

**DECLARATION OF
DENNIS W. CARLTON AND HAL S. SIDER**

March 1, 2002

I. QUALIFICATIONS

1. I, Dennis W. Carlton, am Professor of Economics at the Graduate School of Business of The University of Chicago. I have served on the faculties of the Law School and the Department of Economics at The University of Chicago and the Department of Economics at the Massachusetts Institute of Technology. I specialize in the economics of industrial organization, which is the study of individual markets and includes the study of antitrust and regulatory issues. I am co-author of *Modern Industrial Organization*, a leading textbook in the field of industrial organization, and I also have published numerous articles in academic journals and books. In addition, I am Co-Editor of the *Journal of Law and Economics*, a leading journal that publishes research applying economic analysis to industrial organization and legal matters. In addition to my academic experience, I am a consultant to Lexecon Inc., an economics consulting firm that specializes in the application of economic analysis to legal and regulatory issues.

2. I, Hal S. Sider, am a Senior Economist and Senior Vice-President of Lexecon Inc. I received a B.A. in Economics from the University of Illinois in 1976 and a Ph.D. in Economics from the University of Wisconsin (Madison) in 1980. I have been with Lexecon since 1985, having previously worked in several government positions. I specialize in applied microeconomic analysis and have performed a wide variety of economic and econometric studies relating to industrial organization, antitrust and merger analysis. I have published a number of articles in professional economics journals on a variety of economic topics and have testified as an economic expert on matters relating to industrial organization, antitrust, labor economics and damages. In addition, I have directed several studies of competition in telecommunications

industries and have previously testified as an expert on telecommunications matters before the FCC and various state public utility commissions.

3. Copies of our curriculum vita are attached as Appendix 1 to this declaration.

II. OVERVIEW AND CONCLUSIONS

4. We have been asked by Verizon to comment on various questions raised by the Federal Communications Commission's ("FCC's") current review of regulations faced by incumbent local exchange companies ("ILECs") in the provision of broadband telecommunications services.¹

5. First, we have been asked to respond to the FCC's requests for comments on the appropriate market definition for evaluating broadband regulation. More specifically, the FCC has asked for comments regarding whether it is appropriate to distinguish a "mass market," for broadband services that includes services that are predominantly purchased by residential or small business consumers -- cable modem, asymmetric digital subscriber line ("ADSL"), wireless and satellite services² -- and a "larger business market" that includes services purchased by medium and large businesses, including, principally, frame relay and ATM services.³ We answer these questions from a nationwide perspective, due to the general similarity in competitive circumstances in different areas.⁴

-
1. Review of Regulatory Requirements for Incumbent LEC Broadband Telecommunications Services, CC Docket No. 01-337, FCC 01-360, December 20, 2001, ("FCC Broadband Review").
 2. Today, mass market broadband services consist predominantly of Internet access, which includes both broadband transport and ISP services. Mass market broadband services, however, may include transport services alone.
 3. Additional services could potentially be included as part of a market of broadband services for both mass market and larger business customers. We do not address whether these services are properly considered part of this market because the FCC has not requested comment on this issue.
 4. The FCC has recognized in analyses of other telecommunications services that the use of national data is appropriate if competitive conditions are similar in different areas. We also are unaware of significant areas that can be served economically by ILECs' ADSL service

6. Second, we have been asked to respond to the FCC's request for comments about whether ILECs exercise market power in the appropriately defined markets. We address this by analyzing whether the prices charged by ILECs for broadband services are sufficiently constrained by competition from other firms that removal of regulations that ILECs now face in providing broadband services would not be expected to result in higher prices.

7. We conclude that the "mass market" and "larger business" market definitions discussed in the FCC's notice are economically appropriate and are distinct from the narrowband services market.⁵ Broadband services sold to mass market consumers (including services provided by cable modem, ADSL, satellite and fixed wireless) compete with each other directly and differ in price and quality from narrowband services. Broadband services sold to larger business customers are not substitutes in demand or supply with broadband services sold to mass market consumers.

8. We also conclude that ILECs, individually and collectively, could not exercise market power in either the "mass" market or "larger business" market in the absence of regulations. Broadband services provided by ILECs account for only a modest share of broadband services for both mass market and larger business consumers and, as a result, it is unlikely that ILECs could exercise market power by raising price in the absence of regulation.

(...continued)

that cannot also be served economically by cable modem services. Thus, national data provide a reasonable first approximation to competitive circumstances and ILECs' potential to exercise market power.

5. For the purpose of this declaration, we adopt the market terms used in the FCC Notice. Of course, large business customers may purchase "mass market" services such as cable modem or ADSL services. However, we are unaware of any evidence that these purchases are substitutes for services such as ATM or frame relay. For example, a large business might purchase cable modem services to supply high-speed Internet access for the home of an executive.

9. The bases for our conclusions are detailed in the remainder of the Declaration. Section III briefly reviews the framework for evaluating market definition and market power. Section IV analyzes the scope of the market for broadband services, and Section V analyzes whether ILECs are sufficiently constrained by competition that the removal of current regulations on broadband services would not result in an increase in price.

III. FRAMEWORK FOR EXAMINING THE SCOPE OF THE MARKET FOR BROADBAND SERVICES

10. This section briefly reviews the economic framework for evaluating market definition and market power. Subsequent sections use this framework to analyze the scope of markets for broadband services and whether ILECs could exercise market power in such markets in the absence of regulation.

11. Markets include products that are close substitutes in demand or supply.⁶ To put this principle into practice the FCC has often relied upon the approach outlined in the *1992 Horizontal Merger Guidelines* (“*Merger Guidelines*”) of the Department of Justice (“DOJ”) and Federal Trade Commission (“FTC”) to define product markets.⁷ The *Merger Guidelines* state that a product market consists of

a product or group of products such that a hypothetical profit-maximizing firm that was the only present and future seller of those products (‘monopolist’) likely would impose at least a ‘small but significant and nontransitory’ increase in price.⁸

6. See Dennis Carlton & Jeffrey Perloff, *Modern Industrial Organization* (Third Edition), 2000, pp. 610-615 for a discussion of market definition and market power.

7. Regulatory Treatment of LEC Provision of Interexchange Services Originating in the LEC’s Local Exchange Area and Policy and Rules Concerning the Interstate, Interexchange Marketplace, CC Docket. No. 96-149, 96-61, FCC 97-142, April 18, 1997, ¶5 (“LEC Interexchange Review”).

8. *1992 Horizontal Merger Guidelines*, §1.11.

12. Firms are said to have market power if they can profitably charge a price above that which would prevail under competition.⁹ The FCC has adopted this approach in asking in this proceeding whether ILECs “can profitably raise and sustain prices above competitive levels.”¹⁰ As the FCC notes, prices can be kept above competitive levels if a firm finds it profitable to restrict its own output or restricts a rival’s output by, for example, limiting access to a bottleneck facility controlled by the firm.¹¹

13. ILEC provision of broadband services is now governed by a variety of regulations designed in principal to protect competition.¹² The need for these regulations, of course, is the subject of this proceeding. We analyze whether ILECs could exercise market power by asking whether they would be expected to charge higher prices in the absence of these regulations. If removal of these regulations would not be expected to result in higher prices to consumers, then ILECs cannot be said to have the ability to exercise market power.¹³

IV. BROADBAND SERVICES MARKETS

14. Following the general approach described above, we find that available data support the view that there are distinct markets for narrowband services, mass market broadband services and broadband services for larger businesses. These services do not appear to be close substitutes in demand or supply. We find that:

9. Carlton and Perloff, p. 610.

10. FCC Broadband Review, ¶28.

11. ILEC Interexchange Review, ¶83.

12. We understand that ILEC provision of broadband services is now subject to a variety of regulatory requirements including the obligation to provide network elements used in these services at regulated cost-based prices, the obligation to offer broadband services for resale at cost-based rates, as well as requirements that prices for broadband services be tariffed at rates that can be justified by costs.

13. In analyzing whether an individual ILEC has market power, we also effectively address whether ILECs’ collectively have market power. Since there is only one ILEC in a given area, the existence of other ILECs in different areas is of little or no competitive significance. If a given customer’s ILEC does not exercise market power, then ILECs collectively would not be expected to exercise market power with respect to that customer.

- Broadband services sold to mass market consumers (including those provided by cable modem, ADSL, fixed wireless and satellite facilities) compete directly with each other;
- Broadband services sold to mass market consumers are different from narrowband (e.g., dial-up) services due to differences in price and quality;
- Broadband services sold to larger business customers, including frame relay and ATM services, compete with each other and are in a separate market from broadband services sold to residential and small business customers.

A. Mass Market Broadband Services Are Close Substitutes in Demand

15. Broadband services including ADSL services, cable modem services, satellite services and fixed wireless services are sold primarily to residential and small business consumers. These services constitute a distinct market from both narrowband services (e.g., dial-up Internet access) and broadband services to larger business customers (including frame relay and ATM).

16. There is little question that cable modem, ADSL, fixed wireless and satellite services are close substitutes in demand, primarily serving residential or small business customers.

- Cable modem, ADSL, wireless and satellite services are almost exclusively sold to residential or small business consumers. The FCC finds that, as of June 2001, 96 percent of high-speed cable lines, 92 percent of ADSL lines, 85 percent of fixed wireless lines, and virtually all satellite lines served residential or small business customers.¹⁴

14. Inquiry Concerning the Deployment of Advanced Telecommunications Capability, Third Report, CC Docket 98-146, FCC 02-33, February 6, 2002, ¶¶45, 50, 55, 60 (“Third Advanced Services Report”).

- ADSL, cable modem, fixed wireless and satellite services all provide similar speeds and are actively marketed against each other.¹⁵ For example, the web pages of companies providing broadband residential services typically include comparisons against competing technologies.¹⁶ Companies also often cite these competing technologies as competitors in their SEC filings.¹⁷
- Consumer surveys and analysts have found that consumers do not distinguish between the technologies.¹⁸
- The products have similar prices. The FCC has explicitly noted this with respect to DSL and cable modem services,¹⁹ and pricing surveys confirm this observation.²⁰ Pricing for the various services today remains in the same range. For example, Verizon currently prices its base DSL Internet access package at \$49.95 per month,²¹

15. See the Broadband Fact Report submitted by Verizon for a comparison of the technologies' access speeds.

16. See, for example, <http://www.roadrunner.com/rdrun/> and http://www22.verizon.com/foryourhome/dsl/learnmore/NLF_DSLVsCable.asp.

17. See, for example, Comcast and BellSouth's 2000 10-Ks citing DSL and cable, respectively, as competitors.

18. "Broadband: Cable or DSL? Consumers See Little Difference," December 1, 2000, www.cyberatlas.com. Citing a Harris Interactive poll that found "little difference between perceptions among those planning to get either DSL or cable modem services."; *Coming Eventually: TV on the PC; The World Waits and Waits for Mass Deployment of Broadband*, Broadcasting and Cable, Dec. 11, 2000, p.88. Discussing a Forrester survey: "There's an ongoing fight about who is better . . . But it comes down to this: Nobody cares. People just want broadband."; J.P. Morgan / McKinsey & Co., "Broadband 2001," April 2, 2001, p.37. ("Broadband 2001") "But most customers don't care about technologies. Indeed, most customers are platform agnostic—or more precisely, platform ignorant."

19. FCC, Seventh Annual Report on the Status of Competition in the Market for the Delivery of Video Programming, CS Docket No. 00-132, January 8, 2001, ¶53. "[B]oth cable Internet access providers and DSL operators offer services at around the same price..."

20. Broadband 2001, p.21. "For the past 12-18 months, price points for high-speed access have largely remained between \$40 and \$50 per month for residential-grade service, with heavy use of promotional offers such as free installation..." Also, Broadband Fact Report, Table 2.

21. http://www22.verizon.com/foryourhome/dsl/whyverizon/NLF_AffordablePricingOptions.asp

RoadRunner cable modem service is priced at roughly \$44.95 per month,²² and wireless prices are around \$35 to \$50 per month.²³ The price of satellite service is somewhat higher, roughly \$54.95 to \$69.99 per month.²⁴

B. The Market for Narrowband Services is Distinct from the Market for Broadband Services

17. The market for narrowband (e.g., dial-up) services is distinct from the market for mass market broadband services.

- There are significant differences in quality of broadband and narrowband services. Even in their most basic forms, all broadband services provide substantially greater bandwidth than the fastest 56.6 Kbps dial-up services.²⁵ For example, Verizon's standard residential DSL services offer a maximum bandwidth of 768 Kbps.²⁶ In addition, broadband Internet services are higher in quality than dial-up services because they are "always on" and thus require far less time than dial-up services in establishing an Internet session.
- There is a variety of Internet content that can only be provided efficiently on broadband services. Content such as streaming video and exchange of large data files can only be efficiently accessed through a broadband Internet connection. Similarly, streaming video and audio (such as Internet radio stations) are provided with higher quality (fewer interruptions) using a broadband connection. Increased penetration of

22. <http://www.roadrunner.com/rdrun/> (pricing varies by market).

23. <http://www.ks-usa.net/wireless.asp>, <http://www.lightspeednet.net/news1.htm>,
<http://wireless.iols.com/residential.htm>, <http://www.redred.com/7index.html>.

24. <http://www.direcpc.com/aolplus/index.html>, <https://register.earthlink.net/cgi-bin/wsisa.dll/broadband/satellite/pricing.html?dm=857f0a91b46320871d515c75d56e6e23>,
<http://www.starband.com/wheretobuy/dishsplash.htm>.

25. By "dial-up" services, we mean the use of standard analog phone lines to access ISPs.

26. http://www22.verizon.com/foryourhome/dsl/whyverizon/NLF_AffordablePricingOptions.asp

broadband Internet access services is also likely to result in the creation of more broadband-specific content.

- Narrowband and broadband prices are significantly different and do not appear to respond to one another. Excluding the cost of telephone access, narrowband ISP services range in price from \$0 to \$22 (for AOL) per month.²⁷ However, residential DSL, cable modem, fixed wireless and satellite services are typically \$40 to \$50 per month (slightly more for satellite).
- While the existence of price differences alone does not necessarily establish that narrowband and broadband services are in different markets, available evidence further suggests that broadband prices are unrelated to variations in narrowband prices. Hausman, Sidak and Singer examined subscription prices for Excite@Home and Road Runner and found that they did not vary with narrowband access prices (which vary across regions as the result of differences in the price of second-line telephone services).²⁸ This suggests that narrowband and broadband services are in separate markets.
- Narrowband (dial-up) services and ADSL (and other mass market broadband services) use different facilities and equipment and thus are not substitutes in supply.

27. Unlike many other narrowband and broadband ISPs, AOL offers substantial proprietary content. For example, many broadband subscribers pay \$10 per month to access AOL proprietary content, indicating that the price of Internet access is between \$0 and \$12 per month. Hausman, Sidak and Singer report a range of second line prices in different states, with a midpoint of \$27 per month. Even treating the entire cost of a second phone line as part of the “price” of narrowband access (which surely overstates the cost of narrowband service) the implicit price of narrowband services is typically well below the price of broadband service.

28. Hausman, Jerry; Sidak, Gregory and Singer, Hal. “Residential Demand for Broadband Telecommunications and Consumer Access to Unaffiliated Internet Content Providers,” *Yale Journal on Regulation*, Winter 2001, pp.144-148. (“Residential Broadband Demand”)

18. The conclusion that broadband services constitute a separate product market from narrowband services has been supported by the FCC, the Federal Trade Commission, and the Department of Justice. For example, in its opinion in the AOL/Time Warner matter, the FTC concluded that:

The relevant market in which to assess the effects of the proposed merger is the provision of broadband internet transport service.²⁹

The FCC reached the same conclusion:

We begin by addressing whether high-speed Internet access services, as distinct from narrowband services, constitute the relevant product market in determining the effects of the proposed merger on the public interest. We conclude that they do.³⁰

The Department of Justice, in analyzing the AT&T-MediaOne merger, also defined a market for “aggregation, promotion, and distribution of broadband content and services.”³¹

C. Broadband Services for Larger Business Customers Constitute a Distinct Market from “Mass Market” Broadband Services

19. Frame relay and ATM services for larger business customers comprise a distinct economic market that does not include mass market broadband services or narrowband. That is, “mass market” services and services for larger business customers are not close substitutes in demand or supply.

20. While the FCC has asked whether “larger business” market includes “Frame Relay, ATM, GigE, SMDS and RLAN,” we focus on frame relay and ATM, which are the most widely used of these services today, and conclude that they compete against each other but not

29. FTC. AOL Time Warner Complaint, Docket No. C-3989, December 14, 2000, ¶27.

30. FCC. AOL Time Warner Order, FCC 01-12, January 11, 2001, ¶69.

31. U.S. Department of Justice, AT&T Media One Competitive Impact Statement, May 25, 2000.

against mass market broadband services. As discussed below, frame relay and ATM services perform similar functions, have similar customers and similar prices.³²

- Frame relay services are high-speed packet switched services that provide for transmission of variable length frames of customer data (packets) across geographically dispersed areas. Frame relay services are primarily used to provide connectivity between local area networks thereby creating a wide area network. Facilities, including those supplied by ILECs or other firms, connect individual customer locations to frame relay switches within the frame relay network.³³ Frame Relay is generally available at access speeds from 56 Kbps to 45 Mbps (T-3).³⁴
- ATM is a data service which uses fixed-size packets (as opposed to frame relay, which uses variable-sized packets) to provide integrated data service supporting data, voice and video applications. Customers may be connected to the ATM switches by various facilities including those supplied by ILECs or others. ATM is generally available at access speeds from 1.5 Mbps (T-1) through 155.5 Mbps (OC-3).³⁵
- The bulk of ATM and frame relay revenues are derived from the same range of port speeds: T-1 through T-3. For frame relay, 48 percent of revenues in 2000 were for

32. Dr. Crandall and Prof. Sidak reached the same conclusion in their Declaration filed on behalf of SBC in the SBC Petition for Non-Dominance in the Provision of Advanced Services proceeding.

33. Frame Relay and ATM services may use facilities provided by the ILEC for connecting customers to these services. The FCC is explicitly considering in another proceeding whether there is a need for continued regulation of ILEC provision of traditional special access services.

34. Ron Kaplan, IDC, "U.S. Packet/Cell-Based Services Market Forecast and Analysis, 2000-2005," March 2001, p.4. ("Packet/Cell-Based Services")

35. Packet/Cell-Based Services, p.3.

port speeds of T-1 through T-3.³⁶ For ATM, 66 percent of revenues were for port speeds between T-1 and T-3.³⁷

- Frame relay and ATM are priced similarly for similar bandwidths. The Yankee Group reported in 1999 that “IXCs and ILECs are pricing ATM at parity with frame relay.”³⁸ For example, in 2000, AT&T charged an identical amount for a 1.544 Mbps Frame Relay port as for a 1.544 Mbps ATM port.³⁹
- ATM and frame relay services are purchased almost exclusively by larger business (and government) customers. A 2000 survey of frame relay and ATM services identified no residential customers.⁴⁰ At the same time, as discussed above, the vast majority of cable modem and ADSL services are purchased by residential consumers.
- Frame-relay and ATM services use different equipment and facilities than those used in the provision of ADSL and other mass market broadband services. Thus, these services are not supply-side substitutes. For reasons discussed earlier, narrowband services are not part of the market for broadband services for larger business customers since they are neither supply-side nor demand-side substitutes.

21. This market for larger business services may include the additional broadband services identified by the FCC, although these services today are not widely used. For example, GigE is a relatively new technology intended to address bandwidth constraints in existing Ethernet networks. As of 2001, it had only \$67 million in revenues in all of North America as compared to Frame Relay revenues of \$6.3 billion and ATM revenues of \$1.05 billion in 2000.⁴¹

36. Packet/Cell-Based Services, p.17.

37. Packet/Cell-Based Services, p.54.

38. The Yankee Group, “ATM Service and Pricing Trends,” Data Communications Report Vol. 14, No. 16, October 1999, p.3.

39. Packet/Cell-Based Services, pp.136, 161.

40. Packet/Cell-Based Services, p.18, 56.

41. Lane Cooper and Tom Moore, “Corporate America Implementing New Gigabit Ethernet

Similarly, SMDS is a small (and declining) service. SMDS revenues in 2000 were only \$51.9 million, and many providers are phasing out their SMDS service offerings.⁴²

V. ILECS WILL NOT EXERCISE MARKET POWER IN THE PROVISION OF BROADBAND SERVICES FOR EITHER MASS MARKET OR LARGER BUSINESS CONSUMERS IN THE ABSENCE OF REGULATION

22. Available evidence indicates that ILECs do not have market power in the provision of broadband services for either mass market or larger business customers to raise price in the absence of regulation. That is, the price charged by ILECs for both mass market broadband services and broadband services to larger business customers is constrained by the presence of competition and ILECs would not be able to raise price in the absence of the regulations ILECs now face in providing these services.

A. ILECs Do Not Have Market Power in the Provision of Mass Market Broadband Services

23. Available evidence suggests that ILECs face competition from a variety of firms in the provision of “mass market” services; they have relatively low market share; and possess no “bottleneck” inputs that are required for the success of competitors.

- There are many viable competitors and technologies for providing broadband service to mass market consumers, none of which require access to ILECs’ networks for providing service. The FCC has recognized competition between these technologies in prior proceedings.

The preconditions for monopoly appear absent. [...] The record does not indicate that the consumer market is inherently a natural monopoly ... We see the potential for the market to accommodate different technologies such as DSL cable modems, utility fiber to the home, satellite and terrestrial radio. The fact that different companies are using different

(...continued)

Strategies,” Communications News, August 1, 2001. Packet/Cell-Based Services, pp.1-2.
42. Packet/Cell-Based Services, p.2.

technologies to bring broadband to residential consumers and that each existing broadband technology has advantages and disadvantages as a means of delivery to millions of customers opens the possibility of intermodal competition, like that between trucks, trains and planes in transportation. By the standards of traditional residential telecommunications, there are, or likely will soon be, a large number of actual participants and potential entrants in this market.⁴³

- Cable modem services are currently available to 70 percent of U.S. homes, and can potentially cover 95 percent of homes in the United States.⁴⁴ The FCC has reported estimates that virtually all cable infrastructure will be upgraded by 2003.⁴⁵ Today, ADSL service is currently available to only about 45 percent of U.S. homes and is potentially available to only 70 percent.⁴⁶
- The FCC has reported that, as of June 2001, ADSL comprised only 32 percent of residential and small business high speed lines and only 21 percent of advanced services lines serving these customers.⁴⁷ Coaxial cable, by contrast, comprised 64 percent of residential and small business high speed lines and 74 percent of advanced services lines serving these customers.⁴⁸ This disparity has continued, with cable companies adding three times as many broadband customers in the third quarter of 2001 as DSL providers and maintaining well over a 2:1 lead in total subscribers.⁴⁹
- In addition, satellite broadband services provide virtually ubiquitous broadband service throughout the United States. In the past, such systems have been broadband

43. Report in the Matter of Inquiry Concerning the Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion, (“First Advanced Services Report”) January 28, 1999, ¶48.

44. Third Advanced Services Report, ¶46, 65.

45. Third Advanced Services Report, ¶65.

46. Third Advanced Services Report, ¶51; DSL Forum, “DSL Anywhere,” June 2001, p. 8.

47. High-speed indicates transmission of greater than 200 Kbps in one direction, while advanced indicates over 200 Kbps transmission in both directions.

48. Industry Analysis Division, “High Speed Services for Internet Access: Subscribership as of June 30, 2001,” February 2002, Table 3

49. Kinetic Strategies, Inc., “Cable Modem Market Stats & Projections,” December 21, 2001. <http://www.cabledatacomnews.com/cm/cmic16.html>

only with respect to downstream data (from the Internet). However, this limitation has largely disappeared. Both existing satellite broadband services, StarBand and DirecPC, currently offer 2-way broadband service directly to and from the satellite.⁵⁰ New entrants plan to offer services with even greater bandwidth beginning in 2002.⁵¹

- Fixed wireless providers are also offering mass-market broadband service throughout much of the U.S. According to the FCC, fixed wireless systems of the Microwave Multi-Point Distribution System type (“MMDS”) currently reach 55 percent of the U.S. population and are expected to reach 90 percent by the end of 2004.⁵² The FCC has reported 28 companies offering high-speed Internet access services via MMDS in 44 separate markets, and estimates that there are an additional 241 companies using unlicensed spectrum to provide high-speed Internet access services.⁵³
- Cable modem services do not appear to face capacity constraints. That is, if ILECs were to attempt to raise DSL prices and lose customers as a result, cable modem service providers and providers using other technologies could easily absorb the defecting customers.

24. In sum, ILECs face competition from a variety of firms using different technologies in providing broadband services to mass market consumers and account for a relatively small share of this market. Under these circumstances, ILECs’ pricing of mass market broadband services is constrained by competition and would not be expected to rise in the absence of regulations that ILECs now face in the provision of mass market broadband services.

50. <http://www.direcpc.com/index1.html> and <http://www.starband.com>.

51. <http://www.wildblue.com/ab/index.htm>,
http://www.hns.com/products/advanced_platforms/spaceway/inside_spaceway.htm,
http://www.astrolink.com/press_room/glance.asp; <http://www.teledesic.com/about/about.htm>

52. Third Advanced Services Report, ¶61.

53. Third Advanced Services Report, ¶¶58-59.

B. ILECs Do Not Have Market Power in the Provision of Broadband Services for Larger Business Customers

25. Available data indicate that the prices charged by ILECs for broadband services (such as frame relay and ATM services) provided to large business customers are constrained by competition from other firms and ILECs would be unable to raise price in the absence of current regulations. ILECs face several large competitors that can readily expand output, provide a small share of broadband services to large business customers, do not control critical inputs, and face sophisticated customers.

- The largest providers of frame relay services are the major, national interexchange carriers (IXCs). AT&T, WorldCom and Sprint accounted for 35, 23 and 10 percent, respectively, of all frame relay revenue in the United States in 2000, while the ILEC with the largest share, SBC, accounted for only 4.4 percent. All ILECs together earned only 16.9 percent.⁵⁴
- For ATM services the shares are similar. AT&T earned 23.2 percent of revenues, followed by Sprint with 21.7 percent and WorldCom with 20.9 percent. SBC earned 6.5 percent, while all ILECs together earned 18 percent.⁵⁵
- Frame relay and ATM services are provided over networks that are provisioned in a variety of ways and can include facilities obtained from ILECs, such as traditional special access lines and private lines. In addition to ILECs, access services are also provided by frame relay and ATM providers as well as other CLECs. The use of ILEC facilities to access frame relay or ATM networks is currently governed by regulation. In light of these facts, ILECs possess no bottleneck inputs required for the provision of frame relay or ATM services. We understand that the FCC is

54. Packet/Cell-Based Services, p.20.

55. Packet/Cell-Based Services, p.57.

investigating in a separate proceeding whether there is a need for continuation of these regulations.

- Customers are typically sophisticated multilocation businesses that are well informed as to their alternatives and will switch to alternative carriers in the event of a unilateral price increase. The FCC has previously argued that businesses are sophisticated customers with elastic demand.

[B]usiness customers are to a large degree demand-elastic and will switch carriers in order to obtain price savings and desired features. ... [T]hese customers tend to be more informed and sophisticated purchasers of telecommunications services than other customers and that they increasingly exercise their 'buyer power' by soliciting competitive bids before procuring telecommunications services.⁵⁶

- All of the IXCs and ILECs possess significant network capacity. Frame relay or ATM networks are constructed of interoffice transport, backbone transport, and local loops. The capacity of each element of these networks can be readily expanded given the widespread availability of networking equipment and transport capacity.

VII. CONCLUSIONS

26. Narrowband services, mass market broadband services and broadband services for larger business customers are each appropriately considered distinct economic markets. Mass market broadband services include ADSL, cable modem, satellite and fixed wireless services. Broadband services for larger business customers include (at least) frame relay and ATM services.

27. ILECs will not be able to exercise market power by raising price for these services in the absence of regulation. ILECs account for a relatively modest share of customers

56. In the Matter of Competition in the Interstate Interexchange Marketplace, CC Docket No. 90-132, FCC 91-251, September 16, 1991, ¶37.

in both of these markets. The prices they charge are constrained by competition and would not be expected to rise in the absence of regulations now faced by ILECs in providing these services.

We declare under penalty of perjury that the above is true and correct to the best of our knowledge and belief.



Dennis Carlton



Hal Sider

DENNIS WILLIAM CARLTON

Economist

February 2002

Business Address: Lexecon Inc. (312) 322-0215
332 South Michigan Avenue
Chicago, Illinois 60604

Home Address: 21 Lakewood Drive (847) 835-8855
Glencoe, Illinois 60022

EDUCATION

Ph.D., MASSACHUSETTS INSTITUTE OF TECHNOLOGY, Cambridge, Massachusetts:
Economics, 1975.

M.S., MASSACHUSETTS INSTITUTE OF TECHNOLOGY, Cambridge, Massachusetts: Operations
Research, 1974.

A.B., HARVARD UNIVERSITY (Summa cum laude): Applied Math and Economics, 1972.

EMPLOYMENT

LEXECON INC., Chicago, Illinois (1977 - present): President, 1997 - 2001.

UNIVERSITY OF CHICAGO, Graduate School of Business (1984 - present): Professor of
Economics.

UNIVERSITY OF CHICAGO, Law School (1980 - 1984): Professor of Economics.

UNIVERSITY OF CHICAGO, Department of Economics: Assistant Professor (1976 - 1979):
Associate Professor (1979 - 1980).

MASSACHUSETTS INSTITUTE OF TECHNOLOGY, Cambridge, Massachusetts, Department of
Economics (1975 - 1976): Instructor in Economics.

OTHER PROFESSIONAL EXPERIENCE

HARVARD UNIVERSITY, Public Policy Summer Course in Economics (1977): Professor.

BELL TELEPHONE LABORATORIES (Summers 1976, 1977).

JOINT CENTER FOR URBAN STUDIES OF M.I.T. AND HARVARD UNIVERSITY, Cambridge,
Massachusetts (1974 - 1975).

CHARLES RIVER ASSOCIATES, Cambridge, Massachusetts (Summers 1971, 1972): Research
Assistant.

FIELDS OF SPECIALIZATION

Theoretical and Applied Microeconomics

Industrial Organization

ACADEMIC HONORS AND FELLOWSHIPS

M.I.T., National Scholar Award, 1968
Edwards Whitacker Award, 1969
Detur Book Prize, 1969
John Harvard Award, 1970
Phi Beta Kappa, 1971
National Science Foundation Fellowship, 1972 - 1975
Recipient of Post-doctoral Grant from the Lincoln Foundation, 1975
National Science Foundation Grant, 1977 - 1985
Recipient of the 1977 P.W.S. Andrews Memorial Prize Essay, best essay in the field of Industrial Organization by a scholar under the age of thirty
Ph.D. Thesis chosen to appear in the Garland Series of Outstanding Dissertations in Economics
Alexander Brody Distinguished Lecture, Yeshiva University, 2000

PROFESSIONAL AFFILIATIONS AND ACTIVITIES

Co-editor, Journal of Law and Economics, 1980 - present
Associate Editor, Regional Science and Urban Economics, 1987 - 1997
Associate Editor, The International Journal of Industrial Organization, 1991 - 1995
Member, American Economics Association, Econometrics Society
National Bureau of Economic Research, Research Associate
Member, Advisory Committee to the Bureau of the Census, 1987 - 1990
Editorial Board, Intellectual Property Fraud Reporter, 1990 - 1995
Consultant on Merger Guidelines to the U.S. Department of Justice, 1991 - 1992
Accreditation Committee, Graduate School of Business, Stanford University, 1995
Visiting Committee, MIT, Department of Economics, 1995 - present
Resident Scholar, Board of Governors of the Federal Reserve System, Summer, 1995
Member, Advisory Board, Economics Research Network, 1996 - present
Member, Steering Committee, Social Science Research Council, Program in Applied Economics, 1997 - 1999
Participant in meetings with Committee of the Federal Reserve on Payment Systems, June 5, 1997
Participant in round table discussions on "The Role of Classical Market Power in Joint Venture Analysis," before the Federal Trade Commission, November 19, 1997 and March 17, 1998.
Member, Advisory Board of Antitrust and Regulation Abstracts, Social Science Research Network, 1998 - present
Participant in the Round Table on the Economics of Mergers Between Large ILECS before the Federal Communications Commission, February 5, 1999.
Advisory Board, Massachusetts Institute of Technology, Department of Economics, 1999 - present
Chairman, FTC Round Table on Empirical Industrial Organization (September 11, 2001)

BOOKS

"Market Behavior Under Uncertainty," Ph.D. Thesis, Massachusetts Institute of Technology (September 1975); Garland Publishing (1984).

Modern Industrial Organization, Scott, Foresman & Co., co-authored with Jeffrey Perloff, first edition (1990), second edition (1994), translated into Chinese, French and Italian; Addison Wesley Longman, third edition (2000).

RESEARCH PAPERS

- "The Equilibrium Analysis of Alternative Housing Allowance Payments," (with Joseph Ferreira) Chapter 6 of Analysis of a Direct Housing Allowance Program, The Joint Center for Urban Studies of M.I.T. and Harvard University, (July 1975).
- "Theories of Vertical Integration," presented at Fourth Annual Telecommunications Conference. Appears in a volume of Proceedings of the Fourth Annual Telecommunications Conference, Office of Telecommunications Policy, (April 1976).
- "Uncertainty, Production Lags, and Pricing," American Economic Review, (February 1977).
- "Selecting Subsidy Strategies for Housing Allowance Programs," (with Joseph Ferreira) Journal of Urban Economics, (July 1977).
- "Peak Load Pricing With Stochastic Demand," American Economic Review, (December 1977). (Reprinted in Economic Regulation edited by P.L. Joskow, Edward Elgar Publishing Limited, 1998.)
- "The Distribution of Permanent Income," Income Distribution and Economic Inequality, edited by Zvi Griliches, et al. (Halsted Press, 1978).
- "Market Behavior with Demand Uncertainty and Price Inflexibility," American Economic Review, (September 1978).
- "Why New Firms Locate Where They Do: An Econometric Model," in Studies in Regional Economics, edited by W. Wheaton, (Urban Institute, 1980).
- "Vertical Integration--An Overview," in Congressional Record Hearings on the Communications Act of 1978. Bill H.R. 13105, (August 3, 1978).
- "Vertical Integration in Competitive Markets Under Uncertainty," Journal of Industrial Economics, (March 1979). Awarded the P.W.S. Memorial Prize for the best essay in the field of Industrial Organization by a scholar under the age of thirty.
- "Valuing Benefits and Costs in Related Output and Input Markets," American Economic Review, (September 1979).
- "Contracts, Price Rigidity and Market Equilibrium," Journal of Political Economy, (October 1979).
- "Benefits and Costs of Airline Mergers: A Case Study," (with W. Landes and R. Posner) Bell Journal of Economics, (Spring 1980). (Reprinted in "Air Transport" in Classics In Transport Analysis series, edited by Kenneth Button and Peter Nijkamp, 2001.)
- "The Limitations of Pigouvian Taxes as a Long Run Remedy for Externalities," (with G. Loury) Quarterly Journal of Economics, (November 1980).
- "The Law and Economics of Rights in Valuable Information: A Comment," Journal of Legal Studies, (December 1980).

- "Price Discrimination: Vertical Integration and Divestiture in Natural Resources Markets," (with J. Perloff) Resources and Energy, (March 1981).
- "The Spatial Effects of a Tax on Housing and Land," Regional Science and Urban Economics, (November 1981).
- "Comments on Weicher," Journal of Law and Economics, (December 1981).
- Comment, in Sherwin Rosen ed. Studies in Labor Markets, University of Chicago Press, (1981).
- "Planning and Market Structure," in The Economics of Information and Uncertainty, edited by J.J. McCall, University of Chicago Press, (1982).
- "The Disruptive Effect of Inflation on the Organization of Markets," in Robert Hall, ed. The Economics of Inflation, University of Chicago Press, (1982).
- "A Reexamination of Delivered Pricing," Journal of Law and Economics, (April 1983).
- "Futures Trading, Market Interrelationships, and Industry Structure," American Journal of Agricultural Economics, (May 1983).
- "The Location and Employment Choices of New Firms: An Econometric Model with Discrete and Continuous Endogenous Variables," The Review of Economics and Statistics, (August 1983).
- "The Need for Coordination Among Firms With Special Reference to Network Industries," (with J. M. Klammer) University of Chicago Law Review, (Spring 1983).
- "The Regulation of Insider Trading" (with D. Fischel), Stanford Law Review, (May 1983).
- "Economic Goals and Remedies of the AT&T Modified Final Judgement" (with W. Lavey), Georgetown Law Review, (August 1983).
- "Equilibrium Fluctuations When Price and Delivery Lags Clear the Market," Bell Journal of Economics, (Autumn 1983).
- "Futures Markets: Their Purpose, Their History, Their Growth, Their Successes and Failures," Journal of Futures Markets, (September 1984). (Reprinted in Futures Markets edited by A.G. Malliaris and W.F. Mullady, Edward Elgar Publishing Limited, 1995; and in Classic Futures: Lessons from the Past for the Electronics Age, edited by Lester Telser, Risk Books, 2000.)
- "Energy and Location," Energy Costs, Urban Development, and Housing, Brookings Institution, (1984).
- "The Limitation of Pigouvian Taxes As A Long Run Remedy for Externalities: Extension of Results," (with G. Loury) Quarterly Journal of Economics, (August 1986).
- "The Rigidity of Prices," American Economic Review, (September 1986).
- "The Theory and The Facts of How Markets Clear: Is Industrial Organization Valuable for Understanding Macroeconomics?" in Handbook of Industrial Organization, eds. Schmalensee and Willig, (1989).

- "Market Power and Mergers in Durable Good Industries," (with R. Gertner), Journal of Law and Economics, (October 1989).
- Comments on Vertical Integration and Market Foreclosure, Brookings Papers on Economic Activity, (December 19, 1989).
- Book Review of Tirole's The Theory of Industrial Organization, Journal of Political Economy, (June 1990).
- "The Genesis of Inflation and the Costs of Disinflation: Comment," Journal of Money, Credit & Banking, (August 1991, Part 2).
- "The Theory of Allocation and its Implications for Marketing and Industrial Structure: Why Rationing is Efficient," Journal of Law and Economics, (October 1991).
- "The Economics of Cooperation and Competition in Electronic Services Network Industries," in Economics of Electronic Service Networks, Wildman Steven ed., Praeger Press, (1992).
- "Merger Policy and Market Definition Under the EC Merger Regulation," Conference on Antitrust in a Global Economy, Fordham Corporate Law Institute, (1994).
- "The Antitrust Economics of Credit Card Networks," (with A. Frankel) Antitrust Law Journal, (Winter 1995).
- "Economic Organization and Conflict," Journal of Institutional and Theoretical Economics, (March 1995).
- "Antitrust and Higher Education: Was There a Conspiracy to Restrict Financial Aid?" (with G. Bamberger and R. Epstein) The Rand Journal of Economics, (Vol. 26, No. 1, Spring 1995, pp. 131-147).
- "The Competitive Effects of Line-of-business Restrictions in Telecommunications," (with K. Arrow and H. Sider), Managerial and Decision Economics, (Vol. 16, pp. 301-321, 1995). (Reprinted in Deregulating Telecommunications - The Baby Bells Case for Competition, edited by Richard S. Higgins and Paul H. Rubin, John Wiley & Sons Ltd., 1995.)
- "The Antitrust Economics of Credit Card Networks: Reply to Evans and Schmalensee," (with A. Frankel), Antitrust Law Journal, (Spring 1995).
- "Antitrust and Payment Technologies," (with A. Frankel), Review, Federal Reserve Bank of St. Louis (November/December 1995).
- "Antitrust Policy Toward Mergers When Firms Innovate: Should Antitrust Recognize the Doctrine of Innovation Markets?" Testimony before the Federal Trade Commission Hearings on Global and Innovation-based Competition (October, 1995).
- "You Keep on Knocking But You Can't Come In: Evaluating Restrictions on Access to Input Joint Ventures," (with S. Salop), Harvard Journal of Law & Technology, (Volume 9, Summer, 1996). (Reprinted in e-Commerce Antitrust & Trade Practices, Practising Law Institute, 2001.)
- "Comments on Causes and Consequences of Airline Fare Wars," Micro Brookings Papers on Economic Activity, (1996).

- "A Critical Assessment of the Role of Imperfect Competition in Macroeconomics," in Market Behaviour and Macro Economic Modeling, Brakman, Van Ees, & Kuipers (eds.), MacMillan Press (1997).
- "Price Rigidity," Business Cycles and Depressions, David Glasner ed., Garland Publishing, Inc., (1997).
- "Communication Among Competitors: Game Theory and Antitrust," (with R. Gertner and A. Rosenfield), George Mason Law Review, (1997). (Reprinted in e-Commerce Antitrust & Trade Practices, Practising Law Institute, 2001.)
- "Comments on Born and Viscusi," Brookings Papers on Economic Activity: Microeconomics, (1998).
- "Antitrust and Higher Education: MIT Financial Aid (1993)" (September 1997) (with G. Bamberger), The Antitrust Revolution, (Oxford University Press), 3rd edition (1999).
- "Market Power and Vertical Restraints in Retailing: An Analysis of FTC v. Toys 'R' Us," (with H. Sider), The Role of the Academic Economist in Litigation Support, edited by Daniel Slottje, North Holland, (1999).
- "The Economics of Religion, Jewish Survival and Jewish Attitudes Toward Competition on Torah Education," (with A. Weiss), Journal of Legal Studies, (2001).
- "A General Analysis of Exclusionary Conduct and Refusal to Deal -- Why Aspen and Kodak are Misguided," Antitrust Law Journal, (2001). (Reprinted in e-Commerce Antitrust & Trade Practices, Practising Law Institute, 2001.)
- "The Lessons from Microsoft," Business Economics, (January 2001).
- "Lessons from Halacha About Competition and Teaching" (with A. Weiss), Center for Business Ethics Social Responsibility, <http://besr.org/library/competition.html>, (March 2001).
- "The Choice of Organizational Form in Gasoline Retailing and The Costs of Laws Limiting that Choice," (with A. Blass), Journal of Law and Economics, (October 2001).
- "Should The Merger Guidelines Be Scrapped? Introduction to a Debate," in Symposium On The Antitrust Analysis Of Mergers: Merger Guidelines vs. Five Forces, 33 U. WEST L.A. L. REV. 2001.
- "Contracts that Lessen Competition -- What is Section 27 for, and How Has it Been Used?" (with D. Goddard), Chapter in book on The New Zealand Antitrust Law (forthcoming).
- "Free Riding and Sales Strategies for the Internet," (with J. Chevalier), The Journal of Industrial Economics, (December 2001).
- "The Competitive Effects of Fannie Mae," (with D. Gross and R. Stillman) Fannie Mae Papers, Volume I, Issue 1, January 2002.
- "The Strategic Use of Tying to Preserve and Create Market Power in Evolving Industries," (with M. Waldman), The Rand Journal (forthcoming).

"Airline Networks and Fares," (with G. Bamberger), Handbook of Airline Economics, McGraw Hill (2002 forthcoming).

UNPUBLISHED PAPERS

"Modeling the Housing Allowance Program," M.A. Thesis, Massachusetts Institute of Technology (September 1974).

"The Cost of Eliminating a Futures Market and The Effect of Inflation on Market Interrelationships," (1984).

"The Empirical Importance of Delivery Lags as an Explanation of Demand," (1984).

"Statistical Supplement to The Antitrust Economics of Credit Card Networks: Reply to Evans and Schmalensee Comment, 63 Antitrust Law Journal 903 (1995)," (with Alan Frankel), (May 1997).

"Competition, Monopoly, and Aftermarkets," (with M. Waldman), Working Paper No. 8086, National Bureau of Economic Research, January 2001.

"An Empirical Investigation of the Competitive Effects of Domestic Airline Alliances, " (with G. Bamberger, and L. Neumann).

"An Empirical Assessment of Predation in the Airline Industry, " (with G. Bamberger).

EXPERT TESTIMONIAL EXPERIENCE

Testimony of Dennis W. Carlton in Re: "Vertical Integration--An Overview." Congressional Record Hearings on the Communications Act of 1978: Proceedings before the House on Bill H.R. 13105, August 3, 1978.

Testimony of Dennis W. Carlton, William M. Landes and Richard A. Posner in Re: Competitive Effects of the Proposed North Central-Southern Airline Merger: Proceedings before the Civil Aeronautics Board, Docket No. 33136, Exhibit NC/SO-T-7, October 13, 1978 and October 9, 1979.

Testimony of Dennis W. Carlton in Re: McNeilab, Inc.: Proceedings before the United States Department of Justice, Drug Enforcement Administration, Docket No. 78-13, March 13, 1980 and May 1980 (Oral).

Testimony of Dennis W. Carlton in Re: Acco Industries, Inc. v. Kresl Power Equipment, Inc.: In the U.S. Court of Appeals For the Seventh Circuit, Docket No. 80-2024, March 29, 1980.

Deposition, Testimony, and Rebuttal Testimony of Dennis W. Carlton in Re: Ethyl Corporation: Proceedings before the Federal Trade Commission, Docket No. 9128, November 10 & 11, 1980 (Deposition), November 13 & 14, 1980 (Testimony), and February 20, 1981 (Rebuttal).

Deposition of Dennis W. Carlton in Re: Independence Tube Corporation v. Copperweld Corporation, Regal Tube Company, The Yoder Company v. David F. Grohne (counter-defendant): In the U.S. District Court for the Northern District of Illinois, Eastern Division, No. 76 C 4201, January 24, 1981.

Affidavit of Dennis W. Carlton in Re: Ellis Banking Corporation, Ellis First National Bank of Bradenton, and Ellis First Security Bank v. Barnett Banks of Florida, Inc., Barnett Bank of Manatee County, and Westside National Bank of Manatee County: In the U.S. District Court for the Middle District of Florida, Tampa Division, No. 81-693-Civ-T-H, July 28, 1981.

Deposition and Economic Report of Dennis W. Carlton in Re: Schneider Industrial Sales and Service Company, William Schneider and Mary Emily Schneider v. Acco Industries, Inc.: In the U.S. District Court for the District of New Jersey, April 19, 1982.

Deposition and Testimony of Dennis W. Carlton in Re: City of Batavia, et al. v. Commonwealth Edison Company: Proceedings before the U.S. District Court, Northern District of Illinois, Eastern Division, No. 76 C 4388, May 17, 18 & 25, 1982 (Deposition), and July 22, 1982 (Testimony).

Deposition of Dennis W. Carlton in Re: M. K. Metals Inc., et al. v. National Steel Corporation: In the U.S. District Court for the Northern District of Illinois, Eastern Division, No. 79 C 1661, September 15, 1983.

Declaration and Deposition of Dennis W. Carlton in Re: Carter Hawley Hale Stores, Inc. v. The Limited, Inc., et al.: In the U.S. District Court, Central District California, No. CV 84 22000 AWT (JRX), April 21, 1984 (Declaration), and April 23, 1984 (Deposition).

Verified Statements and Testimony of Dennis W. Carlton in Re: Denver & Rio Grande Western Railroad v. Santa Fe Southern Pacific Corporation et al.: Proceedings before the Interstate Commerce Commission, Docket No. 30400, August 28, 1984, November 14, 1984, and May 22, 1985, (Statements), and January 30, 1985, and June 19, 1985, (Testimony).

Affidavit of Dennis W. Carlton and William M. Landes in Re: United States of America v. Western Electric Company, Inc. and American Telephone and Telegraph Company: In the United States District Court for the District of Columbia, December 19, 1984.

Statement of Carlton, DeMuth, Landes, and Rosenfield in Response to the National Telecommunications Information Administration (NTIA) Request for Comments in Connection with the Comprehensive Study of the Structure and Regulation of the U.S. Telecommunications Industry, March 29, 1985.

Deposition and Affidavit of Dennis W. Carlton in Re: L&W Industries, Inc. v. American Standard, Inc.: In the U.S. District Court, Eastern District of Wisconsin, Civil Action No. 81-C-1409, May 14, 1985 (Deposition) and August 30, 1985 (Affidavit).

Testimony of Dennis W. Carlton in Re: E. I. Du Pont De Nemours and Company's Thebaine Import Application: Proceedings before the U.S. Department of Justice, Drug Enforcement Administration, Docket No. 84-51, May 31, 1985.

Testimony of Dennis W. Carlton, William M. Landes and Sam Peltzman in Re: Joint Application of Pan American World Airways, Inc. and United Airlines, Inc., Pacific Division Transfer Case: Proceedings before the U.S. Department of Transportation, Docket No. 43065, August 7, 1985.

Deposition of Dennis W. Carlton in Re: General Motors "THM 200" Transmission Litigation: Proceedings before the U.S. District Court, Northern District of Illinois, Eastern Division, No. 79 C 1249, 80 C 2151 and 85 C 4805, July 2, 1986.

Affidavit of Dennis W. Carlton in Re: Norwest Bank Fire Case: Proceedings before the U.S. District Court, Fourth Judicial District, State of Minnesota, Court File No. 83-08122, August 28, 1986.

Affidavit of Dennis W. Carlton in Re: Policy and Rules Concerning Rates for Dominant Carriers: Before the Federal Communications Commission, Washington, D.C., Docket No. 87-313, October 16, 1987.

Deposition of Dennis W. Carlton in Re: Research Institute for Medicine and Chemistry, Inc. v. Wisconsin Alumni Research Foundation: In the U.S. District Court, Western District of Wisconsin, Case No. 85-C-1060-D, October 20 & 21, 1986.

Affidavit and Deposition of Dennis W. Carlton in Re: United States Football League, et al. v. National Football League, et al.: In the U.S. District Court, Southern District of New York, 84 Civ. 7484 (PKL), November 24, 1986 (Affidavit), February 26, 1986 and December 4, 1986 (Deposition).

Verified Statements of Dennis W. Carlton in Re: Coal Trading Corporation, et al. v. The Baltimore and Ohio Railroad Co., et al.: Before the Interstate Commerce Commission, ICC Docket No. 38301S, December 16, 1986 and September 8, 1987.

Testimony of Dennis W. Carlton in Re: The Application of Pacific Bell, a Corporation, for Authority to Increase Certain Intrastate Rates and Charges Applicable to Telephone Services Furnished within the State of California, California Public Utilities Commission, Application No. 85-01-034, December 19, 1986, and January 22 & 28, 1987.

Deposition of Dennis W. Carlton in Re: John H. Torphy v. Touche Ross & Co., et al.: In the Circuit Court Dane County, State of Wisconsin, Case No. 82-CV-4033, August 25, 1987.

Deposition of Dennis W. Carlton in Re: Martin Exploration Management Company, et al. v. Panhandle Eastern Corporation, et al.: In the U.S. District Court for the District of Colorado, Civil Action No. 86-Z-804, May 5, 6 & 18, 1988.

Deposition of Dennis W. Carlton in Re: The Dow Chemical Company v. Halliburton Company and The Dow Chemical Company v. Mississippi Power & Light Company: In the U.S. District Court for the Northern District of Mississippi Greenville Division, No. GC-78-31-GD-D and No. GC-78-32-GD-D, June 16, 1988.

Statements and Testimony of Dennis W. Carlton in Re: Trailer Train Company et al., Approval of Pooling of Car Service With Respect to Flat Cars: Before the Interstate Commerce Commission, Finance Docket No. 27590. (Sub-No. 1), July 7 & 14, 1988 (Statements) and July 25 & 26, 1988 (Testimony).

Testimony of Dennis W. Carlton in Re: Pontarelli Limousine, Inc. v. City of Chicago, Finance Docket No. 83-C-6716, September 25 & 26, 1989.

Deposition of Dennis W. Carlton in Re: Great Northern Nekoosa Corporation v. Georgia-Pacific Corporation: Before the United States District Court District of Connecticut, Civ. Action No. B-89-607-WWE, December 28, 1989 and January 15, 1990.

Testimony of Dennis W. Carlton in Re: The Matter of the Physicians and Surgeons Medical Malpractice Insurance Rates of St. Paul Fire & Marine Insurance Company: Before the State of Minnesota Office of Administrative Hearings for the Commissioner of Commerce, O.A.H. Docket No. 0-1004-3412-2, January 1990.

Deposition of Dennis W. Carlton in Re: Dale A. Ervin, et al. v. Amoco Oil Company, et al.: In the District Court, City and County of Denver, State of Colorado, No. 88-CV-11994, September 5, 1990.

Reply Affidavit of Dennis W. Carlton and George J. Stigler in Re: United States of American v. Western Electric Company Inc. and American Telephone and Telegraph Company: In the United States District Court for the District of Columbia, Civil Action No. 82-0192, January 10, 1991.

Testimony of Dennis W. Carlton in Re: Westreco, Inc. v. Commissioner of Internal Revenue: In the United States Tax Court, Washington, D.C. 20217, Docket No. 24078-88, January 29, 1991.

Deposition, Testimony, and Rebuttal Testimony of Dennis W. Carlton in Re: In the Matter of Marathon Oil Company and Phillips Petroleum Company: Before the Department of Revenue, State of Alaska, Case No. 89314, April 23 & 24, 1991 (Deposition), March 28, 1991, June 19, 1991 (Testimony), July 22, 1991 (Rebuttal Testimony) and October 3 & 4, 1991 (Oral).

Deposition of Dennis W. Carlton in Re: Martin Exploration Management Company, et al. v. Panhandle Eastern Pipeline Corporation, et al.: In the U.S. District Court for the District of Colorado, Civil Action No. 91-N-110, February 5, 1992.

Deposition, Affidavit and Testimony of Dennis W. Carlton in Re: United States of America v. Brown University, et al.: In the U.S. District Court For the Eastern District of Pennsylvania, Civil Action No. 91-CV-3274, February 18 & 19, 1992 (Deposition), April 28, 1992 (Affidavit), and July 8 & 9, 1992 (Testimony).

Deposition of Dennis W. Carlton in Re: United States of America, People of The State of California, et al. v. J. B. Stringfellow, Jr., et al.: In the United States District Court Central District of California, No. CIV 83-2501 JMI, March 10 & 11, 1992.

Affidavit of Dennis W. Carlton in Re: SCFC ILC, Inc. d/b/a MountainWest Financial v. Visa U.S.A., Inc.: In the U.S. District Court for the District of Utah, Central Division, Civil No. 2:91-cv-047B, June 25, 1992.

Deposition and Testimony of Dennis W. Carlton in Re: Adcom, Incorporated, Cutrone Communications, Incorporated, Great Southern Communications Incorporated, Nola Communications Incorporated and Conrad Communications, Incorporated v. Nokia Corporation, Nokia-Mobira Oy, Nokia-Mobira, Incorporated, Nokia, Incorporated, Nokia Data Communications and Cue Paging Corporation: In the United States District Court for the Eastern District of Louisiana, Civil Action Number 90-4088, November 3 & 4, 1992 (Deposition), and February 9 & 10, 1993 (Testimony).

Statement, Supplemental Statement and Deposition of Dennis W. Carlton in Re: City of Dillingham, et al. v. Western Pioneer, Inc., et al., and City of Nome v. Western Pioneer, Inc., et al.: In the United States District Court for the District of Alaska, No. A89-014 Civil (Consolidated for Pre-Trial Proceedings with No. N89-004 Civil), November 6, 1992 (Statement and Supplemental Statement) and November 24, 1992 (Deposition).

Verified Statement of Dennis W. Carlton in Re: Kansas City Southern Industries, Inc., The Kansas City Southern Railway Company and K&M Newco, Inc. -- Control -- MidSouth Corporation, MidSouth Rail Corporation, MidLouisiana Rail Corporation, SouthRail Corporation and TennRail Corporation, Before the Interstate Commerce Commission, Finance Docket No. 32167, May 1993.

Verified Statements and Deposition of Dennis W. Carlton in Re: Union Pacific Corporation, Union Pacific Railroad Company and Missouri Pacific Railroad Company -- Control -- Chicago and North Western Holdings Corp. and Chicago and Northwestern Transportation Company: Before the Interstate Commerce Commission, Finance Docket No. 32133, May 24, 1993, June 21, 1993, and November 24, 1993 (Statements), and March 17, 1994, and July 26, 1994 (Deposition).

Verified Statement of Dennis W. Carlton in Re: Application of TTX Company and Certain Common Carriers by Railroad For Approval of Amendment of Pooling Agreement and Car Contract Extending Their Terms, Before the Interstate Commerce Commission, Finance Docket No. 27590 (Sub-No. 2), November 19, 1993.

Deposition of Dennis W. Carlton in Re: Merck & Co., Inc. v. Alcon Laboratories, Inc., In the United States District Court for the District of Delaware, No. C.A. 92-691, December 14, 1993.

- Deposition and Affidavit of Dennis W. Carlton in Re: Northwest Airlines, Inc. v. American Airlines, Inc., Before the United States District Court, District of Minnesota, Fourth Division, C.V. No. 4-91-539, February 22 & 23, 1994, May 16 & 17, 1995, and July 8, 1997 (Deposition); and February 20, 1995 and May 9, 1996 (Affidavit).
- Testimony of Dennis W. Carlton in Re: Florida Power & Light Company: Before the Federal Energy Regulatory Commission, Docket Nos. ER93-465-000, ER93-507-000, ER-93-922-000, and EL94-12-000, April 8, 1994, October 19, 1994, and June 22, 1995.
- Testimony of Dennis W. Carlton in Re: The Matter of Touchfax Information Systems Inc. and Landis & Gyr Communications: Before the American Arbitration Association, No. 13-T-133-00260-93, May 10, 1994.
- Affidavit and Declaration of Kenneth J. Arrow and Dennis W. Carlton in Re: United States of America v. Western Electric Company, Inc., and American Telephone and Telegraph Company: Before the United States District Court for the District of Columbia, Civil Action No. 82-0192, February 28, 1994 (Affidavit), and May 30, 1995 (Declaration).
- Affidavit and Testimony of Dennis W. Carlton and Alan S. Frankel in Re: Leonard R. Kahn v. Emerson Electric Co., a Missouri corporation; Hazeltine Corporation, a Delaware corporation; and Motorola, Inc., a Delaware corporation; John Doe corporations 1-x; and John Does 1-x, individually: Before the United States District Court, for the Eastern District of New York, 92 Civ. 3063 (ADS), October 20, 1994 (Affidavit), and May 22, 1995 (Testimony).
- Deposition and Testimony of Dennis W. Carlton in Re: Federal Trade Commission v. B.A.T. Industries P.L.C., Brown and Williamson Tobacco Corporation; American Brands, Inc.; and American Tobacco Company, Before the United States District Court, Southern District of New York, C.V. No. 94 Civ. 7849, November 20, 1994 (Deposition), and December 14, 1994 (Testimony).
- Affidavit, Supplemental Affidavit and Deposition of Dennis W. Carlton in Re: Weatherford Roofing Company v. Employers National Insurance Company and Employers Casualty Company et al: In the United States District Court for the District of Dallas County, Texas, 116th Judicial District, No. 91-05637, May 5, 1995 (Affidavit), May 9-10 & June 1, 1995 (Deposition), and October 20, 1995 (Supplemental Affidavit).
- Affidavit of Dennis W. Carlton in Re: Airline Travel Agency Commission Antitrust Litigation: In the United States District Court for the District of Minnesota, No. 4-95-107, June 14, 1995.
- Declaration of Dennis W. Carlton in Re: Donnelly Corporation v. Gentex Corporation: In the United States District Court for the Western District of Michigan, Southern Division, Case No. 1:93 CV 530, October 20, 1995.
- Testimony of Dennis W. Carlton before the Federal Trade Commission Hearings on Global and Innovation-based Competition, October 25, 1995.
- Report and Deposition of Dennis W. Carlton in Re: Brand Name Prescription Drugs Antitrust Litigation, In the United States District Court for the Northern District of Illinois, Eastern Division, MDL No. 997, November 20, 1995 (Report), December 18 & 19, 1995 (Deposition).

Expert Report and Deposition of Dennis W. Carlton in Re: Johnson Matthey v. General Motors (Antitrust Counterclaim), District Court for the Eastern District of Wisconsin, No. 93 C 0931, January 9, 1996 (Expert Report), February 14, 1996 (Deposition).

Brief of Evidence, Summary of Evidence, and Testimony of Dennis W. Carlton on Behalf of Defendants in Re: Shell (Petroleum Mining) Company Limited and Todd Petroleum Mining Company Limited v. Kapuni Gas Contracts Limited and Natural Gas Corporation of New Zealand Limited, In the High Court of New Zealand, Auckland Registry, Commercial List, CL 5/94, April 2, 1996 (Brief of Evidence), July 18, 1996 (Summary of Evidence), and July 18-19, 1996 (Testimony).

Expert Report, Deposition, and Testimony of Dennis W. Carlton in Re: The Matter of the Arbitration Between Sprint Communications Company L.P. and Network 2000 Communications Corporation, Arbitration Case Number 57 181 0013 94, July 15, 1996 (Expert Report with H. Sider), August 12, 1996 (Deposition), and September 27, 1996 (Testimony).

Testimony and Prepared Statement of Dennis W. Carlton on behalf of Sacramento Municipal Utility District in Re: Pacific Gas & Electric Company, San Diego Gas & Electric Company, and Southern California Edison Company: Before the Federal Energy Regulatory Commission Technical Conference on Market Power & Transmission Pricing, Docket Nos. ER96-1663-000, EC96-19-000, EL96-48-000, September 12, 1996.

Declaration of Dennis W. Carlton in Re: United States of America v. International Business Machines: In the United States District Court for the Southern District of New York, Civil Action No. 72-344 (AGS), November 12, 1996.

Expert Report, Affidavit Rebuttal and Deposition of Dennis W. Carlton in Re: Bell Atlantic Corporation and DSC Communications Corporation v. AT&T Corporation and Lucent Technologies Inc., Civil Action No. 5-96CV45, December 4, 1996 (Expert Report with R.E. Olley and D.S. Sibley), January 10, 1997 (Affidavit Rebuttal with R.E. Olley and D.S. Sibley), and January 21, 1997 (Deposition).

Affidavit of Dennis W. Carlton in Re: Pacific Gas & Electric Company, San Diego Gas & Electric Company, and Southern California Edison Company: United States of America Before the Federal Energy Regulatory Commission, FERC Docket No. ER96-1663-000, January 16, 1997 (with G.E. Bamberger).

Affidavit of Dennis W. Carlton in Re: Advanta Corp., Advanta National Bank U.S.A., and Advanta National Bank v. Visa U.S.A., Inc. and Mastercard International, Inc.: In the United States District Court for the Eastern District of Pennsylvania, Civil Action No. 96-CV-7940, January 21, 1997.

Deposition, Testimony, and Surrebuttal Testimony of Dennis W. Carlton in Re: In the Matter of Toys "R" Us, Inc.: In the United States of America Before the Federal Trade Commission, File No. 9278, March 16, 1997 (Deposition), April 16 and 25, 1997 (Testimony), and June 3, 1997 (Surrebuttal Testimony).

Deposition of Dennis W. Carlton in Re: In the Matter of Theresa Aguilar, et al vs. Atlantic Richfield Corporation et al: In the Superior Court of the State of California In and For the County of San Diego, File No. 700810, September 30, 1997 (Deposition).

Report of Dennis W. Carlton in Re: Few Ready Mix Concrete Co., v. Transit Mix Concrete & Materials Co., et al: In the United States District Court for the Eastern District of Texas Lufkin Division, No. 9:96-CV-86, October 31, 1997 (with W. J. Lynk).

Verified Statement, Depositions, Verified Reply Statement, and Verified Rebuttal Statement of Dennis W. Carlton in Re: CF Industries, Inc. v. Koch Pipeline Company, L.P.: In the United States of America Before the Department of Transportation Surface Transportation Board, No. 41685, November 7, 1997 (Verified Statement), December 19, 1997 (Deposition), January 8, 1998 (Verified Reply Statement), February 3, 1998 (Deposition), and February 20, 1998 (Verified Rebuttal Statement).

Expert Witness Report, Deposition and Affidavits of Dennis W. Carlton in Re: Industrial Silicon Antitrust Litigation: In the United States District Court for the Western District of Pennsylvania, No. 95-2104, January 9, 1998 (Expert Witness Report), February 10-11, 1998 (Deposition), April 8, 1998 (Affidavit), and June 29, 1998 (Affidavit).

Declaration of Dennis W. Carlton in Re: Applications of WorldCom, Inc. and MCI Communications Corporation for Transfer of Control of MCI Communications Corporation to WorldCom, Inc.: Before the Federal Communications Commission, CC Docket No. 97-211, January 25, 1998 (with H. Sider)

Expert Report and Deposition of Dennis W. Carlton in Re: Bepco, Inc., et al v. AlliedSignal Inc. and AlliedSignal Truck Brake System Co.: In the United States District Court for the Middle District of North Carolina, Winston-Salem Division, No. 6:96CV00274, February 3, 1998 (Expert Report) and March 3, 1998 (Deposition).

Affidavit of Dennis W. Carlton in Re: Petition of WorldCom, Inc. for Approval to Transfer Control of MCI Communications Corporation to WorldCom, Inc.: Before the New York State Public Service Commission, No. 97-C-1804, February 16, 1998 (with H. Sider).

Affidavit of Dennis W. Carlton in Re: Petition of WorldCom, Inc. for Approval to Transfer Control of MCI Communications Corporation to WorldCom, Inc.: Before the Florida Public Service Commission, No. 971375-TP, February 27, 1998 (with H. Sider).

Second Declaration of Dennis W. Carlton in Re: Applications of WorldCom, Inc. and MCI Communications Corporation for Transfer of Control of MCI Communications Corporation to WorldCom, Inc.: Before the Federal Communications Commission, CC Docket No. 97-211, March 19, 1998 (with H. Sider).

Affidavit, Reports, Reply Affidavit, Reply Report, Prepared Statements and Testimony of Dennis W. Carlton in Re: The Merger of SBC Communications Inc. with Ameritech Corporation: Before the Federal Communications Commission, CC Docket No. 98-141, July 20, 1998 (Affidavit and Report), November 12, 1998 (Reply Affidavit and Reply Report), February 5, 1999 (Prepared Statements and Testimony as a Participant in the Round Table on the Economics of Mergers Between Large ILECS), April 13, 1999 (Report to the FCC on Supplemental Analysis of the Katz/Salop Hypothesis).

Report and Supplemental Report of Dennis W. Carlton in Re: Riverside Pipeline Company v. Panhandle Eastern Pipeline Company: In the U.S. District Court for the Western District of Missouri, No. 97-0642-CV-W-4, September 20, 1998 (Report with H. Sider) and January 7, 1999 (Supplemental Report).

- Statement of Dennis W. Carlton in Re: Enforcement Policy Regarding Unfair Exclusionary Conduct in the Air Transportation Industry: Before the Department of Transportation, Office of the Secretary, Washington, D.C., Docket No. OST-98-3713, September 24, 1998 (with G. Bamberger).
- Report and Deposition of Dennis W. Carlton in Re: The Procter & Gamble Company, et al. vs. Amway Corporation, et al.: In the U.S. District Court for the Southern District of Texas, Houston Division, January 8, 1999 (Report) and February 9, 1999 (Deposition).
- Responsive Direct Testimony and Prepared Answering Testimony of Dennis W. Carlton for Intervenor Oklahoma Gas and Electric Company in Re: Joint Application of American Electric Power Company, Inc., Public Service Company of Oklahoma and Central and South West Corporation Regarding Proposed Merger: Before the Corporation Commission of the State of Oklahoma, Cause No. PUD 980000444, March 29, 1999 (with G. Bamberger).
- Report and Declaration of Dennis W. Carlton in Re: Telnet Communications, Inc., et al. v. WorldCom, Inc., et al.: In the United States District Court for the Southern District of Texas, Houston Division, No. H-98-2020, March 30, 1999 (Report) and April 28, 1999 (Declaration).
- Prepared Answering Testimony and Exhibits of Dennis W. Carlton on Behalf of Oklahoma Gas and Electric Company in Re: American Electric Power Company, Inc. and Central and South West Corporation: United States of America Before the Federal Energy Regulatory Commission, FERC Docket Nos. ER98-40-000, ER98-2770-000, ER98-2786-000, April 27, 1999 (with G. Bamberger).
- Expert Report , Deposition and Supplemental Report of Dennis W. Carlton in Re: United States of America vs. American Society of Composers, Authors and Publishers in the Matter of the Application of Turner Broadcasting Systems Inc. for the Determination of Reasonable License Fees: Before the United States District Court, Southern District of New York, Civ. 13-95 (WCC) (Referred to Magistrate Judge Dolinger), April 15, 1999 (Expert Report), July 28-29 and August 5, 1999 (Deposition), and December 16, 1999 (Supplemental Report).
- Declaration, Deposition and Reply Declaration of Dennis W. Carlton in Re: Visa Check/MasterMoney Antitrust Litigation: Before the United States District Court, Eastern District of New York, No. CV 96-5238 (JB) RLM), April 15, 1999 (Declaration), May 25, 1999 and June 1, 1999 (Deposition), and August 1, 1999 (Reply Declaration).
- Report and Deposition of Dennis W. Carlton in Re: Zeneca Limited, Zeneca Holdings Inc., and Zeneca Inc. v. Rhone-Poulenc Inc. and Rhone-Poulenc AG Company: In the United States District Court for the District of Delaware, No. 97-652-GMS, May 17, 1999 (Report) and June 16, 1999 (Deposition).
- Affidavit and Reply Affidavit of Dennis W. Carlton in Re: Andersen Consulting Business Unit Member Firms v. Arthur Andersen Business Unit Member Firms and Andersen Worldwide Societe Cooperative: Before the International Court of Arbitration of the International Chamber of Commerce, No. 9797/CK, June 2, 1999 (Affidavit) and September 13, 1999 (Reply Affidavit).

- Affidavit, Report, Rebuttal Report, Reply Report, Rebuttal Report and Testimony of Dennis W. Carlton in Re: The Commissioner of Competition and Superior Propane Inc. and ICG Propane Inc.: Before The Competition Tribunal, No. CT-98/2, August 17, 1999 (Affidavit and Report), September 14, 1999 (Rebuttal Report with G. Bamberger), September 19, 1999 (Reply Report with G. Bamberger), September 27, 1999 (Rebuttal Report to Professor Michael Ward with G. Bamberger), and December 13-14, 1999 (Testimony with G. Bamberger).
- Declaration of Dennis W. Carlton in Re: Merger of Qwest Communications International Inc. and U.S. WEST, Inc.: Before the Federal Communications Commission, CC Docket No. 99-272, October 18, 1999 (with Hal Sider).
- Prepared Direct Testimony, Deposition and Cross-Examination of Dr. Dennis W. Carlton on behalf of Sierra Pacific Power Company in Re: United States of America Before the Federal Energy Regulatory Commission: Docket Nos. ER99-28-001, ER99-28-003, EL99-38-002 and ER99-945-002, November 17, 1999 (Prepared Direct Testimony), January 10, 2000 (Deposition), and April 26 and May 1, 2000 (Cross-Examination).
- Expert Report and Deposition of Dennis W. Carlton in Re: United States of America v. Northwest Airlines Corporation and Continental Airlines, Inc.: In the United States District Court for the Eastern District of Michigan, Southern Division, Civil Action No. 98-74611, January 27, 2000 (Expert Report) and June 7, 2000 (Deposition).
- Declaration and Ex Parte Declaration of Dennis W. Carlton in Re: Joint Applications of MCI WorldCom, Inc., and Sprint Corporation for Consent to Transfer Control: Before the Federal Communications Commission, CC Docket No. 99-333, February 18, 2000 (Declaration with H. Sider), and May 10, 2000 (Ex Parte Declaration with H. Sider).
- Testimony, Rebuttal Testimony and Cross-Examination of Dennis W. Carlton on behalf of Sacramento Municipal Utility District in Re: Application of Pacific Gas and Electric Company to Market Value Hydroelectric Generating Plants and Related Assets Pursuant to Public Utilities Code Sections 367(b) and 851: Before the Public Utilities Commission of the State of California, application No. 99-09-053, March 2, 2000 (Testimony), March 16, 2000 (Rebuttal Testimony) and May 9, 2000 (Cross-Examination).
- Affidavit, Deposition and Reply Affidavit of Dennis W. Carlton in Re: Gregory F. Daniel, M.D., et al. v. American Board of Emergency Medicine, et al.: In the United States District Court for the Western District of New York, Civil Action No. 90-CV-1086A, March 3, 2000 (Affidavit), April 17 and 18, 2000 (Deposition), and July 12, 2000 (Reply Affidavit).
- Expert Report, Reply Expert Report, Deposition and Supplemental Report of Dennis W. Carlton in Re: CSX Transportation, Inc. V. Qwest Communications International, Inc.: In the United States District Court for the Middle District of Florida, Jacksonville Division, Civil Action No. 99-412-CIV-J-21C, July 19, 2000 (Expert Report), October 11, 2000 (Reply Expert Report), January 10-11, 2001 (Deposition), and July 18, 2001 (Supplemental Report).
- Reply Declaration of Dennis W. Carlton in Re: Joint Application of Northpoint Communications and Verizon Communications for Authority to Transfer Control of Blanket Authorization to Provide Domestic Interstate Telecommunications Services as a Non-Dominant Carrier: Before the Federal Communications Commission, Washington DC, Docket No. 00-157, October 17, 2000 (with H. Sider).

Declaration and Reply Declaration of Dennis W. Carlton in Re: In the Matter of Inquiry Concerning High-Speed Access to the Internet Over Cable and Other Facilities: Before the Federal Communications Commission, Washington DC, Docket No. 00-195, December 1, 2000 (Declaration with K. Arrow and G. Becker), and January 10, 2001 (Reply Declaration with K. Arrow and G. Becker).

Report, Rebuttal Report and Deposition of Dennis W. Carlton in Re: Rambus Inc. v. Infineon Technologies AG, Infineon Technologies North America Corp., Infineon Technologies, Inc., Infineon Technologies Holding North America Corp., and Infineon Technologies Corp.: In the United States District Court for the Eastern District of Virginia, Richmond Division, Civil Action No. 3:00CV524, December 20, 2000 (Report), January 19, 2001 (Rebuttal Report), and February 6, 2001 (Deposition).

Reports, Rebuttal Reports, Deposition and Declaration of Dennis W. Carlton in Re: Micron Technology, Inc. v. Rambus Inc.: In the United States District Court for the District of Delaware, Civil Action No. 00-792, March 28, 2001 (Report), April 13, 2001 (Rebuttal Report), April 18, 2001 (Deposition), and August 17, 2001 (Report), September 17, 2001 (Rebuttal Report), and Declaration (October 1, 2001).

Expert Report of Dennis W. Carlton in Re: Amgen Inc. v. Ortho Pharmaceutical Corp.: Endispute Arbitration, Chicago, Illinois, August 31, 2001.

Testimony of Dennis W. Carlton in Re: Empirical Industrial Organization Roundtable: Before the Federal Trade Commission, Matter No. P015602 (September 11, 2001).

Expert Report of Dennis W. Carlton in Re: Artemio Del Serrone, et al. v. Philip Morris Companies, Inc., et al.: In the Circuit Court for the County of Wayne, State of Michigan, No. 00-004035 CZ, December 19, 2001.

Expert Report of Dennis W. Carlton in Re: Holiday Wholesale Grocery Company, et al. v. Philip Morris Incorporated, et al.: In the United States District Court for the Northern District of Georgia, Atlanta Division, No. 1:00-CV-0447-JOF, MDL No. 1342, December 19, 2001.

Expert Report of Dennis W. Carlton in Re: Flat Glass Antitrust Litigation: In the United States District Court for the Western District of Pennsylvania, No. 97-550, MDL NO. 1200, December 20, 2001.

Expert Report of Dennis W. Carlton in Re: Symbol Technologies et al v. Lemelson Medical et al and Cognex Corporation v. Lemelson Medical et al: In the United States District Court, District of Nevada, CV-S-01-701-PMP (RJJ) and CV-S-01-702-PMP (RJJ), December 14, 2001.

HAL SIDER

September 2001

Business Address: Lexecon Inc.
332 S. Michigan Ave.
Suite 1300
Chicago, IL 60604 (312) 322-0229

Home Address: 385 Ramsay Road
Deerfield, IL 60015 (847) 405-0153

EDUCATION

Ph.D., UNIVERSITY OF WISCONSIN, Madison, Wisconsin: Economics, 1980.

M.A., UNIVERSITY OF WISCONSIN, Madison, Wisconsin: Economics, 1978.

B.A., UNIVERSITY OF ILLINOIS, Urbana, Illinois: Economics, 1976.

EMPLOYMENT

LEXECON INC., Chicago, Illinois (October 1985 - present): 1985-90: Economist; 1990-1999: Vice President; 1999-current: Senior Vice President.

U.S. COMMISSION ON CIVIL RIGHTS, Washington, D.C., (August 1984 - October 1985): Co-Director: Project on Minority Income Trends.

OFFICE OF POLICY: U.S. DEPARTMENT OF LABOR, Washington, D.C., (May 1982 - August 1984): Economist.

PRESIDENT'S TASK FORCE ON FOOD ASSISTANCE (on leave from U.S. Department of Labor), Washington, D.C., (September 1983 - February 1984): Research Associate.

OFFICE OF RESEARCH AND EVALUATION; BUREAU OF LABOR STATISTICS, Washington, D.C., (September 1980 - May 1982): Economist.

UNIVERSITY OF WISCONSIN, Madison, Wisconsin (1978 - 79): Teaching Assistant.

UNIVERSITY OF WISCONSIN, Madison, Wisconsin (1976 - 78): Science Writer.

FIELDS OF SPECIALIZATION

Applied Microeconomics
Econometrics
Industrial Organization
Telecommunications
Labor Economics

ARTICLES

- "Will Mergers of Large Local Exchange Carriers Lead to Discrimination Against Rivals?" April 2000 (with Dennis Carlton and Thomas Stemwedel).
- "Recent Developments in U.S. Antitrust Enforcement," The United States Antitrust Review, October 1999 (with Gustavo Bamberger).
- "Market Power and Vertical Restraints in Retailing: An Analysis of FTC v. Toys 'R' Us," in The Role of the Academic Economist in Litigation Support, edited by Daniel Slottje (1999), with Dennis Carlton.
- "The Competitive Effects of Line-of-Business Restrictions in Telecommunications," Managerial and Decision Economics (1995), with Kenneth Arrow and Dennis Carlton. (Reprinted in R. Higgins and P. Rubin, eds., Deregulating Telecommunications: The Baby Bells' Case for Deregulation, Wiley Series in Managerial Economics, 1995.)
- "Applications of Economic Theory and Econometric Methods to Merger Review in the United States," (paper presented to European Commission Merger Task Force, 1992), with A. Rosenfield and W. Bishop.
- "Unemployment Incidence and Duration: 1968-1982," American Economic Review (June 1985).
- "The Pay Gap and Occupational Segregation: Implications for Comparable Worth," Proceedings of the Industrial Relations Research Association (1985), with June O'Neill.
- "Work-Related Accidents and the Production Process," Journal of Human Resources (Winter 1985).
- "Labor Force Participation and the Relative Earnings of Black and White Males: 1940-80," with Andy Sparks, (paper presented at the World Congress of the Econometric Society, 1985).
- "Comment on McIntyre: Estimating Long-Term Labor Market Flows from CPS Data," Proceedings: Conference on Applications of Gross Flow Data, U.S. Bureau of the Census (1985).
- "The Changing Makeup of the Military and the Effect on Labor Force Data," Monthly Labor Review (July 1984), with Cheryl Cole.
- "Accuracy of Response in Labor Market Surveys: Evidence and Implications," Journal of Labor Economics (October 1983), with Wesley Mellow.
- "Safety and Productivity in Underground Coal Mining," Review of Economics and Statistics (May 1983).

"Economic Incentives and Safety Regulation," American Economist (Summer 1983).

"Consumers and Product Safety: Market Processes and Imperfections," Policy Studies Journal (February 1983), with Eugene Smolensky.

REPORTS

The Economic Progress of Black Men in America, U.S. Commission on Civil Rights (1986).

Economic Status of Americans of Eastern and Southern European Ancestry, U.S. Commission on Civil Rights (1986).

Report of the President's Task Force on Food Assistance, Curran Press, Alexandria, Virginia (1984).

MISCELLANEOUS

University-Industry Dissertation Fellowship, University of Wisconsin, 1979-80.

Referee for:

Journal of Human Resources
Journal of Industrial Economics
Journal of Labor Economics
Journal of Law and Economics
Journal of Legal Studies
National Commission on Employment Policy

National Science Foundation
Policy Studies Journal
Review of Economics and Statistics
Social Science Research Council
U.S. Department of Health and Human Services

Member, Internet Committee, American Bar Association Section on Antitrust Law

TESTIMONIAL EXPERIENCE

Joint Declaration to Federal Communications Commission, GN Docket No. 00-185, in the matter of Inquiry Concerning High-Speed Access to Internet Over Cable and Other Facilities, July 2001 (with K. Arrow, G. Becker, D. Carlton, R. Gertner, D. Fishcel, J. Kalt, and G. Bamberger), July 2001.

Forest Laboratories, Inc. v. G.D. Searle and Co., U.S. District Court for the Northern District of Illinois, Eastern Division, CA No. 98C-5170. Expert Witness Report on behalf of Forest Laboratories, April 2001 (with David Gross).

Reply Declaration Re: Joint Application of Northpoint Communications and Verizon Communications for Authority to Transfer Control of Blanket Authorization to Provide Domestic Interstate Telecommunications Services as a Non-Dominant Carrier: Before the

Federal Communications Commission, Washington DC, Docket No. 00-157, October 17, 2000 (with Dennis Carlton).

Vitamin Antitrust Litigation, United States District Court for the District of Columbia, MDL No. 1285. Expert Report on behalf of opt-out plaintiffs, June 2000 (with William M. Landes).

Ex Parte Declaration to Federal Communications Commission, CC Docket No. 99-333, in the matter of Joint Application of MCI WorldCom and Sprint for Consent to Transfer Control, May 2000, on behalf of SBC.

Gas City, Ltd. v. Indiana Department of Transportation, Circuit Court of St. Joseph County, Indiana. Affidavit on behalf of Gas City, March 2000.

Declaration before the Federal Communications Commission, CC Docket No. 99-333, in the matter of Joint Application of MCI WorldCom and Sprint for Consent to Transfer Control, February 2000 (with Dennis Carlton), on behalf of SBC.

Ex Parte Comments to Federal Communications Commission, CC Docket No. 99-272, in the matter of the Merger of Qwest Communication International Inc. and U S WEST, February 2000, on behalf of Qwest and U S WEST.

Lemon, Myer, Duncan et al. v. International Union of Operating Engineers, et al., U.S. District Court for the Eastern District of Wisconsin, Case No. 97-C-0857. Affidavit on behalf of International Union of Operating Engineers (December 1999); deposition (January 2000); Supplemental Report (February 2000).

Declaration before the Federal Communications Commission, CC Docket No. 99-272, in the matter of Merger of Qwest Communications International Inc. and U S WEST, Inc., October 18, 1999 (with Dennis Carlton), on behalf of Qwest and U S WEST.

Ex Parte Report to the Federal Communications Commission, CC Docket No. 98-141 regarding the merger of SBC Communications Inc. with Ameritech Corporation, April 1999 (with Dennis Carlton) on behalf of SBC and Ameritech.

Riverside Pipeline Co., v. Panhandle Eastern Pipeline Co., United States District Court for the Western District of Missouri, Case No. 97-0642-CV-W-4, Expert Report in September 1998, on behalf of Panhandle Eastern Pipeline Co.

Lemon, Myer, Duncan et al. v. International Union of Operating Engineers, et al., United States District Court for the Eastern District of Wisconsin, Case No. 97-C-0857; Affidavit in September 1998, on behalf of International Union of Operating Engineers.

Testimony before the Department of Public Service of the State of West Virginia in the Matter of Application of WorldCom, Inc., Corp., for Approval to Transfer Control of MCI Communication to WorldCom, Inc. (June 17, 1998); oral testimony (July 2, 1998), on behalf of WorldCom.

Testimony before the Department of Public Service Regulation, Public Service Commission of the State of Montana, Docket No. D97.10.191, In the Matter of the Application of WorldCom, Inc. and MCI Communications Corporation for Approval to Transfer Control of MCI Communications Corporation to WorldCom, Inc., May 12, 1998, on behalf of WorldCom.

Testimony before the Public Utilities Commission of the State of Colorado, Docket No. 97A-494T, In re Application of WorldCom, Inc. for Approval to Transfer Control of MCI Communications Corporation to WorldCom, Inc., pre-filed direct testimony (March 25, 1998), cross-examination (April 2, 1998); on behalf of WorldCom.

Affidavit before the Florida Public Service Commission, Docket No. 971375-TP, Petition of WorldCom, Inc. for Approval to Transfer Control of MCI Communications Corporation to WorldCom, Inc., February 27, 1998 (with Dennis Carlton); on behalf of WorldCom.

Affidavit before the New York State Public Service Commission, Case 97-C-1804, Petition of WorldCom, Inc. for Approval to Transfer Control of MCI Communications Corporation to WorldCom, Inc., February 16, 1998 (with Dennis Carlton); on behalf of WorldCom.

Second Declaration before the Federal Communication Commission, CC Docket No. 97-211, in the Matter of Application of WorldCom, Inc. and MCI Communications Corporation for Transfer of Control of MCI Communications Corporation to WorldCom, Inc., March 19, 1998 (with Dennis Carlton); on behalf of WorldCom and MCI.

Shuller v. United States, U.S. District Court for the Eastern District of Pennsylvania, Civil Action No. 97-3820, Expert report in February, 1998; on behalf of U.S. Department of Justice.

Declaration before the Federal Communication Commission, CC Docket No. 97-211, in the Matter of Applications of WorldCom, Inc. and MCI Communications Corporation for Transfer of Control of MCI Communications to WorldCom, Inc., January 25, 1998 (with Dennis Carlton); on behalf of WorldCom and MCI.

Smith v. Amtrak, Circuit Court of Cook County, IL, Case 92 L 10525. Deposition in November 1997, trial testimony in January 1998; on behalf of Smith.

Johnson and Lehl v. City Colleges of Chicago, U.S. District Court for the Northern District of Illinois Eastern Division Case No. 96 C 0862. Expert report in July 1997, deposition testimony in November 1997; on behalf of City Colleges of Chicago.

Gelumbauskas v. Precision Gear, U.S. District Court, Northern District of Illinois Eastern Division, Case No. 96 C 0862. Expert report in April 1997; on behalf of Gelumbauskas.

Galvan v. U.S. Industries, Expert Report on December 27, 1997, deposition testimony in January 1997; on behalf of U.S. Industries.

Sprint Communications Company L.P. v. Network 2000 Communications Corporation, Expert report

on July 15, 1996, deposition testimony in July, August 1996; affidavit on November 9, 1996; on behalf of Sprint.

Beazer East v. CSX Transportation, Inc., U.S. District Court for the Western District of Pennsylvania Case No. 93 0861, Expert report in April 1996; deposition testimony in June 1996; on behalf of CSX.

Report submitted in May 1996 to the National Association of Insurance Commissions on behalf of National Association of Independent Insurers.

Carbon Dioxide Industry Litigation, U.S. District Court for Central District of Florida MDL940. Expert report in October 1994 (with William M. Landes); supplemental report (with William M. Landes and Richard Leftwich) in May 1995; deposition testimony in July 1995; on behalf of opt-out plaintiffs.

AVR, Inc. v. Cemstone Products Corp., U.S. District Court, District of Minnesota, Third Division, File CIV 3-92-551. Expert report in October 1994; supplemental affidavits in December 1994, January 1995; on behalf of Cemstone.

W. Borysiewicz v. M. Gilblair, Circuit Court of Cook County, Illinois. Deposition testimony in August 1994; trial testimony in September 1994; on behalf of Borysiewicz.

NAACP et. al. v. American Family Mutual Insurance Co., U.S. District Court, Eastern District of Wisconsin, Civil Action No. 90-C-0759. Deposition testimony in July 1994 and November 1994; on behalf of American Family.

G. Bowan v. The Sales Force Companies, U.S. District Court for The Western District of Missouri, Case No. 92-0496-CV-W-2. Affidavit in February 1993; on behalf of Sales Force.

Wisconsin Central Transportation Corporation -- Continuance in Control -- Fox Valley and Western Ltd. Finance Docket 32036. Verified Statement to the Interstate Commerce Commission in September 1992 (with Andrew M. Rosenfield); on behalf of the Wisconsin Central.

Castaneda v. Baron Wire and Steel Inc., Circuit Court of Cook County, Illinois, Municipal Department, Second District. Deposition testimony in February 1992; on behalf of Castaneda.

Morgan v. ServiceMaster, U.S. District Court for the Northern District of Illinois, Case No. 89-C-0581. Report in August 1991 (with Sherwin Rosen); on behalf of ServiceMaster.

Sepich v. Mueller, U.S. District Court for the Central District of Illinois, U.S. District Court, Case No. 88-2353. Report in March 1991 (with Sherwin Rosen); on behalf of Mueller.

N. Savakis v. Beatrice Company, U.S. District Court for the N.E. District of Illinois Eastern Division,

No. 89 C5790. Deposition testimony in June 1990; on behalf of Beatrice.

Times Herald Printing Company v. A.H. Belo Corp. and Dallas Morning News Company, District Court of Harris County Texas, 280th Judicial District. Deposition testimony in April 1990; on behalf of Dallas Morning News.

Turner v. IDS Financial Services, Inc., U.S. District Court for the District of Minnesota, File No. 88-521. Report in November 1989; on behalf of IDS.

McLendon et al. v. Continental Group et. al., U.S. District Court for the District of New Jersey, Civil Action No. 83-1340 (SA). Trial testimony in February 1989, testimony before Special Master in February 1990; testimony before Special Master (with Sherwin Rosen) in August 1990; on behalf of Continental Group.

Application of Illini Carrier L.P. before Illinois Commerce Commission. Testimony in April 1988 regarding application to provide natural gas transportation services; on behalf of Illini Carrier.