183. Because of the common business and residential infrastructure, the new build-outs required to serve the incremental business traffic generated by the transaction, described in Section IV.A above, will also benefit residential customers. In particular, I understand that build-outs generally take into account future requirements.[249] The cost of adding incremental fiber capacity as part of a build-out is relatively low compared to other build-out costs, including the labor and equipment required to do the "digging" at the heart of the build-out. For example, the Commission recently estimated that the cost of deploying one mile of fiber can easily exceed $100,000, but noted that "[t]he largest element of deployment costs is not the fiber itself, but the placement costs associated with burying the fiber in the ground. . . . These placement costs can, in certain cases, account for almost three-quarters of the total cost of fiber deployment."[250]

184. Hence, through a forward-looking lens, every build-out Comcast does for a business customer in the future lays down more network infrastructure to serve more businesses and residential customers. Building out the network infrastructure in a way that creates excess capacity effectively reduces the marginal costs of connecting more business and residential customers near the build-out. All expansions of cable plant and investments in core network to serve newly profitable business customer opportunities

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249 Phil Meeks, Executive Vice President and Chief Operating Officer, Business Services, TWC, March 7, 2014, interview.

250 *National Broadband Plan*, 114.

directly benefit residential customers as well (through a faster core network and more homes passed). In a similar vein, the expansion of broadband to certain businesses within a footprint increases the likelihood of providing access to other business and residential customers in the future.

185. The complementary nature of usage patterns—business use generally occurs during the day, and the heaviest residential use occurs in the evening (and early morning and over the weekend)—heightens the benefits of such capacity investments. In particular, more business customer traffic generally does not raise a network congestion concern for residential customers since networks are designed to meet peak usage loads and business/residential peak usage times do not overlap.[251]

186. The provisioning of broadband services to business customers also increases the reliability of the network for residential customers.[252] As Comcast has retooled its network to cater to business customers (such as providing Metro Ethernet and cell tower backhaul services), it has built redundancy in its network infrastructure not only to deliver the increased capacity, but also to make the network more resilient to problematic events. Since residential customers largely share the same infrastructure, they benefit from the increased reliability that has come about as a result of serving business customers. For

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[251] Kevin O'Toole, Senior Vice President, Product Development, Business Services, Comcast Corporation, February 20, 27, and 28, 2014, interviews.

[252] This paragraph relies on interviews with Kevin O'Toole, Senior Vice President, Product Development, Business Services, Comcast Corporation, February 20, 27, and 28, 2014.

example, I understand that as a quality-assurance service provided to business customers, Comcast actively monitors network nodes that are connected to these customers to ensure that outages and other performance degradations are promptly noted and addressed. Since in many instances the same nodes also serve residential customers, those customers benefit from the enhanced quality of service generally only accorded to business customers.

(2) Scale-based benefits to national core network

187. Economies of scale can also be expected to lead to improvements in the core network infrastructure. As discussed in Section II.A.3(c), both Comcast and TWC have independently developed their own national core backbone infrastructure. I understand that combining the scale of the two core networks will generate additional innovations in capacity and architecture that will allow Comcast to reach more commercial customers on a single network with potentially better latency that large-scale enterprises demand.[253] I also understand that, although Comcast is contemplating upgrading its backbone infrastructure sometime in the future, the additional scale facilitated by the merger will accelerate that process. In particular, I understand that as the volume of data transmission increases, Comcast will begin to approach physical limitations that will require it to make

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253 This paragraph and the following paragraph are based on an interview with Kevin McElearney, Senior Vice President, Network Engineering, Comcast Corporation, April 2, 2014.

fixed cost investments to overcome (*e.g.*, investing in new router technology or additional fiber). By combining Comcast and TWC traffic in a single network, the combined firm will reach those thresholds sooner and therefore Comcast expects to accelerate its investment in backbone infrastructure.

188. Comcast also expects that the transaction will lead to faster development of the next generation Layer 2 (optronics) and Layer 3 (electronic) infrastructure for backbone. In particular, I understand that Comcast regularly makes decisions about whether to buy network equipment from third-party vendors or to develop it internally. Developing such technologies internally involves fixed cost investments, so this option becomes more attractive as a result of the scale enabled by the transaction. Thus, the transaction will give Comcast an improved option to bring infrastructure development in-house when doing so is most profitable and, by making this option more credible, will also create a competitive incentive for suppliers to bring products to the market more quickly (and on better terms) than they would otherwise have an incentive to do.

(3) Scope-based benefits to regional core networks

189. The transaction will also create benefits in areas where Comcast's and TWC's footprints are currently near one another, and thus where the transaction effectively

creates more complete network coverage for the combined firm in a given region.[254] The benefits from such "regional densification" follow from the design of Comcast's network. In particular, Comcast typically builds Converged Regional Area Networks ("CRANs") to serve geographically proximate markets.[255] I understand that building out more CRANs helps the network to be more resilient (meaning to maintain more consistent quality even as conditions or demands on the network change); provides additional capacity to support growth in demands on the network from a range of services including broadband Internet, IP cable services, and business services like Metro Ethernet and cell tower backhaul; improves network performance (*e.g.*, reduces "latency"); and can provide additional connectivity to third-party regional data centers, offering increased points of interconnection. Comcast also supports CRANs with regional data centers that enable Comcast to offer new IP cable services, better support the X1 platform, and potentially offer an additional regional option for interconnection with Comcast's network.

190. Although I understand that Comcast does not currently know the full details of TWC's network architecture, the increased regional density in certain areas associated with the transaction mean that the combined firm may be able to increase the number of

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254 This paragraph and the following based on an interview with Barry Tishgart, Vice President, Product Management & Wholesale Services, Comcast Corporation, February 20, 2014.

255 CRANs allow voice, video, and data traffic to flow over a single network and enable very fast networks.

CRANs and regional data centers, providing better service to customers in particular areas. In particular, where Comcast has systems in geographic proximity to those of TWC systems, it may be profitable for Comcast to invest in a new CRAN supported by a new regional data center. Such an investment would improve the quality of the network to the benefit of residential and business customers, as well as edge providers.

(c) Improvements in wireless access networks

191. With respect to *wireless access networks,* customers of the combined firm will benefit from a unified Wi-Fi strategy yielding expanded and improved Wi-Fi offerings, including expanded and accelerated rollout of new generations of Wi-Fi gateways and a denser grid of Wi-Fi hotspots. These expanded Wi-Fi offerings may potentially, over the longer term, be part of a strategy to use the combined firm's grid of Wi-Fi hotspots as a launching point for a national "Wi-Fi first" mobile wireless service.

192. As part of its overall consumer offering, Comcast has deployed a network of Wi-Fi hotspots. Comcast's Wi-Fi network consists of public Wi-Fi in residential areas ("home hotspots" or alternatively, "Neighborhood hotspots"), outdoor hotspots, typically in heavily trafficked areas, and hotspots in small and medium-sized businesses.[256] Table 4

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[256] In 2013, Comcast introduced advanced multi-signal wireless gateways to customers. These wireless gateways broadcast two separate signals, one to create a private and secure signal for in-home use and a second for public use. Therefore, in addition to offering an advanced in-home wireless experience, the neighborhood hotspots also create a supplemental public pathway for other Comcast customers to access the Internet, without requiring the host customer's Wi-Fi password or affecting the host's service. (*See*

indicates the number of each type of Wi-Fi location that Comcast offers today and plans to offer in 2017.[257] The total number of Wi-Fi hotspots will increase from 725,000 in 2013 to [[ ]] million in 2017, with the most prominent increase projected for neighborhood hotspots that will grow from [[ ]] in 2013 to [[ ]] million in 2017. Moreover, Wi-Fi hotspot usage has been expanding, indicating that customers value access to a large Wi-Fi network. For example, the average Comcast broadband user (excluding home subscribers in their own home) consumes approximately [[ ]] gigabytes of data per month via Wi-Fi, a figure that has increased by [[ ]] percent over the past year.[258]

Comcast, Press Release "Comcast Today Announced Plans to Create Millions of Wifi Access Points for its Customers through a Neighborhood Hotspot Initiative," June 10, 2013, *available at* http://corporate.comcast.com/news-information/news-feed/comcast-unveils-plans-for-millions-of-xfinity-wifi-hotspots-through-its-home-based-neighborhood-hotspot-initiative-2, *site visited* March 28, 2014.)

257 Tom Nagel, Senior Vice President & General Manger, Wireless Services, Comcast Corporation, March 18, 2014, interview.

258 [[ ]].

Table 4: Number of Xfinity Wi-Fi Hotspots

Number of Wi-Fi Hotspots (000s)	2013	2017
Outdoor	[[	]]
Small and Medium Businesses (SMB)		
Home		]]
Total	*725*	]]

193. By comparison, TWC's Wi-Fi network has only 30,000 hotspots located in Los Angeles, New York City, Austin, Charlotte, Myrtle Beach, Kansas City, and Hawaii.[259]

194. In an attempt to address the lack of Wi-Fi coverage outside of their own footprints, both Comcast and TWC are members of Cable WiFi, a collaboration between Bright House Networks, Cox Communications, Optimum, TWC, and Comcast that offers customers access to each other's Wi-Fi networks.[260] For example, Comcast customers have access to approximately 145,000 Wi-Fi hotspots outside the Comcast footprint via the Cable WiFi partnership.[261]

195. While the Cable WiFi partnership has successfully provided customers with access to Wi-Fi access points outside of the footprint of their cable provider, the

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259 TWC is considering adding another [[ ]] hotspots in 2014 in outdoor public locations and in small and medium-sized businesses. (Peter Stern, Executive Vice President & Chief Strategy Officer, TWC, February 28, 2014, interview.)

260 *See* http://www.cablewifi.com/, *site visited* March 31, 2014.

261 [[ ]].

collaboration suffers from two shortcomings relative to an integrated network operated by a single entity. First, the partnership does not require any particular level of investment in Wi-Fi from its members. For example, as noted above, TWC has deployed many fewer Wi-Fi access points than has Comcast. Following the transaction, Comcast will internalize the benefits of a greater number of Wi-Fi access points to legacy Comcast customers who travel in the TWC footprint, and vice versa, because offering a broader Wi-Fi footprint makes Comcast and TWC more attractive to consumers. Hence, subscribers of the combined firm—particularly those in the TWC footprint—will likely benefit from a more aggressive strategy toward Wi-Fi deployment.

196. Second, an integrated entity will be able more efficiently to operate a Wi-Fi network. As one measure of the greater efficiency from operating an integrated Wi-Fi network, including the possible elimination of double marginalization, Comcast estimates that the cost of data usage on its own Wi-Fi access points is [[ ]] per gigabyte, while the cost of data usage -other Wi-Fi networks can range from [[ ]] per gigabyte up to [[ ]] per gigabyte.[262] Operating the Wi-Fi network at a lower marginal cost post-transaction will create an incentive for the combined firm to expand its network further.

197. In addition to directly benefiting existing customers, to the extent that the transaction enables the combined firm to achieve a high-quality, broad-based, tightly

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[262] Tom Nagel, Senior Vice President & General Manger, Wireless Services, Comcast Corporation, March 18, 2014, interview.

integrated Wi-Fi network, it may facilitate entry into the mobile wireless industry at some point in the future, thus increasing competition in that industry. I understand that such entry likely would be based on a network that combines Wi-Fi infrastructure with a Mobile Virtual Network Operator (MVNO) option.[263] Notably, such a strategy would further incentivize the combined firm to expand its base of Wi-Fi hotspots (both to increase the quality of the offering and because, as explained above, traffic carried on the Wi-Fi network is substantially less expensive than traffic carried on the MVNO network), thus benefiting customers of the combined firm whether or not they use the mobile wireless offering and whether or not that effort ultimately succeeds.

198. The transaction increases the profitability of a Wi-Fi-plus-MVNO product—and thus the possibility that it will be introduced. The transaction will expand the combined firm's Wi-Fi base, reducing dependence on the more expensive MVNO option.[264] In addition, because the combined firm will be able to deliver a greater potential base of sales to device manufacturers, the transaction will put the combined firm in a better position to negotiate with device manufacturers to work on the technology needed to

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263 MVNOs purchase wireless network services on a wholesale basis from mobile network operators and then resell those services under their own brand. Comcast currently has MVNO agreements {{ }} and Verizon. (Tom Nagel, Senior Vice President & General Manger, Wireless Services, Comcast Corporation, March 18, 2014, interview.)

264 Tom Nagel, Senior Vice President & General Manger, Wireless Services, Comcast Corporation, March 18, 2014, interview.

improve the Wi-Fi/CMRS handoff technology to the point where it provides a superior experience.[265]

(d) Improvements in home networks

199. With respect to *home networks*, customers of the combined network will likely benefit from increased investments in home network technologies made profitable by the combined firm's increased scale, including tools to enable consumers to better manage all devices on the household's broadband network.

200. The combined entity's greater scale will encourage more rapid and deeper innovation, both in terms of developing better tools for customers (*e.g.*, online self-help, installation, parental controls, and antivirus software) and housing such services "in the cloud" so that they can help people manage these tools for the whole household.[266] On the video side, Comcast already tested a cloud-based DVR service in 2013 in a trial market area and is in the process of launching its service across the entire footprint starting in 2014.[267] I understand that Comcast has also developed prototype business

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265 Tom Nagel, Senior Vice President & General Manger, Wireless Services, Comcast Corporation, March 18, 2014, interview.

266 Peter Stern, Executive Vice President & Chief Strategy Officer, TWC, February 28, 2014, interview.

267 Tony Werner, Executive Vice President, Chief Technology Officer, Comcast Corporation, February 20, 2014, interview.

cases for technologies including the ability to track usage, establish priorities, block unwanted Internet sites, and store data in the cloud.

201. IT services such as those described above require large fixed cost investments to develop and support the required software.[268] As explained above, such high fixed-cost investments are more likely to be profitable when scaled over a larger base of customers because the larger base of customers increases the revenue opportunity without increasing the fixed costs.[269] For example, TWC is eager to develop network-based, rather than device-specific, parental controls but recognizes that a large upfront investment is required to deploy this technology and hence that this initiative may need to be limited in scope given TWC's current scale limitations.[270] With the proposed transaction, the combined firm could not only develop and deploy such technology, but it could also devote substantial resources for marketing and educating customers about it.[271]

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268 Marcien Jenckes, Executive Vice President, Consumer Services Group, Comcast Corporation, February 27 and 28, 2014, interviews.

269 Marcien Jenckes, Executive Vice President, Consumer Services Group, Comcast Corporation, February 27 and 28, 2014, interview.

270 Peter Stern, Executive Vice President & Chief Strategy Officer, TWC, February 28, 2014, interview.

271 Marcien Jenckes, Executive Vice President, Consumer Services Group, Comcast Corporation, February 27 and 28, 2014, interview.

V. CONCLUSION

202. Based on my analysis of the transaction, presented throughout this Declaration, I reach the following primary conclusion: *Given (i) the lack of any valid competitive concerns and (ii) the substantial consumer benefits, the proposed transaction—as it relates to the provision of broadband services in particular—is pro-consumer, pro-competitive, and in the public interest.*

I, Mark A. Israel, declare under penalty of perjury that the foregoing declaration is true and correct to the best of my knowledge, information, and belief.

Executed on April 7, 2014.

Mark A. Israel

Mark A. Israel **March 2014**
Executive Vice President and Managing Director

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SUMMARY OF EXPERIENCE

Mark Israel has substantial experience applying economic analysis and econometric tools to antitrust cases, including mergers, regulatory proceedings, and litigation matters. He has served as an expert for both the government and private parties in cases in industries including telecommunications, cable television, broadband internet service, other high technology industries, airlines, railroads, shipping, financial markets, credit cards, consumer retail, and many others. Israel has written numerous academic articles on topics ranging from competition economics, merger policy, telecommunications, airlines, insurance markets, and applied econometrics. His research has been published in leading scholarly and applied journals including The American Economic Review, The Rand Journal of Economics, The Review of Industrial Organization, Antitrust Source, and the Global Competition Review, and has been presented to business, government, and academic audiences around the world. Prior to joining Compass Lexecon, Israel was an Associate Professor at Northwestern University's Kellogg School of Management. He received his Ph.D. in Economics from Stanford University in 2001.

AREAS OF EXPERTISE

- Antitrust and competition economics
- Industrial organization economics
- Applied econometrics
- Economic and econometric analysis of horizontal and vertical mergers
- Economic and econometric analysis of antitrust litigation topics, including: Class certification, damages, and liability issues in cases involving price fixing, exclusive dealing, monopolization, bundling, price discrimination, and exclusionary practices.

EDUCATION

Ph.D., in Economics, STANFORD UNIVERSITY, June 2001.

M.A., in Economics, UNIVERSITY OF WISCONSIN-MADISON, August 1992.

B.A., in Economics, ILLINOIS WESLEYAN UNIVERSITY, Summa Cum Laude, May 1991.

EMPLOYMENT HISTORY

Compass Lexecon, Washington, DC: Executive Vice President and Managing Director, Washington, DC Office, April 2013 – Present.

(Previously: Senior Vice President and Managing Director, Washington, DC Office, November 2010 – March 2013; Senior Vice President, January 2009 – November 2010; Vice President, January 2008 – December 2008; Economist, January 2006 – December 2007.)

Kellogg School of Management, Northwestern University, Evanston, Illinois: Assistant Professor of Management and Strategy, September 2000 – June 2007; Visiting Associate Professor of Management and Strategy, September 2007 – August 2008.

State Farm Insurance, Bloomington, Illinois: Research Administrator, August 1992 – August 1995.

Illinois Wesleyan University, Bloomington, Illinois: Visiting Assistant Professor of Economics, January 1993 – June 1993.

EXPERT REPORTS, AFFIDAVITS, AND DECLARATIONS

Declaration of Michael L. Katz, Philip A. Haile, Mark A. Israel, and Andres V. Lerner, "Sprint's Proposed Weighted Spectrum Screen Defies Economic Logic and Is Inconsistent with Established Facts," Federal Communications Commission, WT Docket 12-269, March 14, 2014.

Reply Declaration of Mark A, Israel, "Competitive Effects and Consumer Benefits from the Proposed Acquisition of Leap Wireless by AT&T: A Reply Declaration," Federal Communications Commission, WT Docket 13-193, October 23, 2013.

Declaration of Mark A. Israel, "An Economic Analysis of Competitive Effects and Consumer Benefits from the Proposed Acquisition of Leap Wireless by AT&T," Federal Communications Commission, WT Docket 13-193, August 1, 2013.

Supplemental Reply Declaration of Michael L. Katz, Philip A. Haile, Mark A. Israel, and Andres V. Lerner, "Comments on Appropriate Spectrum Aggregation Policy with Application to the Upcoming 600 MHz Auction," Federal Communications Commission, WT Docket 12-269, June 13, 2013.

Reply Declaration of Michael L. Katz, Philip A. Haile, Mark A. Israel, and Andres V. Lerner, "Comment on the Submission of the U.S. Department of Justice Regarding Auction Participation Restrictions," Federal Communications Commission, WT Docket 12-269, June 13, 2013.

Reply Declaration of Michael L. Katz, Philip A. Haile, Mark A. Israel, and Andres V. Lerner, "Spectrum Aggregation Policy, Spectrum-Holdings-Based Bidding Credits, and Unlicensed Spectrum," Federal Communications Commission, GN Docket 12-268, March 12, 2013.

Declaration of Igal Hendel and Mark A. Israel, "Econometric Principles That Should Guide the Commission's Analysis of Competition for Special Access Service," Federal Communications Commission, WC Docket 05-25, February 11, 2013.

Reply Declaration of Mark A. Israel and Michael L. Katz, "Economic Analysis of Public Policy Regarding Mobile Spectrum Holdings," Federal Communications Commission, WT Docket 12-269, January 7, 2013.

Declaration of Mark A. Israel and Michael L. Katz, "Economic Analysis of Public Policy Regarding Mobile Spectrum Holdings," Federal Communications Commission, WT Docket 12-269, November 28, 2012.

Declaration of Mark Israel, "An Economic Assessment of the Prohibition on Exclusive Contracts for Satellite-Delivered, Cable-Affiliated Networks," Federal Communications Commission, MB Docket Nos. 12-68, 07-18, & 05-192, September 6, 2012.

Expert Report of Mark Israel, "Implications of the Verizon Wireless & SpectrumCo/Cox Commercial Agreements for Backhaul and Wi-Fi Services Competition," Federal Communications Commission, WT Docket 12-4, August 1, 2012.

Expert Report of Mark A. Israel, Michael L. Katz, and Allan L. Shampine, "Promoting Interoperability in the 700 MHz Commercial Spectrum," Federal Communications Commission, WT Docket 12-69, July 16, 2012.

Affidavits of Dr. Mark A. Israel in Re: Bloomberg L.P. V. Comcast Cable Communications, LLC, Federal Communications Commission, MB Docket 11-104, June 21, 2012 (Declaration), June 8, 2012 (Declaration), September 27, 2011 (Supplemental Declaration), July 27, 2011 (Declaration).

Expert Report of Robert Willig, Mark Israel, Bryan Keating, and Jonathan Orszag, "Response to Supplementary Comments of Hubert Horan," Docket DOT-OST-2009-1055, October 22, 2010.

Expert Report of Robert Willig, Mark Israel, Bryan Keating, and Jonathan Orszag, "Measuring Consumer Benefits from Antitrust Immunity for Delta Air Lines and Virgin Blue Carriers," Docket DOT-OST-2009-1055, October 13, 2010.

Expert Report of Mark Israel and Michael L. Katz, "Economic Analysis of the Proposed Comcast-NBCU-GE Transaction," Federal Communications Commission, MB Docket 10-56, July 20, 2010.

Expert Report of Mark Israel and Michael L. Katz, "The Comcast/NBCU Transaction and Online Video Distribution," Federal Communications Commission, MB Docket 10-56, May 4, 2010.

Expert Report of Mark Israel and Michael L. Katz, "Application of the Commission Staff Model of Vertical Foreclosure to the Proposed Comcast-NBCU Transaction," Federal Communications Commission, MB Docket 10-56, February 26, 2010.

Expert Report of Robert Willig, Mark Israel, and Bryan Keating, "Competitive Effects of Airline Antitrust Immunity: Response of Robert Willig, Mark Israel, and Bryan Keating" in Docket DOT-OST-2008-0252, January 11, 2010.

Affidavit of Dr. Mark A. Israel on Class Certification in Re: Puerto Rican Cabotage Antitrust Litigation, in the United States District Court for the District of Puerto Rico, MDL Docket No. 3:08-md-1960 (DRD), December 10, 2009.

Expert Report of Robert Willig, Mark Israel, and Bryan Keating, "Competitive Effects of Airline Antitrust Immunity" in Docket DOT-OST-2008-0252, September 8, 2009.

Expert Report and Supplemental Expert Report of Dennis W. Carlton and Mark Israel in Re: Toys "R" Us-Delaware, Inc., and Goeffrey Inc. v. Chase Bank USA N.A. in American Arbitration Association New York, New York, Commercial Arbitrations No. 13-148-02432-08, February 27, 2009 (Expert Report), March 20, 2009 (Supplemental Expert Report).

Expert Reports of James Levinsohn and Mark Israel in Re: 2006 NPM Adjustment Proceeding pursuant to Master Settlement Agreement, October 6, 2008 (Expert Report), January 16, 2009 (Expert Report), March 10, 2009 (Expert Report).

INVOLVEMENT IN REGULATORY REVIEW OF MERGERS/TRANSACTIONS

Successful acquisition of Leap Wireless by AT&T. 2014. Lead economic expert for AT&T. Submitted multiple Declarations to FCC and made presentation to DOJ, demonstrating the transaction would generate substantial consumer benefits, while generating at most minimal upward pricing pressure in a properly defined mobile wireless services market and no issues related to spectrum concentration or other competitive concerns.

Successful merger of American Airline and US Airways. 2013. Lead consulting expert, managing Compass Lexecon team of over 25 economists supporting multiple experts. Made multiple presentations to DOJ, worked on expert reports in litigation, and assisted counsel with the analysis leading to settlement of litigation, permitting transaction to close.

Successful merger of T-Mobile USA and MetroPCS. 2013. Lead economic expert for T-Mobile USA. Conducted economic analyses of competitive effects of the transaction, as well as consumer benefits from reduced costs and increased network quality. Presented analyses to both DOJ and FCC.

Decision by Federal Communications Commission not to extend the ban on exclusive contracts for satellite-delivered, cable-affiliated networks. 2012. Lead economic expert for National Cable and Telecommunications Association. Submitted economic analysis demonstrating that the ban on exclusive distribution of satellite-delivered, cable affiliated networks is no longer warranted given increased marketplace competition. FCC made decision to allow the ban to sunset.

Successful sale of wireless spectrum by SpectrumCo and Cox ("Cable Companies") to Verizon Wireless and successful completion of related commercial agreements. 2012. On behalf of the Cable Companies, performed economic analyses demonstrating lack of

competitive harm from the transaction on markets for backhaul and Wi-Fi services. Presented analyses to FCC.

Successful acquisition by LIN Media of broadcast television stations from NVTV. 2012. Lead economic expert for LIN Media. Prepared economic analysis demonstrating lack of competitive concern over potential issues related to Shared Service and Joint Sale Arrangements.

Proposed acquisition of T-Mobile USA by AT&T. 2011. Served as one of the lead economists, initially for T-Mobile (along with Michael Katz) and ultimately for both parties (along with Michael Katz and Dennis Carlton). Made multiple presentations to DOJ and FCC. Appeared in FCC Workshop, ex parte meeting.

Successful application for antitrust immunity by Delta and Virgin Blue. 2010. Together with Robert Willig, Bryan Keating, and Jon Orszag, prepared economic analyses demonstrating substantial net consumer benefits from antitrust immunity. Submitted results in expert reports to Department of Transportation.

Successful joint venture between Comcast and NBC Universal (and ultimate full acquisition of NBC Universal by Comcast). 2010. Served as one of the lead economists (along with Michael Katz) on behalf of the merging parties. Wrote multiple reports submitted to FCC (with Michael Katz) demonstrating lack of significant competitive concerns from the transaction. Made multiple presentations to DOJ and FCC. Appeared in FCC Workshop of economists, ex parte meeting.

Successful application for antitrust immunity for oneworld alliance and associated joint venture of American Airlines, British Airways, and Iberia Airlines. 2009-2010. Together with Robert Willig and Bryan Keating, prepared economic analyses demonstrating substantial net consumer benefits associated with antitrust immunity for the joint venture. Submitted results in expert reports to Department of Transportation.

Successful acquisition by PepsiCo of bottlers, PBG and PAS. 2009. Performed econometric and simulation analyses demonstrating pro-competitive effect of merger on PepsiCo's own brands, other brands distributed by PBG and PAS, and overall marketplace. Presented results to FTC (together with Dennis Carlton).

Successful merger of Delta Airlines and Northwest Airlines. 2008. In support of Dennis Carlton, developed empirical and theoretical analyses to demonstrate merger's pro-competitive nature. Work focused on (ultimately settled) private litigation opposing the merger.

Successful acquisition of Harcourt Education by Houghton Mifflin. 2007. Along with Daniel Rubinfeld and Frederick Flyer, developed econometric analyses demonstrating lack of competitive harm from proposed merger. Presented results to DOJ.

Successful acquisition of Chicago Board of Trade by Chicago Mercantile Exchange. 2007. Along with Robert Willig and Hal Sider, developed and presented multiple empirical analyses demonstrating lack of competitive harm from merger. Submitted multiple white papers and made multiple presentations to DOJ.

SELECTED OTHER EXPERT/CONSULTING WORK

Led team supporting Dennis Carlton's testimony in Toshiba/Hannstar TFT-LCD Antitrust litigation vs. Plaintiff Best Buy, 2013.

Led team supporting Dennis Carlton's testimony in Toshiba's TFT-LCD Class Action Antitrust litigation Named Litigation Matter of the Year for 2012 by *Global Competition Review*, 2012.

As economic expert for US Airways, developed econometric analysis of air traffic at major US airports, presented to Philadelphia Airport management team, 2011.

Prepared analysis of the competitive impact of low-cost-carrier competition in Washington, DC and New York airports. Filed with DOT, 2011.

On behalf of major pharmaceutical firm, developed econometric model to forecast pharmaceutical expenditures, 2009.

On behalf of large not-for-profit foundation, developed and implemented a Monte Carlo simulation model to assess risk and return on investments, 2008.

In support of Robert Willig, developed econometric model to measure of the importance of network effects in credit cards in the context of measuring damages incurred by a major credit card issuer, 2007-2008.

PUBLICATIONS

"The Evolution of Internet Interconnection from Hierarchy to 'Mesh': Implications for Government Regulation," (with Stanley M. Besen), *Information Economics and Policy*, December 2013.

"Airline Network Effects and Consumer Welfare," (with Bryan Keating, Dan Rubinfeld, and Robert Willig), *Review of Network Economics*, published online November 2013.

"The Delta-Northwest Merger: Consumer Benefits from Airline Network Effects (2008)," (with Bryan Keating, Daniel L. Rubinfeld, and Robert D. Willig), *The Antitrust Revolution*, Sixth Edition, Edited by John E. Kwoka, Jr. and Lawrence J. White, Oxford University Press, New York, July 2013.

"Proper Treatment of Buyer Power in Merger Review," (with Dennis W. Carlton), *Review of Industrial Organization*, July 2011.

"Response to Gopal Das Varma's Market Definition, Upward Pricing Pressure, and the Role of the Courts: A Response to Carlton and Israel," (with Dennis W. Carlton), *The Antitrust Source*, December 2010.

"Will the New Guidelines Clarify or Obscure Antitrust Policy?" (with Dennis W. Carlton), *The Antitrust Source,* October 2010.

"Should Competition Policy Prohibit Price Discrimination?" (with Dennis W. Carlton), *Global Competition Review*, 2009.

"The Empirical Effects of Collegiate Athletics: An Update Based on 2004-2007 Data," (with Jonathan Orszag), Paper commissioned by National Collegiate Athletic Association, available *at http://www.epi.soe.vt.edu/perspectives/policy_news/pdf/NCAASpending.pdf,* February 2009.

"Services as Experience Goods: An Empirical Examination of Consumer Learning in Automobile Insurance," *The American Economic Review*, December 2005.

"Tenure Dependence in Consumer-Firm Relationships: An Empirical Analysis of Consumer Departures from Automobile Insurance Firms," *The Rand Journal of Economics*, Spring 2005.

"The Impact of Youth Characteristics and Experiences on Transitions Out of Poverty," (with Michael Seeborg), *The Journal of Socio-Economics*, 1998.

"Racial Differences in Adult Labor Force Transition Trends," (with Michael Seeborg), *The Journal of Economics*, 1994.

FORTHCOMING AND UNDER-REVIEW PUBLICATIONS

"Buyer Power in Merger Review," (with Dennis W. Carlton and Mary Coleman), forthcoming in *Oxford Handbook of International Antitrust Economics*, November 2013.

"The Economics of Cartel Cases and Use of Experts," (with Gustavo Bamberger and Dennis W. Carlton), forthcoming in *Manual on Cartel Enforcement,* April 2013.

SELECTED RECENT PRESENTATIONS

The IATA Legal Symposium 2014, Aviation Law: Upfront and Center, "Merger Analysis – A sudden shift in approach by DOJ in the American Airlines and US Airways merger," Panelist, February 2014.

Georgetown Law 7th Annual Global Antitrust Enforcement Symposium, "Merger Enforcement and Policy," Panelist, September 2013.

American Bar Association Section of Antitrust Law, "Airline Mergers: First Class Results or Middle-Seat Misery?" Panelist, May 2013.

American Bar Association Section of Antitrust Law, "Go Low or Go Home! Monopsony a Problem?" Panelist, March 2012.

Federal Communications Bar Association Transactional Committee CLE Seminar, "The FCC's Approach to Analyzing Vertical Mergers," Panelist, October 2011.

The Technology Policy Institute Aspen Forum, "Watching the Future: The Economic Implications of Online Video," Panelist, August 2011.

American Bar Association Forum on Air & Space Law, 2011 Update Conference, "Antitrust Issues: What's on the Horizon for the Industry," Panelist, February 2011.

American Bar Association Section of Antitrust Law, "Antitrust in the Airline Industry," Panelist, September 2010.

GRANTS AND HONORS

Searle Fund for Policy Research Grant, 2004-2006, for "An Empirical Examination of Asymmetric Information in Insurance Markets."

Kellogg School of Management Chairs' Core Course Teaching Award, 2003 & 2005.

Bradley Dissertation Fellowship, Stanford University, 1999-2000.

Stanford University, Outstanding Second Year Paper Prize, 1997.

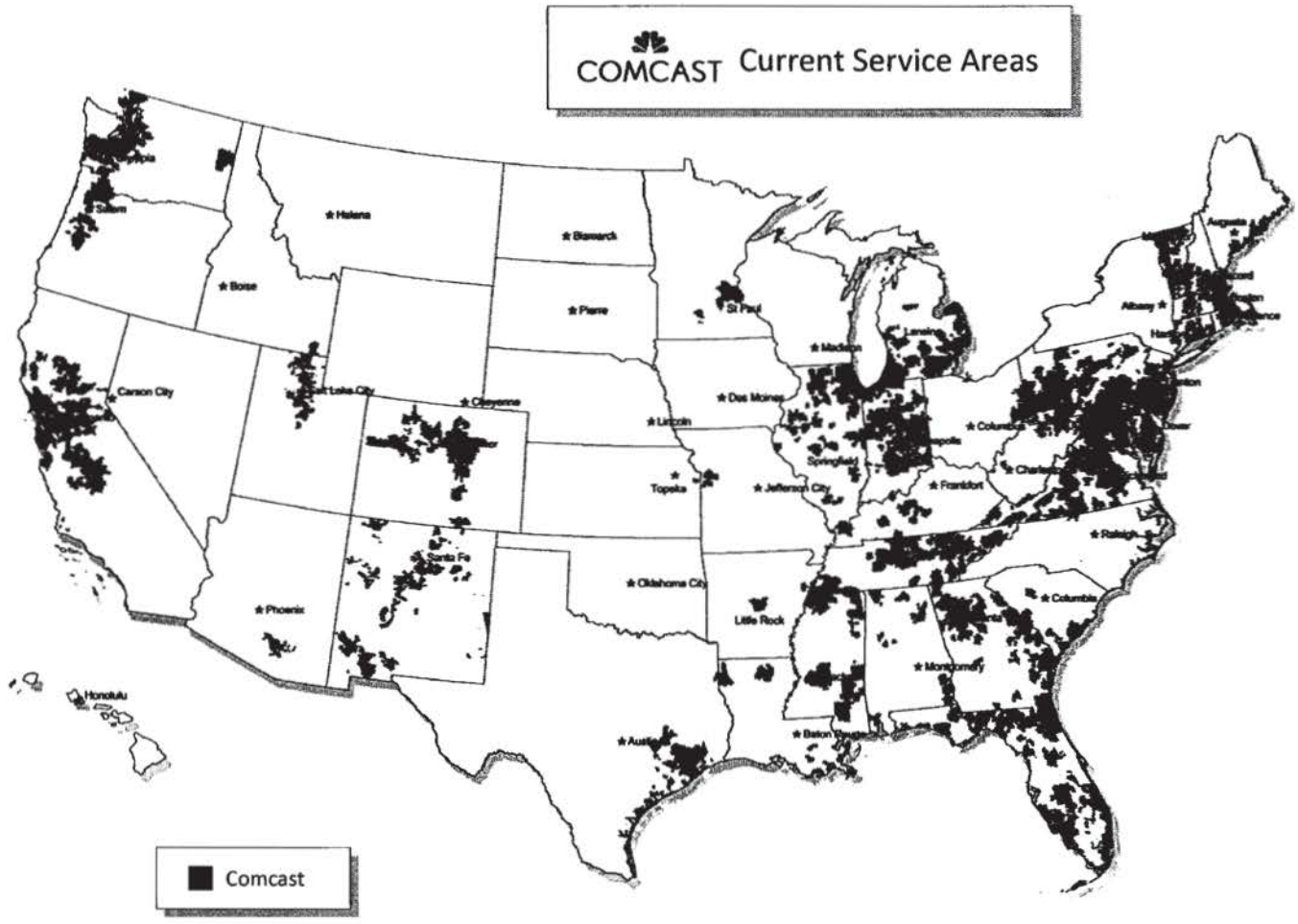
SELECTED ACADEMIC SEMINARS

Yale University
University of Arizona
Washington University, St. Louis
University of Pennsylvania
University of Toronto
UCLA
University of Wisconsin-Madison
Massachusetts Institute of Technology
Harvard University
University of Chicago
Columbia University
University of Texas
Carnegie Mellon University
University of California, Irvine
University of California, San Diego

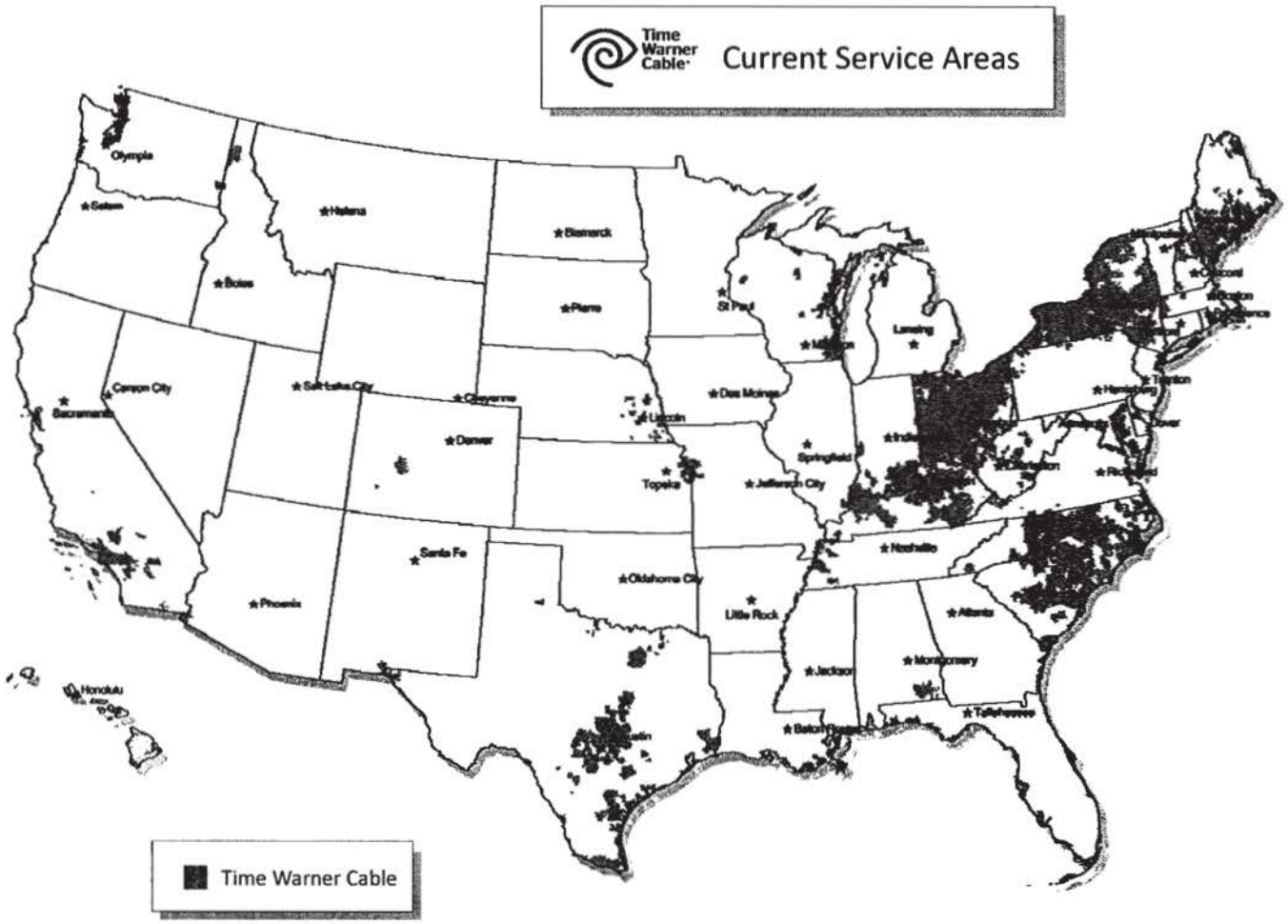
REFEREE FOR ACADEMIC JOURNALS

American Economic Review
The Journal of Industrial Economics
The Rand Journal of Economics
Journal of the European Economic Association
The Review of Economic Studies
The Review of Economics and Statistics
Journal of Risk and Insurance

EXHIBIT 7



Cable & Telecom Boundaries Provided by GeoResults



Cable & Telecom Boundaries Provided by GeoResults