Besen, P. Milgrom, and P. Srinagesh. *American Economic Review*, May 2001.

“Competitive Effects of Internet Peering Policies.” With P. Milgrom and P. Srinagesh. *The Internet Upheaval*, B. Compaine and I. Vogelsang, (eds.), MIT Press, 2000.

“An Economic Analysis of Telephone Number Portability.” With P. Srinagesh. *Competition, Regulation, and Convergence*, S. E. Gillett and I. Vogelsang, (eds.), Lawrence Erlbaum, 1999.

“Markup Pricing for Interconnection: A Conceptual Framework.” With I. Vogelsang. *Opening Networks to Competition: The Regulation and Pricing of Access*, D. Gabel and D. Weiman, (eds.), Kluwer Academic Publishers. Boston, 1998.

“Technological Change and the Electric Power Industry: Insights from Telecommunications.” With P. J. Spinney. *The Virtual Utility*, S. Awerbuch and A. Preston, (eds.), Kluwer Academic Publishers. Boston, 1997.

“Costs and Cross-Subsidies in Telecommunications.” *The Changing Nature of Telecommunications/Information Infrastructure*, National Academy Press, Washington, DC, 1995.

“Federal Investment Through Subsidies: Pros and Cons.” *The Changing Nature of Telecommunications/Information Infrastructure*, National Academy Press, Washington, DC, 1995.

“Expanded Competitiveness and Regulatory Safeguards in Local Telecommunications Markets.” With I. Vogelsang. *Managerial and Decision Economics*, 1995. Also published in *Deregulating Telecommunications*, R. S. Higgins and P. H. Rubin, (eds.), John Wiley, New York, 1995.

“The Regulation of Pricing of Interconnection Services.” With W. Neu, K-H Neumann, and I. Vogelsang. In Gerald Brock (ed.), *Toward a Competitive Telecommunication Industry: Selected Papers from the 1994 Telecommunications Policy Research Conference*, Lawrence Erlbaum Associates, Inc., 1995.

“Network Interconnection in the Domain of ONP.” With J. Arnbak, W. Neu, K-H Neumann, and I. Vogelsang. *European Commission DG XIII*, Brussels, November 1994.

“Network Interconnection in the Domain of ONP: Country Studies.” With J. Arnbak, G. N’Guyen, B. Ickenroth, W. Neu, K-H Neumann, and I. Vogelsang. *European Commission DG XIII*, Brussels, November 1994.

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“Efficient Pricing of Telecommunications Services and the Ways to Get There.” In S. Globerman, W. T. Stanbury, and T. A. Wilson (eds.), *The Future of Telecommunications Policy in Canada*. Toronto, 1994.

“Het toewijzen van spectrum voor cellulaire telefonie: Evaringen in de VS.” *Mediaform* 4, No. 7–8 (1992): 82–84.

“Allocating Spectrum for Cellular Telephones: U.S. Experience and Issues.” In Franca Klaver and Paul Slaa (eds.), *Telecommunications: New Signposts to Old Roads*. Proceedings, IOS Press, Amsterdam, 1992.

“Telephone Penetration.” In B. Cole (ed.), *After the Breakup: Assessing the New Post-AT&T Divestiture Era*. Columbia University Press, 1991, pp. 370–376.

“Incremental Capital Costs of Telephone Access and Local Use.” In *Telecommunications Costing in a Dynamic Environment*. Hull, Quebec: Bell Canada, 1989.

“Measuring Technological Change of Heterogeneous Products.” With A. J. Alexander. *Technological Forecasting and Social Change* 27 (1985): 161–195.

“Pricing Subscriber Access to the Telephone Network.” In A. Baughcum and G. R. Faulhaber (eds.), *Telecommunications Access and Public Policy*. Norwood, NJ: Ablex, 1984.

“Response to Residential Time-of-Use Electricity Rates: How Transferable Are the Findings?” With D. F. Kohler. *Journal of Econometrics* 26 (1984): 141–177.

“Local Telephone Costs and Design of Rate Structures.” In L. Courville, A. de Fontenay, and A. R. Dobell (eds.), *Economic Analysis of Telecommunications: Theory and Applications*. North-Holland Publishing Company, 1983.

“Charging for Local Telephone Calls: How Household Characteristics Affect the Distribution of Calls in the GTE Illinois Experiment.” With R. E. Park, B. M. Wetzell, and J. H. Alleman. *Journal of Econometrics* 22 (1983): 339–364.

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“The Cost of Telephone Service: An International Comparison of Rates in Major Countries.” *Telecommunications Policy* (March 1983): 53–63.

“Welfare Analysis of Electricity Rate Changes.” With J. P. Acton. In S. Berg (ed.), *Metering for Innovative Rate Structures*. Lexington, MA: Lexington Books, 1983.

“Electricity Consumption by Time of Use in a Hybrid Demand System.” With J. P. Acton. In Jorg Finsinger (ed.), *Public Sector Economics*. MacMillan Press Ltd., 1983.

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“Specifying and Estimating Multi-Product Cost Functions for a Regulated Telephone Company.” In G. Fromm (ed.), *Studies in Public Regulation*. Cambridge, MA: MIT Press, 1981.

“Repression Effects of Mandatory vs. Optional Local Measured Telephone Services.” With R. E. Park. In H. Trebling (ed.), *New Challenges for the 1980s*. East Lansing, MI: Institute of Public Utilities, 1981.

“The Effect of Time-of-Use Rates: Facts vs. Opinions.” With J. P. Acton. *Public Utilities Fortnightly* 107, No. 9 (April 23, 1981): 1–8.

“Alternative Measured-Service Rate Structures for Local Telephone Services.” In M. A. Crew (ed.), *Issues in Public Utility Pricing and Regulation*. Lexington, MA: Lexington Books, 1980.

“New Technologies, Competition, and the Postal Service.” In R. Sherman (ed.), *Postal Service Issues*. Washington, D.C. American Enterprise Institute, 1980.

“Do Time-of-Use Rates Change Load Curves? And How Would You Know?” With J. P. Acton. *Public Utilities Fortnightly* 105, No. 11 (May 22, 1980): 3–12.

“Estimating Residential Electricity Demand under Declining-Block Tariffs: An Econometric Study Using Micro Data.” With J. P. Acton and R. Sohlberg. *Applied Economics* 12, No. 2 (June 1980): 145–161.

“Evaluating Time-of-Day Electricity Rates for Residential Customers.” With J. P. Acton. In B. M. Mitchell and P. R. Kleindorfer (eds.), *Regulated Industries and Public Enterprise: European and United States Perspectives*. Lexington, MA: Lexington Books, 1980.

“Public Enterprise and Regulation in International Perspective.” With P. R. Kleindorfer. In B. M. Mitchell and P. R. Kleindorfer (eds.), *Regulated Industries and Public Enterprise: European and United States Perspectives*. Lexington, MA: Lexington Books, 1980.

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“Pricing Policies in Selected European Telephone Systems.” In H. Dordick (ed.), *Proceedings of the Sixth Annual Telecommunications Policy Research Conference*. Lexington, MA: Lexington Books, 1979.

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“Auswirkung Staatlicher Regulierung auf die Elektrizitätsversorgung.” With J. Müller. *Staat und Wirtschaft*, Neue Folge, Band 102 (1979): 625–650.

“The Financing of National Health Insurance.” With W. B. Scharz. In G. K. Chako (ed.), *Health Handbook*. North-Holland Publishing Company, 1979.

“Optimal Pricing of Local Telephone Service.” *American Economic Review* 68, No. 4 (September 1978): 517–537.

“Copyright Liability for Cable Television: Compulsory Licensing and the Coase Theorem.” With S. M. Besen and W. G. Manning, Jr. *Journal of Law and Economics* 21 (April 1978): 67–95. Reprinted in *The Economics of Intellectual Property*, R. Towse and R. Holzhauser (eds.), Cheltenham: Edward Elgar, 2001.

“European Industrial Response to Peak-Load Pricing of Electricity, with Implications for U.S. Energy Policy.” With J. P. Acton and W. G. Manning, Jr. In *Marginal Costing and Pricing of Electrical Energy*. Montreal: Canadian Electrical Association, May 1978.

“Tariffe Elettriche Industriali e Modulazione dei Carichi.” With J. P. Acton and W. G. Manning, Jr. *Economia delle Fonti di Energia* 22, No. 6 (1978).

“Economic Policy Research on Cable Television: Assessing the Costs and Benefits of Cable Deregulation.” With S. M. Besen, R. G. Noll, M. Owen, R. E. Park, and J. N. Rosse. In P. W. MacAvoy (ed.), *Deregulation of Cable Television*. Washington, D.C. American Enterprise Institute, 1977.

“Peak-Load Pricing in Selected European Electric Utilities.” In A. Lawrence (ed.), *Forecasting and Modeling Time-of-Day and Seasonal Electricity Demands*. Palo Alto, CA: Electric Power Research Institute, December 1977.

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“Lessons from the Los Angeles Rate Experiment in Electricity.” With J. P. Acton and W. G. Manning, Jr. In J. L. O’Donnell (ed.), *Adapting Regulation to Shortages, Curtailment and Inflation*. East Lansing, MI: Michigan State University, 1977.

“Watergate and Television: An Economic Analysis.” With S. M. Besen. *Communications Research* 3, No. 3 (July 1976): 243–260.

“National Health Insurance: Some Costs and Effects of Mandated Employee Coverage.” With C. E. Phelps. *Journal of Political Economy* 84, No. 3 (June 1976): 553–571.

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“Impact of Competition on an Independent Telephone Company.” With W. S. Baer. *Public Utilities Fortnightly* (October 23, 1975).

“Health and Taxes: An Assessment of the Medical Deduction.” With R. J. Vogel. *Southern Economic Journal* 41, No. 4 (April 1975): 660–672.

“Cable, Cities, and Copyrights.” With W. S. Comanor. *Bell Journal of Economics and Management Science* 5, No. 1 (Spring 1974): 235–263.

“Fixed Point Estimation of Econometric Models.” *Australian Economic Papers* (December 1974): 250–266.

“Short-Run Prediction and Long-Run Simulation of the Wharton Model: Discussion.” In B. G. Hickman (ed.), *Econometric Models of Cyclical Behavior*. National Bureau of Economic Research, 1972.

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“Cable Television and the Impact of Regulation.” With W. S. Comanor. *Bell Journal of Economics and Management Science* 2, No. 1 (Spring 1971): 154–212.

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“A Linear Logarithmic Expenditure System: An Application to U.S. Data.” With L. J. Lau. Presented at the Second World Congress, Econometric Society, September 1970. *Econometrica* 39, No. 4 (1971): 87–88.

“The Choice of Instrumental Variables in the Estimation of Economy-Wide Econometric Models: Some Further Thoughts.” With F. M. Fisher. *International Economic Review* 11, No. 2 (June 1970): 226–234.

“Estimating Joint Production Functions by Canonical Correlation Analysis.” With P. J. Dhrymes. *Econometrica* 37, No. 4 (October 1969).

“Community Antenna Television Systems and Local Television Station Audience.” With F. M. Fisher, V. E. Ferrall, Jr., and D. Belsley. *Quarterly Journal of Economics* 80 (May 1966): 227–251.

Review Article and Reviews

R. G. Noll, M. J. Peck, and J. J. McGowan, *Economic Aspects of Television Regulation*. With S. M. Besen in *Bell Journal of Economics and Management Science* 5, No. 1 (spring 1974): 301–319.

Economic Innovations in Public Utility Regulation, edited by M. A. Crew. *Journal of Economics/Zeitschrift für Nationalökonomie* 59, No. 3 (July 1994).

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Economic Analysis of Product Innovation: The Case of CT Scanners by M. Trajtenberg. *Journal of Economic Literature* 30, No. 2 (June 1992): 935–936.

Econometric Studies of U.S. Energy Policy, edited by D. W. Jorgenson. *Journal of Econometrics* 6 (1977).

Structure and Performance of the U.S. Communications Industry by Kurt Borchardt. *Annals of the American Academy of Political and Social Science* (March 1972).

Principles of Econometrics by K. Chu. *American Economic Review* 58, No. 5 (December 1968).

Other Publications

“Information, Telecommunications, and Markets,” 19th Pacific Telecommunications Conference, Honolulu, Jan. 22, 1997.

“Utilization of the U.S. Telephone Network.” Discussion Paper No. 126, Wissenschaftliches Institut für Kommunikationsdienste, March 1994.

“Incremental Costs of Telephone Access and Local Use.” R-3909-ICTF, Rand, July 1990. Also published in W. Pollard (ed.), *Marginal Cost Techniques for Telephone Services: Symposium Proceedings*. National Regulatory Research Institute, NRRI 96–1, January 1991.

“Theory of Telecommunications Pricing.” With I. Vogelsang. Wissenschaftliches Institut für Kommunikationsdienste, May 1991.

“U.S. Practice of Telecommunications Pricing.” With I. Vogelsang. Wissenschaftliches Institut für Kommunikationsdienste, May 1991.

“Pricing Local Exchange Services: A Futuristic View.” In J. H. Alleman (ed.) and R. D. Emmerson (eds.), *Perspectives on the Telephone Industry: The Challenge for the Future*. Ballinger, 1989.

“Optimal Peak Load Pricing for Local Telephone Calls,” With R. E. Park. The Rand Corporation, R-3404-1-RC, 1987.

“A Framework for Considering Local Measured Service.” In Richard J. Schultz and Peter Barnes (eds.), *Local Telephone Pricing: Is There A Better Way?* Center for the Study of Regulated Industries, Montreal 1984.

“Demographic Effects of Local Calling Under Measured vs. Flat Service: Analysis of Data from the GTE Illinois Experiment.” With R. E. Park. In *Pacific Telecommunications Conference Proceedings*. Pacific Telecommunications Conference '80, Honolulu, 1980.

“Economic Aspects of Measured-Service Telephone Pricing.” In *Ratemaking Problems of Regulated Industries*. Proceedings of the Symposium on Problems for Regulated Industries, University of Missouri, 1980.

REDACTED – FOR PUBLIC INSPECTION

“The Effect of Time-of-Day Rates in the Los Angeles Electricity Rate Study.” With J. P. Acton. In *Electric Rate Demonstration Conference: Papers and Proceedings*. Denver, Colorado, April 1980.

“Economic Issues in Local Measured Service.” In J. A. Baude (ed.), *Perspectives on Local Measured Service*. Telecommunications Industry Workshop, Organizing Committee, Kansas City, 1979.

“Foreign Experience with Peak-Load Pricing of Electricity.” In *Impact of the National Energy Act on Utilities and Industries Due to the Conversion of Coal*. Information Transfer, Silver Springs, Maryland, 1979.

“The Costs of Constructing and Operating a CATV System.” In *CATV Today: A Discussion of Current Issues*. Georgetown University, School for Summer and Continuing Education, February 1975.

Reports

Simultaneous Ascending Auctions with Package Bidding. Prepared for the US Federal Communications Commission, March 1998. With Paul Milgrom and Brad Miller.

Package Bidding for Spectrum Licenses. Prepared for the US Federal Communications Commission, October 1997. With Paul Milgrom and Brad Miller.

Auction Design Enhancements for Non-Combinatorial Auctions. Prepared for the US Federal Communications Commission, September 1997. With Paul Milgrom and Brad Miller.

Testimony and Filed Studies

- Affidavit testimony, on behalf of plaintiff in *Mercury Communications Limited v. The Director General of Telecommunications and British Telecommunications PLC*, concerning costs of interconnection.
- Affidavit testimony (with Ingo Vogelsang), on behalf of Motion of Bell Atlantic Corporation, Bellsouth Corporation, NYNEX Corporation, and Southwestern Bell Corporation to Vacate the Decree in *U.S. v. Western Electric Co, Inc. and American Telephone and Telegraph Co*.
- Reply declaration in a Federal Communications Commission proceeding, on behalf of the California Public Utilities Commission concerning Calling Number Identification Service—Caller ID.
- Expert testimony for the defendant in *U.S. Tel, Inc. and Kallback Ventures International, Inc. v. Sprint Communications Company, LP*, a case alleging breach of contract and lost profits.
- Rebuttal testimony before the Pennsylvania Public Utility Commission on behalf of Vanguard Cellular Systems, Inc., concerning costs of interconnection services supplied by Sprint Communications.

REDACTED – FOR PUBLIC INSPECTION

- Expert testimony before the California Public Utilities Commission for Roseville Telephone Co. in its proposal for an incentive regulation plan.
- White paper (with Steven R. Brenner) on behalf of the Cellular Telephone Industry Association submitted to the Federal Communications Commission, “Economic Issues in the Choice of Compensation Arrangements for Interconnection between Local Exchange Carriers and Commercial Mobile Radio Service Providers.”
- Report (with Steven R. Brenner and Padmanabhan Srinagesh) on behalf of TCI submitted to the Federal Communications Commission, “An Economic Analysis of Terminating Access.”
- Joint Declarations (with Joseph Farrell), on behalf of Sprint Communications Company submitted to the Federal Communications Commission, “Benchmarking and the Effects of ILEC Mergers.”
- Expert report, deposition testimony, and pre-filed testimony on behalf of Nextel Communications in its motion to vacate the 1995 consent decree in *U.S. v. Motorola, Inc. and Nextel Communications, Inc.*
- Report (with Padmanabhan Srinagesh) on behalf of Telstra submitted to the Australian Competition & Consumer Commission, “Review of the PIE Model.”
- Report (with Jose Alberro and Padmanabhan Srinagesh) submitted to Telmex SA for use in World Trade Organization proceedings, “International Comparisons of Interconnection Rates – United States and Mexico.”
- Expert testimony on behalf of intervenor McLeodUSA. before Arizona, Colorado, Iowa, Minnesota, Montana, Nebraska, Utah, Washington and Wyoming state regulatory commissions in the merger application of Qwest Communications Corp. and U.S. West, Inc.
- Brief of Evidence on behalf of Telecom New Zealand in a claim concerning carrier rebilling brought by Telstra New Zealand.
- White paper (with Padmanabhan Srinagesh) on behalf of SprintPCS submitted to the Federal Communications Commission, “Transport and Termination Costs in PCS Networks: An Economic Analysis.”
- Prefiled testimony on behalf of SprintPCS submitted to the Florida Public Service Commission, regarding the additional costs of terminating local calls in a PCS network.
- Prefiled testimony on behalf of SprintPCS submitted to the New York State Public Service Commission, regarding the additional costs of terminating local calls in a PCS network.
- Statement of Evidence on behalf of Telstra Corporation in the Federal Court of Australia, New South Wales District Registry, evaluating the claim of plaintiff Optus Networks that Telstra earned monopoly profits from local telephony services.

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- Expert reports and deposition testimony on behalf of TeraBeam Networks in its claim for damages from misappropriation of trade secrets and unfair competition by Dominion Communications, and evaluation of reasonable royalty damages from alleged patent infringement claimed by Dominion.
- Expert reports on behalf of Telstra Corporation to the Australian Competition Tribunal in a review of a regulatory determination concerning the pricing of originating and terminating access services.
- Expert report and deposition testimony on behalf of plaintiffs in their claim for damages for misrepresentation of wireless telephone coverage by Los Angeles Cellular Telephone Company.
- Expert report on behalf of Amtrak concerning the classification of telecommunications services in Amtrak's appeal of Federal communications excise tax liability before the District Court for the District of Columbia.
- Expert report (with Adonis Yatchew) and testimony on behalf of the Electricity Distributors Association and the Canadian Electricity Association concerning the fair distribution of the costs of joint-use power poles before the Ontario Energy Board.
- Expert report (with John R. Woodbury) on behalf of Sprint Nextel submitted to the Federal Communications Commission concerning regulatory triggers for granting local exchange carriers flexibility in the pricing of special access services.
- Expert report (with Adonis Yatchew) and testimony on behalf of New Brunswick Power Distribution and Customer Service Corporation (DISCO) concerning the fair distribution of the costs of joint-use power poles before the New Brunswick Board of Commissioners of Public Utilities.
- Direct and rebuttal testimony on behalf of Sprint Communications Company concerning termination of the rural exemption of Consolidated Communications' local exchange carriers in Texas.
- Expert report (with Stanley M. Besen) filed before the Federal Communications Commission on behalf of Time Warner Telecom, Inc. concerning the effect of the proposed merger of AT&T Inc. and BellSouth Corporation on the increased footprint of the merged entity and the use of regulatory benchmarks.
- Economic study (with P. Paterson, M. Dodd, P. Reynolds, A. Jung, P. Waters, R. Nicholls, E. Ball) on IP interworking on behalf of the GSM Association.
- Expert report, rebuttal report, and deposition testimony on behalf of Massachusetts Turnpike Authority concerning an antitrust claim regarding leasing of rights-of-way to telecommunications carriers.

REDACTED – FOR PUBLIC INSPECTION

- Expert report on behalf of Sprint Nextel submitted to the Federal Communications Commission concerning an analytic framework for regulating special access services.
- Expert report on behalf of a class of mobile telephone users on the effect of full-minute billing on mobile telephone subscribers' bills.
- Expert report and direct testimony on behalf of New Brunswick Power Corporation on the fair cost allocation of cable company attachments to joint-use power poles.

REDACTED – FOR PUBLIC INSPECTION

I declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct to the best of my knowledge and belief.

Executed on January 19, 2016



Stanley M. Besen

REDACTED – FOR PUBLIC INSPECTION

I declare under penalty of perjury under the laws of the United States of America
that the foregoing is true and correct to the best of my knowledge and belief.

Executed on January 19, 2016



Bridger M. Mitchell