

REPORT OF DEBRA J. ARON

I. INSTRUCTIONS

1. I have been asked by Mallesons Stephen Jaques, on behalf of Telstra Corporation Limited (Telstra), to respond to the Australian Competition & Consumer Commission (ACCC) discussion paper *Unconditioned Local Loop Service - An ACCC Discussion Paper examining possible variation of the service declaration for the unconditioned local loop service* dated May 2007. Specifically, I have been asked to express my opinion as to whether the proposed variations to the service declaration of the Unconditioned Local Loop Service (ULLS) contained in that document would be in the long term interests of end-users (LTIE) as required by section 152AB of the Trade Practices Act.

II. QUALIFICATIONS

2. I received a Ph.D. in economics from the University of Chicago in 1985, where my honors included a Milton Friedman Fund fellowship, a Pew Foundation teaching fellowship, and a Center for the Study of the Economy and the State dissertation fellowship. I was an Assistant Professor of Managerial Economics and Decision Sciences from 1985 to 1992, at the J. L. Kellogg Graduate School of Management, Northwestern University, and a Visiting Assistant Professor of Managerial Economics and Decision Sciences at the Kellogg School from 1993-1995. I was named a National Fellow of the Hoover Institution, a think tank at Stanford University, for the academic year 1992-1993, where I studied innovation and product proliferation in multiproduct firms. Concurrent with my position at Northwestern University, I also held the position of Faculty Research Fellow with the National Bureau of Economic Research from 1987-1990. At the Kellogg School, I have taught M.B.A. and Ph.D. courses in managerial economics, information economics, and the economics and strategy of pricing. I am a member of the American Economic Association and the Econometric Society, and an Associate member of the American Bar Association. My research focuses on multiproduct firms, innovation, incentives, and pricing, and I have published articles on these subjects in several leading academic journals, including the American Economic Review, the RAND Journal of Economics, and the Journal of Law, Economics, and Organization. I currently teach a graduate course in the economics and strategy of communications industries at Northwestern University.

3. I have consulted on numerous occasions to the telecommunications industry on competition, costing, pricing, and regulation issues in the U.S. and internationally. I have testified in several states regarding economic and antitrust principles of competition in industries undergoing deregulation; measurement of competition in telecommunications markets; the proper interpretation of Long Run Incremental Cost and its role in pricing; the economic interpretation of pricing and costing standards in the Telecommunications Act of 1996 (TA96); limitations of liability in telecommunications; Universal Service; and proper pricing for mutual compensation for call termination. I have also submitted affidavits to the Federal Communications Commission (FCC) analyzing the merits of Ameritech Michigan's application for authorization under Section 271 of TA96 to serve the in-region interLATA market, CC Docket No. 97-137; explaining proper economic principles for recovering the costs of permanent local number portability, CC Docket No. 95-116; explaining the economic meaning of the "necessary and impair" standards for determining which elements should be required to be unbundled under TA96, CC Docket No. 96-98; and an analysis of market power in support of Ameritech's petition for Section 10 forbearance from regulation of high-capacity services in the Chicago LATA, CC Docket No. 95-65. I have consulted to carriers in Europe, the Pacific, and Latin America on interconnection and competition issues, and have consulted on issues pertaining to local, long distance, broadband, wireless, and equipment markets. I have conducted analyses of mergers in other industries under the U.S. Merger Guidelines. In addition, I have consulted in other industries regarding potential anticompetitive effects of bundled pricing and monopoly leveraging, market definition, and entry conditions, among other antitrust issues, as well as matters related to employee compensation and contracts, and demand estimation. In 1979 and 1980, I worked as a Staff Economist at the Civil Aeronautics Board on issues pertaining to price deregulation of the airline industry. In July 1995, I assumed my current position at LECG. My professional qualifications are detailed in my curriculum vitae, which is attached as Appendix A.

III. SUMMARY OF OPINIONS

1. The proposed variation of the ULLS service declaration mandating interconnection at additional locations is not in the Long Term Interest of End-users and should be rejected

- The proposed variation, by essentially creating an unlimited obligation to provide interconnection at “any...physically accessible point of interconnection,” will impose costs on the access provider whether or not demand materializes that takes advantage of the additional access points. Unless access seekers demand access at the additional locations sufficient to justify and recover the costs, the costs will be recovered from the access provider’s customers, to their detriment.
- To the extent that complying with the proposed variation hinders Telstra’s ability to design, optimize, and maintain its network, economic efficiency is decreased. If little or no demand materializes for the additional access locations, the decreased efficiency can only be to the detriment of all customers.
- Evidence from other countries indicates that demand for subloop unbundling has been consistently low. Hence, precedent in other countries indicates the prudent policy analysis must put significant weight on the possibility that demand for the additional subloop unbundling options requested will not materialize. In the absence of demand, the additional costs must be recovered from the access provider’s customers through higher prices, if they can be recovered at all. These higher prices not only put the access provider at a competitive disadvantage but may also allow other competitors to raise prices.
- It is possible the additional points of interconnection made available by the proposed variation would enable competitive strategies by some parties that interfere with the ability of other parties to compete, or that interfere with the services of the access provider. This interference could take many forms, including degradation of the service quality or deliverability of services. The proposed variation permits too many possibilities for one to be confident that it would not have anticompetitive effects.
- As a general economic matter, additional unbundling can have negative or positive effects on competition and on the LTIE, even where demand is clearly evident. For example, a cross country study by economist Scott Wallsten indicates that the presence of mandatory subloop unbundling has a negative effect on broadband penetration. Determination of whether the additional unbundling is in the LTIE would, therefore, require detailed cost/benefit analysis.
- Prudent public policy would be to decline to approve a blanket unbundling requirement and instead consider requests for atypical interconnections as part of the Special Access Undertaking process or another process by which the details and implications of a specific plan to provision a network using the proposed interconnection can be assessed.

IV. BACKGROUND

A. Understanding of LTIE

4. I have based my opinions on my understanding of Section 152AB of the Trade Practices Act which, as stated in the ACCC's Discussion Paper,¹ provides that:

“in determining whether declaration promotes the [Long Term Interest of End-users] LTIE, regard must be had to the extent that declaration is likely to result in the achievement of the following objectives:

- promoting competition in a market for listed services;
 - achieving any-to-any connectivity in relation to carriage services that involve communications between end-users; and
 - encouraging economically efficient use of, and the economically efficient investment in, the infrastructure by which telecommunications services are supplied and the economically efficient use of and investment in other types of infrastructure by which services are capable or likely to be supplied.”²
5. It is a fundamental principle of economics that competition advances consumer welfare. The competitive process is one by which suppliers seek to best understand and meet consumer preferences so as to retain existing customers and attract new ones away from rivals. The ability of customers to deprive their provider of their patronage—and thereby, the revenues they generate—by switching to a rival empowers customers to impose discipline on suppliers in a market. In competitive markets, consumer welfare is advanced because consumers are sovereign and suppliers survive and prosper only by meeting consumers' needs and desires.
6. Competition differs from rivalry, however—a distinction that must be understood in order to make sound competition and regulatory policy. Rivalry is simply the interplay of multiple providers in the marketplace. Rivalry is increased when additional providers enter the market, but the additional rivalry can create the semblance of additional competition without creating the consumer benefits that derive from genuine competition. This concern arises in particular when regulatory intervention encourages entry that would not otherwise be efficient.

¹ “Unconditioned Local Loop Service: An ACCC Discussion Paper examining possible variation of the service declaration for the unconditioned local loop service,” Australian Competition & Consumer Commission, May 2007, (hereafter “*Discussion Paper*”).

7. To understand the distinction, consider a small town with only a single taxi company, and suppose the leaders of the town want to encourage competition in the taxi business. If they were to attempt to do so by subsidizing an entrant into the taxi business, they may well increase rivalry, because the subsidy would likely engender new entry into the market. However, the subsidy would also have a variety of unintended but predictable consequences. For one, the policy would put the incumbent provider at a competitive disadvantage, even if the incumbent were no less efficient—or were more efficient—than the entrant. Even if the incumbent were as efficient as the entrant (or even if it were somewhat more efficient than the entrant), the entrant could under-price the incumbent by the amount of the subsidy, while still covering its costs. Indeed, the entrant could drive price below the actual (unsubsidized) cost of providing the service. Hence, the relative prices of the competitors would not reflect their relative efficiencies; and, indeed, the incumbent provider could be driven from the market entirely by a less efficient entrant. Distorting prices in favor of a less efficient rival decreases efficiency as does, of course, driving out a more efficient competitor in favor of a (subsidized) less efficient one. Such a policy would not be in the LTIE.
8. The ability of the entrant to drive prices down to below-cost levels (due to the subsidy), even if doing so did not result in the exit of the incumbent, would damage the incentives of the incumbent provider to make new investments. The incentives to invest in new facilities, or to invest in innovation to provide new services, depend on the prospects for recovering the investments and earning a return that compensates for the risk of the investment. An incumbent taxi company would be ill advised to invest in replacing retired automobiles or increasing the size of the fleet knowing that it would have to compete with a rival whose business is subsidized. Hence, subsidizing the operations of an entrant would discourage the incumbent from making investments in new facilities, in light of the prospect that the new investments would not be recoverable.
9. Finally, the lower price resulting from the subsidy, while benefiting consumers in the short run, would reflect a misallocation of society's resources because the price paid by consumers (and therefore, the value they ascribe to the service at the margin) would be less than the

² *Discussion Paper*, p. 15.

social costs of the resources used. For example, consider the decision of a rental car agency that is considering locating in the town. Rental car agencies compete with taxis, at least to some extent. The ability of the subsidized taxi entrant to price below its own cost impedes the ability of the rental car agency to compete on its merits. More generally, the entrant subsidy would discourage other parties from investing in alternative services and technologies, because the subsidy to taxis, and associated lower price, would make it more difficult for alternative providers to compete with the taxi business.

10. Hence, while the subsidy to entrants in this example would clearly result in increased rivalry, at least in the short run, it would not necessarily increase genuine competition. It would, however, discourage investments by the non-subsidized providers, would discourage development of competing technologies, and would therefore not necessarily advance the long term interest of consumers.
11. For the same reasons, if regulators were to adopt a policy of subsidizing new entrants into telecommunications, the effect might be increased rivalry, but would not necessarily be in the long term interest of end-users. Direct subsidization is not the only policy intervention, however, that might increase rivalry without increasing competition or enhancing the LTIE. One policy in the telecommunications industry that is more nuanced than a direct subsidy to entrants but can have similar unintended consequences is mandatory unbundling. A requirement that a company provide components of its own network to its rivals in order to encourage their entry inherently has a variety of conflicting effects, some of which would tend to benefit consumers, and some of which would tend to harm them. Requiring a company to open its network to its competitors would tend to encourage entry, but would also tend to discourage the access provider from investing in its own network, unless the prices of the network elements fully compensated the access provider for its risk and opportunity costs. It would also tend to discourage companies from investing in alternative technologies or alternative facilities to the access provider's network. Hence, the net effect of such unbundling obligations is ambiguous as a matter of theory.
12. One avenue by which unbundling requirements can result in net harm to end-users is if the unbundling obligations impose costs on the access provider that will be incurred whether or

not demand for the unbundled elements materializes. If the costs must be incurred for the access provider to satisfy the obligation to be prepared to provide the unbundled access, by preparing its network and back office systems, for example, those costs may never be recoverable from the access seekers if there turns out to be little or no demand for the newly available interconnection. Such costs represent a waste of society's resources, a deadweight loss to society, and a cost that is likely to be incurred ultimately by the customers of the access provider, who will bear the costs in the form of higher prices.

B. Proposed Variance to the Service Declaration of the ULLS

13. I understand that the proposed variance has two key components: a modification of the definition of the Customer Access Module (CAM), at which ULLS must be made available, and an expansion of the locations at which access seekers can seek interconnection. My comments address the second proposed variance, but not the first. I do not have an opinion on the redefinition of the CAM.
14. The modification expanding interconnection obligations to additional points of connection is proposed as follows:

~~“The—An~~ unconditioned local loop service is the use of unconditioned communications wire between the boundary of a telecommunications network at an end-user's premises and a point on a telecommunications network that is a potential point of interconnection located at or associated with:

(a) a customer access module;

(b) a junction or concentration point for two or more communications wires; or

(c) any other physically accessible point of interconnection on a communications wire or any section of it.

For the avoidance of doubt a request by an access seeker for access at one point of interconnection on a communications wire is not satisfied by the provision of access at another point of interconnection on that communications wire, and located on the end-user side of the customer access module.”³

³ *Discussion Paper*, p. 8. Strikethrough text (~~text~~) indicates deletions, underlined text (text) indicates insertions.

15. It is my understanding that the addition of the locations described in (b) and (c) would require that Telstra supply, on demand, access to the ULLS at locations that fit those descriptions.⁴
16. Hence, the proposed variance to the ULLS service declaration increases the number of locations at which Telstra is obliged to provide access to ULLS in its network. It appears to expand Telstra's unbundling obligation to a virtually unlimited number of potential access points. The increased number of access points may lead to additional entry by competitors, but it will certainly lead to additional costs to be incurred by Telstra. If entry does occur, the net effect on the LTIE could be positive or negative, depending on the nature of the entry. For example, if the strategy of the entrant is such that its network configuration impedes any additional competitors from entering the market, or if its service interferes with the deployment of the incumbent's services, the net effect could be negative. If no new entry results, however, the effect on the LTIE of the additional obligations would be unambiguously negative. With no new demand, there would be no beneficial effect of the proposed variance, but there would be costs, the effect of which, as I just described, would be harmful to consumers.

V. EFFECT OF REQUIRING ACCESS AT ADDITIONAL LOCATIONS

A. Effect on competition

17. Requiring Telstra to provide access to ULLS at points other than those associated with a CAM would at first seem to reduce impediments to the competitive process by increasing the options available to competitors. However, as I explained earlier in my report, creating options that may increase rivalry does not necessarily promote competition and therefore is not necessarily in the LTIE. Assessing whether a particular unbundling policy advances consumer welfare requires a determination of whether the use of the additional access by one party would impair the ability to compete by other parties, or would interfere with their services. One must also consider whether the option is economically viable. Mandating the

⁴ I have not considered whether these additions might also affect any requirement that Telstra provide "backhaul service," i.e. a connection from the point of access to the metallic network to an access seeker's Point of Interconnection (POI) in a Telstra Central office.

availability of an option that is too costly to use can have no beneficial effect on actual competition.

18. To assess whether the options enabled by the proposed variance would impair existing competitors, one would assess whether a company utilizing those options could increase the costs of a competitor or decrease the competitors' quality of service. I am not a technical expert, but I am advised by Telstra that interference between xDSL services fed from the exchange and xDSL services fed from a device at a remote point can limit the capacity of one or the other of these services depending on the version of DSL being deployed.⁵ I understand that standards intended to address interference problems are currently included in an industry code but that the problems addressed by this code would be exacerbated by the proliferation of interconnection points remote from the exchange and may require revisions to the code.⁶
19. An assessment of the proposed variance should also include whether the variance would affect the ability of the access provider to provide adequate quality of service in an efficient manner. The quality of services provided over a network depends not only on the current configuration of the network but also on the ability of the network to adapt to changes in the products used by those connected to the network. As products and user demographics change, rearrangement of the network may be required. If providing an access option to competitors impairs the network owner's ability to optimize the network, the quality of products provided by some competitors may be adversely affected. In its *Technical Document*, Telstra provides a description of how increasing the number of available interconnection points will adversely affect its ability to plan and optimize the network.⁷
20. The details of how the additional interconnection points would be used, assuming that there would be demand for them, are critical to determining whether the effect of the additional availability would enhance competition and the LTIE. If an option made available by the proposed variation can only be used by a single competitor, its addition may not facilitate, but may actually impede the competitive process. While I understand that the assessment of the proposed variation of the ULLS service declaration must be done without reference to

⁵ "ACCC Inquiry on Variation to ULLS Service Description: Overview of Technical Factual Information," Telstra, June 5, 2007, (hereafter "*Technical Document*"), ¶¶16-20.

⁶ *Technical Document*, ¶¶18-20.

any particular implementation, it may be instructive to examine it in the context of the Special Access Undertaking (SAU) recently submitted by FANOC. This SAU describes a Fibre To The Node (FTTN) network that interconnects with Telstra's network at the pillar,⁸ a point which is not currently available but that would be available if the ACCC's proposed variation were accepted.⁹ In its SAU, FANOC acknowledges that once it has deployed its network, "it is not technically or economically feasible for competitors to build a separate node and fibre connection back to the exchange and interconnect at the pillar,"¹⁰ and that "there can only be one [Hybrid Fibre Twisted Pair] HFTP Network based on the twisted copper pair local loop in a particular geographic area."¹¹ That is, allowing the deployment of one network interconnected at the pillar may preclude any other competitor from deploying a similar network in the same geographic area.

21. As discussed above, if the proposed variation results in costs that are never recovered from a potential entrant, for example if no demand materializes for access at the additional locations, those costs must be recovered from the incumbent's own customers, to their detriment. It is therefore important to assess the probability that demand for access at the additional locations will indeed materialize.

B. Demand for subloop unbundling

1. Minimal demand seen in other jurisdictions

22. Access to copper (metallic) loops at locations downstream of the access provider's switching exchange is usually defined as "subloop unbundling." Regulators have mandated subloop unbundling in the U.S., but it has seen little use by competitors. I have seen no evidence to

⁷ *Technical Document*, ¶¶11-13.

⁸ FANOC refers to its FTTN implementation as a Hybrid Fibre Twisted Pair (HFTP) network. See "Statutory Amendments to Facilitate Competitive Proposals For The Construction Of An Australian Next Generation Broadband Network," Submission to the Federal Government by the G9 Consortium, Dated 30 May 2007, (hereafter "*Proposed Statutory Amendments*"), ¶¶1.1, 1.2.

⁹ *Discussion Paper*, pp. 8, 10.

¹⁰ *Proposed Statutory Amendments*, ¶2.2.

¹¹ *Proposed Statutory Amendments*, ¶3.4.

suggest this is different in the other Organisation for Economic Co-operation and Development (OECD) countries in which subloop unbundling is mandated.¹²

23. While the requirement for subloop unbundling is relatively common, the evidence of actual usage or demand for this service is scarce. In 2003, subloop unbundling requirements were in effect in approximately half of the OECD member countries, including the U.S.¹³ Mandated subloop unbundling remains in effect in the U.S., where incumbent local exchange carriers must allow non-discriminatory access to unbundled copper subloops and subloops for access to multiunit premises at a point of technically feasible access.¹⁴
24. For example, the U.S. Code of Federal Regulations defines a point of technically feasible access as:
- “... any point in the incumbent LEC’s outside plant where a technician can access the copper wire within a cable without removing a splice case. Such points include, but are not limited to, a pole or pedestal, the serving area interface, the network interface device, the minimum point of entry, and any remote terminal, and the feeder/distribution interface.”¹⁵
25. Notwithstanding expectations to the contrary, and this relatively expansive definition, U.S. demand has been limited for unbundled subloops.¹⁶ In a 2002 filing with the FCC, Sprint

¹² A 2006 white paper by Analysys Consulting states that subloop unbundling “has not yet been widely adopted in any country.” See “The Importance of Local Loop Unbundling in Ireland,” Analysys Consulting, March 6, 2006, p. 6.

¹³ “Developments in Local Loop Unbundling,” Organisation for Economic Co-operation and Development, DSTI/ICCP/TISP(2002)5/FINAL, September 10, 2003, Table 2.

¹⁴ The FCC adopted the following definitions as part of its Triennial Review Order, adopted February 2003.

Copper Subloops: “An incumbent LEC shall provide a requesting telecommunications carrier with non-discriminatory access to a copper subloop on an unbundled basis. A copper subloop is a portion of a copper loop, or hybrid loop, comprised entirely of copper wire or copper cable that acts as a transmission facility between any point of technically feasible access in an incumbent LEC’s outside plant ... and the end-user customer premises.” See 47 CFR 51.319 (b) (1).

Subloops for Access to Multiunit Premises Wiring: “An incumbent LEC shall provide a requesting telecommunications carrier with non-discriminatory access to the subloop for access to multiunit premises wiring on an unbundled basis regardless of the capacity level or type of loop that the requesting telecommunications carrier seeks to provision for its customer. The subloop for access to multiunit premises wiring is defined as any portion of the loop that it is technically feasible to access at a terminal in the incumbent LEC’s outside plant at or near a multiunit premises. One category of this subloop is inside wire...” See 47 CFR 51.319 (b) (2).

¹⁵ 47 CFR 51.319 (b) (1) (i).

¹⁶ “Report and Order and Order on Remand and Further Notice of Proposed Rulemaking,” Before the Federal Communications Commission, CC Docket Nos. 01-338, 96-98, 98-147, Released August 21, 2003, (hereafter “TRO”), ¶¶344, 349.

Communications stated "... there is little current demand for subloops..."¹⁷ As part of its Triennial Review Order released in 2003, the FCC echoed this conclusion, and stated that "[w]e acknowledge that the record contains some evidence that competitor's use of subloop UNEs, to date, has been limited."¹⁸

26. Demand for unbundled subloops depends on many factors including price of the subloop, price and availability of alternate options such as line sharing, and any restrictions or limitations that may apply. The absence of observed usage of subloops does not, therefore, indicate that there are no conditions under which substantial usage would exist. The net effect of the most recent (2003) U.S. FCC decisions on subloop unbundling is not clear. The development and deployment of all fibre networks, which were determined to be exempt from unbundling requirements, will tend to reduce the availability and usage of unbundled subloops. However, the elimination of mandated line sharing would, all else equal, tend to increase demand for subloops.¹⁹

27. Demand for subloop unbundling over all apparently remains weak, especially with regard to the provision of DSL. Neither Covad nor EarthLink, two major U.S. DSL providers that are not ILECs, indicate that they lease subloops from ILECs. Covad offers DSL service through line sharing²⁰ and central office collocation agreements with ILECs.²¹ EarthLink offers DSL service primarily through wholesale agreements with AT&T, Covad, Verizon and Qwest.²²

2. Demand indications within Australia

28. As noted by OPTUS in its request for variation of the ULLS service declaration, "Currently ULLS interconnection is generally *requested* and provided at the location of Telstra's

¹⁷ "Comments of Sprint Corporation," Before the Federal Communications Commission, CC Docket Nos. 01-338, 96-98, 98-147, April 5, 2002, p. 30.

¹⁸ TRO, ¶349.

¹⁹ TRO, ¶¶259-260, 273.

²⁰ Line Sharing refers to the use of the high-frequency, non-voice band portion of the loop. See "Line Sharing Service," ACCC Website, accessed June 8, 2007, available at: <http://www.accc.gov.au/content/index.phtml/itemId/328810/fromItemId/777921>.

²¹ At the end of 2006, Covad had over half a million DSL and T-1 lines in service (data are not broken down separately by service). See Covad Communications Group, Inc., Form 10-K, For the Fiscal Year Ended December 31, 2006, pp. 2, 8-9, 11.

²² EarthLink had over 1.8 million broadband (DSL, cable, and other) subscribers by year-end 2006. See EarthLink Inc., Form 10-K, For the Fiscal Year Ended December 31, 2006, pp. 9, 11-12, 41.

customer access module, which is *generally located at the Telstra exchange building*.²³ That is, demand for the ULLS from Telstra is generally for “full-loop” unbundling rather than “subloop” unbundling.

29. As discussed above, evidence of demand for unbundled subloops has also been minimal in the United States and in other jurisdictions outside Australia. Although indicative, these facts do not preclude the possibility that demand in Australia for the ULLS at the proposed additional locations would be substantial. It is therefore prudent to examine the possible sources of future demand at these proposed new locations.

30. In its recently filed SAU, FANOC, “a company formed by the G9 consortium of telecommunications companies,”²⁴ describes a proposed FTTN network based on access to the ULLS at Telstra’s pillars.²⁵ Access at a pillar that is not associated with a CAM is not currently available but would be covered by the ACCC’s proposed additions.²⁶

31. At first reading, FANOC’s SAU would seem to identify demand for the ULLS at one of the proposed additional locations. However, FANOC’s proposal also states that specific legislative changes are required in order to make its proposed FTTN network economically feasible.²⁷ Apparently, FANOC’s demand for the ULLS is conditional on the promulgation of the requested statutory changes. That is, in the absence of these statutory changes, FANOC’s undertaking does not identify any demand for the ULLS at the requested additional locations.

32. Hence, an assessment of whether the FANOC undertaking represents demand for subloops that would be made available by the additional interconnection locations at issue in the ACCC proposal would depend, first, on an estimate of whether or not FANOC is likely to succeed in its undertaking. Rendering such an estimate would in turn require an assessment

²³ Letter from Jason Ockerby (OPTUS) to Nicole Hardy (ACCC), re: Request for amendment to the ULLS service description, March 15, 2007.

²⁴ “Fibre-to-the-node: G9/FANOC FTTN Special Access Undertaking (May 2007),” ACCC Website, accessed June 12, 2007, available at: <http://www.accc.gov.au/content/index.phtml/itemId/788471>.

²⁵ “Special Access Undertaking to the Australian Competition and Consumer Commission Under Division 5 of Part XIC of The Trade Practices Act of 1974 (Cth) in respect of the Broadband Access Service,” FANOC Pty Limited (“FANOC”), ACN 125 451 363, May 30, 2007, Schedule 1.

²⁶ *Discussion Paper*, pp. 8, 10.

²⁷ *Proposed Statutory Amendments*, ¶5.

of whether the FANOC undertaking would be in the LTIE. The fact that the FANOC proposal raises material questions of interference with other services and presents the question of whether its proposal would stifle competition from alternative service providers, means that approval of the SAU is not assured. If the FANOC undertaking is not approved, then there is no obvious source of demand for the interconnection sites enabled by the ACCC proposal.

C. Cost induced by the proposed variation

33. As discussed above, the mandatory imposition of costs not associated with any benefit to consumers is an inefficient allocation of resources. It appears that adoption of the proposed variation to the ULLS service declaration will require significant expenditures on the part of Telstra. At least some of these costs will be incurred whether or not demand for interconnection at the alternative locations ever develops, and therefore may never be recoverable except from Telstra's own customers.²⁸
34. Telstra has identified a number of processes that it believes would be required to facilitate interconnection at the proposed additional points. These include:
- “capturing Telstra, and potentially competitor, new asset data;
 - provisioning systems to accept and manage orders;
 - service qualification and service assurance processes;
 - fault recording and rectification processes;
 - allocating and recording network reference points; and
 - integrating new databases into existing databases.”²⁹
35. In addition, Telstra indicates that additional capital expenditures may be required to provide additional cabling or equipment.³⁰
36. I have been asked to assume that the requirement under law is that Telstra must provide a declared service on request and that failure to do so is a breach of Telstra's license.³¹ If the

²⁸ *Technical Document*, ¶10.

²⁹ *Technical Document*, ¶8.

³⁰ *Technical Document*, ¶9.

ACCC's proposed changes were adopted, in order to meet that requirement Telstra believes it would incur costs associated with analyzing the required changes and impacts to its network and systems and the costs of factoring in the potential requirements to provide access in ongoing network design and hardware acquisition.³²

37. If the proposed variance imposes costs of compliance on Telstra that must be incurred even if little or no demand for the additional subloop opportunities materializes, those costs will harm the LTIE, as I have discussed. It is poor public policy to impose an obligation that will cause costs to be incurred before it is known whether there will be demand for the particular service made available by the obligation. A better policy would be to consider atypical interconnection obligations in the context of specific requests for such interconnection.
38. Not only are there immediate direct costs of compliance anticipated, but future, indirect costs are anticipated as well. When a competitor provides service to a customer by interconnecting with a metallic loop, an obligation is imposed on Telstra to accommodate the access seeker in future network rearrangements.³³ For example, if an access seeker is provided access at a particular point in the copper network and a subsequent upgrade to the network makes it desirable to replace the copper with fibre, Telstra must provide sufficient notification to allow the access seeker to weigh its options and obtain access at an alternate point in the network. If the number of points at which access providers are allowed to interconnect is increased, that process will become more complex possibly causing significantly delays in network modernization. To the extent that these additional delays affect Telstra's costs or incentives to modernize the network, its productive efficiency will suffer. This threatens to harm the LTIE by not only increasing costs and therefore prices, but it may deprive Telstra customers of advanced services and service innovations or delay their availability.
39. If it were certain that there was demand for the additional points of access provided by the proposed variance, it would not necessarily be in the LTIE to provide that access, as I have explained. It would be necessary to conduct an analysis of the relative costs and benefits of the proposal in light of the anticipated demand. Absent any certain, identifiable demand for

³¹ Instructions from Counsel.

³² *Technical Document*, ¶10.

³³ *Technical Document*, ¶22.

the ULLS at the proposed additional locations, however, there is little policy justification for imposing the additional costs that would, with certainty, be associated with the proposed variance. Doing so would ensure that end-users bear costs with no assurance that they would receive any benefits, let alone benefits that would outweigh the costs.

D. Unbundling, competition and investment

40. Around the world, mandatory unbundling of telecommunications networks has been justified as a means for facilitating competition that would not otherwise be economically feasible, and possibly as a means for enabling future facilities-based competition.³⁴ It is recognized that unbundling is costly and that these costs must be weighed against the benefits that might be gained. For example, in one of the U.S. Court decisions pertaining to unbundling, the Court states that:

“Each unbundling of an element imposes costs of its own, spreading the disincentive to invest in innovation and creating complex issues of managing shared facilities. At the same time... a broad [network sharing] mandate can facilitate competition by eliminating the need for separate construction of facilities where such construction would be wasteful. [U.S. Supreme Court] Justice Breyer concluded that fulfillment of the Act's purposes therefore called for ‘balance’ between these competing concerns.”³⁵

41. Because unbundling has conflicting effects, in theory, that may on balance increase or decrease consumer welfare, whether the net effect is actually positive or negative is an empirical question. There has been some empirical analysis of the effects of unbundling in the U.S. to assess this question. In a study of the effect of UNE prices on CLEC investment, Robert Crandall, Allan Ingraham and Hal Singer conclude that “the share of CLEC lines that are facilities-based is lower in states where the UNE rental rates are lower, which suggests that unbundling decreases facilities-based competition in the short term.”³⁶

³⁴ See, for example, Martha Garcia-Murillo and David Gabel, “International Broadband Deployment: The Impact of Unbundling,” paper presented at the 31st Telecommunications Policy Research Conference (Arlington, VA), September 2003 (hereafter “*Garcia-Murillo/Gabel*”).

³⁵ United States Telecom Association, et al., v. Federal Communications Commission (D.C. Cir., No. 00-1012; May 24, 2002), p. 13, footnotes omitted, <http://www.fcc.gov/ogc/documents/opinions/2002/00-1012.doc>.

³⁶ Crandall, Robert W., Allan T. Ingraham and Hal J. Singer, “Do Unbundling Policies Discourage CLEC Facilities-Based Investment?” Article Submitted to The B.E. Journals in Economic Analysis and Policy, Manuscript 1136, Berkeley Electronic Press, 2004, p. 20.

42. In an earlier study, Martha Garcia-Murillo and David Gabel use broadband, demographic and regulatory data from 135 countries to analyze the effect of various ownership structures and regulatory requirements on broadband access.³⁷ They find that the existence of an unbundling requirement does not significantly increase the access to broadband.³⁸
43. The forgoing studies pertained to unbundling in general. Perhaps reflecting the general lack of demand for subloop unbundling, there are few studies of the effect of subloop unbundling policies specifically. One study that is particularly relevant to the instant inquiry, however, is by former Brookings Institute economist Scott Wallsten. Wallsten provides evidence that more extensive unbundling has a negative effect on incumbent investment over and above that of full-loop unbundling.³⁹ Using a dataset combining data from the OECD and the International Telecommunications Union, Wallsten analyzes the effect of various unbundling requirements on broadband penetration. Specifically Wallsten's data include:
- “... whether a country has implemented unbundling requirements, the type of unbundling (local loop, bitstream, or subloop unbundling), and the year in which the regulation came into effect, if at all.”⁴⁰
44. Wallsten interprets his results as a general indication that “market rules that keep costs low but allow firms to earn returns on investments are good for broadband growth.”⁴¹
45. With respect to subloop unbundling, Wallsten's analysis concludes that, “Subloop unbundling—the most extensive type of unbundling studied here—is robustly negatively correlated with broadband penetration.”⁴² Wallsten hypothesizes that since subloop unbundling “gives the greatest relative advantages to new entrants and the greatest obligations on the incumbents,”⁴³ it has the greatest depressing effect on incumbent investment.

³⁷ Garcia-Murillo/Gabel, p. 6

³⁸ Garcia-Murillo/Gabel, p. 14.

³⁹ Wallsten, Scott, “Broadband and Unbundling Regulations in OECD Countries,” AEI-Brookings Joint Center For Regulatory Studies, Working Paper 06-16, June 2006, (hereafter “Wallsten Working Paper”) executive summary and p. 16.

⁴⁰ Wallsten Working Paper, p. 10.

⁴¹ Wallsten Working Paper, p. 17.

⁴² Wallsten Working Paper, p. 16.

⁴³ Wallsten Working Paper, p. 16.

46. While Wallsten's result that subloop unbundling tends to discourage broadband penetration is consistent with the theoretical concerns I elaborated earlier—that unbundling obligations can suppress investment—there may, of course, be cross-country differences that would create a different outcome in Australia. Nevertheless, Wallsten's results demonstrate that the theoretical concerns about the harmful effect of unbundling obligations on efficient incentives to invest have empirical merit and must be attended.

VI. EVALUATION PROCESS

47. I have explained in these comments that as a general economic matter, additional unbundling can have negative or positive effects on competition and on the LTIE. In my judgment, the proposed additional unbundling obligations are so broad, and the potential uses of the additional access opportunities so nebulous and uncertain at this point, that it is not possible for me as an economist, nor would it be possible for the policy makers, to assess what the likely effects of proceeding with the proposed variance would be. It appears clear that the proposal would create costs which might not be recoverable from the cost causers, resulting in harm to customers. Without legislative changes that are uncertain and whose value themselves are in question, there is no apparent source of demand for the proposed additional interconnection points. The proposal could detrimentally affect Telstra's ability to efficiently engage in network planning and upgrade.
48. Declining to enact the proposed changes appears to risk very little possible harm to the LTIE, because proposed changes to unbundling obligations can, I understand, be considered in the context of specific plans by competitors, possibly in the context of an SAU. In my judgment, it would be appropriate and prudent for the ACCC to decline to approve a blanket unbundling requirement and instead consider requests for atypical interconnections as part of the SAU process or another process by which the details and implications of a specific plan to provision a network using the proposed interconnection can be assessed.



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Ph.D., Economics, UNIVERSITY OF CHICAGO, Chicago, IL, 1985

A.B. (summa cum laude), Economics, UNIVERSITY OF CALIFORNIA AT LOS ANGELES, Los Angeles, CA, 1979

PRESENT POSITIONS

LECG, LLC Evanston, IL, 1995-present
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NORTHWESTERN UNIVERSITY, Communication Systems Strategy and Management Program, School of Communication, Evanston, IL, 2000 - present
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ACADEMIC AND PROFESSIONAL EXPERIENCE

NORTHWESTERN UNIVERSITY, J. L. Kellogg Graduate School of Management, Evanston, IL, 1985-1995
Visiting Assistant Professor of Managerial Economics, 1993-1995
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UNIVERSITY OF CHICAGO, Department of Economics, Chicago, IL, 1983-1984
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HONORS & AWARDS

Guthman Research Chair, Kellogg Graduate School of Management, Northwestern University, Summer 1994.

Hoover National Fellowship, Hoover Institution, 1992-1993.

Faculty Research Fellow, National Bureau of Economic Research, 1987-1990.

Pepsico Research Chair, Northwestern University, 1990.

Kellogg Research Professorship, Northwestern University, 1989.

National Science Foundation Research Grant, 1987-1988.

Buchanan Chair, Kellogg Graduate School of Management, Northwestern University, 1987-1988.

IBM Chair, Kellogg Graduate School of Management, Northwestern University, 1986-1987.

RESEARCH INTERESTS

Industrial organization, antitrust economics, business strategy, pricing, information industries, network industries, telecommunications policy, theory of the firm, compensation and incentives.

TEACHING

Courses taught: Pricing Strategy; Information, Communication, and Competition (strategy and competition in communications industries); Intermediate Microeconomic Theory; Managerial Economics (microeconomic theory as applied to business strategy and decision making) at the M.B.A. level, The Economics of Information at the Ph.D. level.

Also qualified to teach: graduate Microeconomic Theory; Industrial Organization and Labor Economics; the Economics of Personnel; Public Finance; Applied Game Theory.

PUBLICATIONS AND WORKING PAPERS

Contributing author, *ABA Section of Antitrust Law, Telecom Antitrust Handbook*, (2005), (Chicago: American Bar Association), 2005.

"The Proper Treatment of Spare Network Capacity in Regulatory Cost Models," with Ana Danies, May 2005.

"State Commissions Systematically Have Set UNE Prices Below Their Actual Costs," with Frank Pampush and E. Gerry Keith, 2004.

"Broadband Adoption in the United States: An Empirical Analysis," with David E. Burnstein, in *Down to the Wire: Studies in the Diffusion and Regulation of Telecommunications Technologies*, Allan Shampine, ed., (Nova Science Publishers, Hauppauge, NY, 2003).

- “Developments in the Theory of Vertical Foreclosure as Applied to Regulated Telecommunications Markets” (March, 2002), Prepared for Presentation at The American Bar Association Section of Antitrust Law, 50th Annual Spring Meeting.
- “Modifications at HHIs for Vertical Supply Relationships” with Wenqing Li and James Langenfeld, White Paper submitted to European Commission, February 2000.
- “Economic Theories of Tying and Foreclosure Applied—And Not Applied—in *Microsoft*,” with Steven S. Wildman, *Antitrust*, vol. 14, no. 1, 1999, pp.48-52.
- “Effecting a Price Squeeze Through Bundled Pricing,” with Steven S. Wildman, in *Competition, Regulation, and Convergence: Current Trends in Telecommunications Policy Research*, Gillett and Vogelsang, eds. (New Jersey: Lawrence Erlbaum Associates, Inc.) 1999, pp. 1-17.
- “Worldwide Wait? How the Telecom Act’s Unbundling Requirements Slow the Development of the Network Infrastructure,” with Ken Dunmore and Frank Pampush, *Industrial and Corporate Change*,” vol.7, no. 4, 1998, pp. 615-621.
- “The Pricing of Customer Access in Telecommunications,” with Steven S. Wildman, *Industrial and Corporate Change*, vol. 5, no. 4, 1996, pp. 1029-1047.
- “Bonus and Penalty Schemes as Equilibrium Incentive Devices, With Application to Manufacturing Systems,” with Pau Olivella, *Journal of Law, Economics, and Organization*, 10, Spring 1994, pp. 1-34.
- “Diversification as a Strategic Preemptive Weapon,” *Journal of Economics and Management Strategy*, 2, Spring 1993, pp. 41-70.
- “Using the Capital Market as a Monitor: Corporate Spin-offs in an Agency Framework,” *RAND Journal of Economics*, 22, Winter 1991, pp. 505-518.
- “Firm Organization and the Economic Approach to Personnel Management, *American Economic Review*, vol. 80, no. 2, May 1990, pp. 23-27.
- “The Introduction of New Products,” with Edward P. Lazear, *American Economic Review*, vol. 80, no. 2, May 1990, pp. 421-426.
- “Ability, Moral Hazard, Firm Size, and Diversification,” *RAND Journal of Economics*, 19, Spring 1988, pp. 72-87.
- “Worker Reputation and Productivity Incentives,” *Journal of Labor Economics*, vol. 5, no. 4, October 1987, part 2, pp. S87-S106.
- “The Role of Managerial Ability and Moral Hazard in the Determination of Firm Size, Growth and Diversification,” Ph.D. Dissertation, University of Chicago, August 1985.

REPRESENTATIVE PRESENTATIONS

Presentations to the New Jersey Board of Public Utilities and to the New Jersey Legislature’s Telecommunications Utilities Committee regarding the economic principles for a forward-looking regulatory agenda in light of the facts of competition nationwide and in New Jersey, and the costs of regulation, October – November 2006.

“The Interaction of Regulation with Economics and Financial Analysis in Litigation, Policy, and Strategy Consulting,” CLE course, XPRT Forum, October 7, 2006.

“Comments on ‘Economic Analysis in FCC Merger Proceedings,’” Conference on Economic Analysis and FCC Decisionmaking, presented by the Federal Communications

Bar Association (FCBA) and Stanford Institute for Economic Policy Research (SIEPR), Washington D.C., March 15, 2006.

“Economic Principles for Consumer Protection Rules,” Pri Telecom / Tech Briefing, Santa Clara, California, October 11, 2005.

“The Proper Treatment of Spare Network Capacity in Regulatory Cost Models,” Presentation at the Advanced Workshop in Regulation and Competition, Center for Research in Regulated Industries, Skytop, Pennsylvania, May 2005.

“Telecommunications Regulation: What’s Obsolete? What Will Become Obsolete?” Presentation at the State and City Telecom Reform Conference, Heartland Institute, Chicago, Illinois, December 2004.

“Trends in Telecommunications Demand & Supply,” Presentation at the 46th Annual NARUC Regulatory Studies Program, Michigan State University, August 2004.

“The Economic Costs of Proposed Wireless Regulations in California,” Presentation to Commissioners Brown and Kennedy, California Public Utilities Commission, San Francisco, California, April 2004.

“The Economics of UNE Pricing: Presentation to Staff,” Ex parte presentation to the staff of the FCC, in FCC WC Docket No. 03-173: Review of the Commission’s Rules Regarding the Pricing of Unbundled Network Elements and the Resale of Service by Incumbent Local Exchange Carriers, March 2004.

“The High Cost of Proposed New Wireless Regulations,” Presentation to the Pacific Research Institute conference “Regulating Wireless in California: Bill of Rights... or Wrongs?,” San Francisco, April 2003.

“The TELRIC Showdown,” Panelist, NARUC Staff Subcommittee on Telecommunications, 2002 Annual Convention, Chicago, Illinois, November 2002.

“Economic Principles for Efficient Pricing of Municipal Rights-of-Way,” National Association of Telecommunications Officers and Advisors (NATOA), Chicago, Illinois, September 2002.

“Trends in Voice and Broadband Competition in Telecommunications Markets: Markets, Strategies, and Regulation,” 82nd Annual Convention of the Indiana Telecommunications Association, Lexington, Kentucky, June 2002.

“Broadband Deployment in the United States,” Emerging Opportunities in Broadband Symposium, Northwestern University, Evanston, Illinois, December 2001.

“Local Competition in Illinois,” Illinois Telecommunications Symposium, Northwestern University, Evanston, Illinois, December 2000.

“Licensing and Access to Innovations in Telecommunications and Information Services,” Telecommunications Policy Research Conference, Alexandria, Virginia, September 2000.

“Effecting a Price Squeeze Through Bundled Pricing,” Federal Communications Commission, Washington, D.C., May 1999.

“Competitive and Strategic Use of Optional Calling Plans and Volume Pricing Plans,” The Institute for International Research Conference for Competitive Pricing of Telecommunications Services, Chicago, Illinois, July 1998.

"Effecting a Price Squeeze Through Bundled Pricing," Consortium for Research in Telecommunications Policy Conference, University of Michigan, Ann Arbor, Michigan, June 1998.

"The Pricing of Customer Access in Telecommunications," Conference on Public Policy and Corporate Strategy for the Information Economy, Evanston, Illinois, May 1996.

"Diversification as a Strategic Preemptive Weapon," University of Iowa, Iowa City, Iowa, February 1994.

"Diversification as a Strategic Preemptive Weapon," University of Buffalo, Buffalo, New York, February 1994.

"Diversification as a Strategic Preemptive Weapon," University of Southern California, Los Angeles, California, December 1993.

"Strategic Pricing," Winter Meetings of the Econometric Society, Discussant, Anaheim, California, December 1993.

"Innovation, Imitation, Productive Differentiation, and the Value of Information in New Markets," Michigan State University, Lansing, Michigan, November 1993.

"Diversification as a Strategic Preemptive Weapon," Rutgers University, New Brunswick, New Jersey, November 1993.

"Diversification as a Strategic Preemptive Weapon," University of California at Santa Cruz, Santa Cruz, California, November 1993.

"Diversification as a Strategic Preemptive Weapon," Graduate School of Business, Stanford University, Stanford, California, November 1993.

"Innovation, Imitation, Productive Differentiation, and the Value of Information in New Markets," Purdue University, West Lafayette, Indiana, September 1993.

"Innovation, Imitation, Productive Differentiation, and the Value of Information in New Markets," Summer Meetings of the Econometric Society, Boston University, Boston, Massachusetts, June 1993.

"Innovation, Imitation, Productive Differentiation, and the Value of Information in New Markets," University of California, Department of Economics, Berkeley, California, May 1993.

"Innovation, Imitation, Productive Differentiation, and the Value of Information in New Markets," Stanford University, Graduate School of Business, Stanford, California, May 1993.

"Diversification as a Strategic Preemptive Weapon," Stanford University, Graduate School of Business, Stanford, California, April 1993.

"Innovation, Imitation, Productive Differentiation, and the Value of Information in New Markets," Hoover Institution, Stanford, California, April 1993.

"Innovation, Imitation, Productive Differentiation, and the Value of Information in New Markets," University of California, Graduate School of Business, Berkeley, California, February 1993.

"Innovation, Imitation, Productive Differentiation, and the Value of Information in New Markets," Stanford University, Department of Economics, Stanford, California, February 1993.

"Innovation, Imitation, Productive Differentiation, and the Value of Information in New Markets," Hoover Institution, Stanford, California, January 1993.

"Pricing Strategies," Session Discussant, 1992 North American Winter Meeting of The Econometric Society, Anaheim, California, January 1992.

"Diversification as a Strategic Preemptive Weapon," University of Toronto, Toronto, Canada, November 1991.

"Diversification as a Strategic Preemptive Weapon," Queen's University, Kingston, Ontario, Canada, November 1991.

"Bonuses and Penalties as Equilibrium Incentive Devices, with Application to Manufacturing Systems," University of Chicago, Chicago, Illinois, June 1991.

"The Timing of Entry into New Markets," Summer Meetings of the Econometric Society, University of Pennsylvania, Philadelphia, Pennsylvania, June 1991.

"Innovation, Imitation, Productive Differentiation, and the Value of Information in New Markets," University of Chicago, Chicago, Illinois, April 1991.

"Bonuses and Penalties as Equilibrium Incentive Devices, with Application to Manufacturing Systems," Winter Meetings of the Econometric Society, Washington, D.C., December 1990.

"Corporate Spin-offs in an Agency Framework," University of Washington, Seattle, Washington, October 1990.

"The Timing of Entry Into New Markets," University of British Columbia, Vancouver, British Columbia, October 1990.

"Corporate Spin-offs in an Agency Framework," Texas A&M University, College Station, Texas, April 1990.

"Firm Organization and the Economic Approach to Personnel Management," Winter Meetings of the American Economic Association, New York, New York, December 1989.

"Corporate Spin-offs in an Agency Framework," Western Finance Association Meetings, Seattle, Washington, June 1989.

"Corporate Spin-offs in an Agency Framework," University of Rochester, Rochester, New York, May 1989.

"Corporate Spin-offs in an Agency Framework," North American Summer Meetings of the Econometric Society, Minneapolis, Minnesota, June 1988.

"Competition, Relativism, and Market Choice," North American Summer Meetings of the Econometric Society, Berkeley, California, June 1987.

"Competition, Relativism, and Market Choice," University of Chicago, Chicago, Illinois, April 1987.

“Rate Reform and Competition in Electric Power,” Discussant, Conference on Competitive Issues in Electric Power, Northwestern University, Evanston, Illinois, March 1987.

“Worker Reputation and Productivity Incentives,” New Economics of Personnel Conference, Arizona State University, Tempe, Arizona, April 1986.

“Ability, Moral Hazard, and Firm Diversification,” Various Universities, 1985, 1994, including Yale University, University of Rochester, Stanford University, University of Minnesota, California Institute of Technology, Duke University, Northwestern University, Brown University, Harvard University, University of California - Los Angeles, University of Pennsylvania.

ACADEMIC JOURNAL REFEREEING

Dr. Aron has served as a referee for *The Rand Journal of Economics*, *the Journal of Political Economy*, *the Journal of Finance*, *the American Economic Review*, *the Quarterly Journal of Economics*, *the Journal of Industrial Economics*, *the Journal of Economics and Business*, *the Journal of Economic Theory*, *the Journal of Labor Economics*, *the Review of Industrial Organization*, *the European Economic Review*, *the Journal of Economics and Management Strategy*, *the International Review of Economics and Business*, *the Quarterly Review of Economics and Business*, *Management Science*, *the Journal of Public Economics*, *the Journal of Institutional and Theoretical Economics*, and the National Science Foundation.

SELECTED TESTIMONY AND OTHER ENGAGEMENTS

Expert testimony before the New Jersey Board of Public Utilities regarding its review of telecommunications regulations and proposal to establish new regulations on incumbent and competitive wireline carriers, March 2007.

Analysis of damages in a matter pertaining to disputed access to landing rights and investment in submarine cable for transport of international data traffic, Ongoing 2007.

Expert testimony before the Michigan Public Service Commission regarding the competitive effects of total service resale of telecommunications services, and restrictions on resale pertaining to aggregation of demand for volume discounts, November 2006.

Preliminary Expert Report of Debra J. Aron, “The U.S. Long-haul Fiber Optic Network Industry: 1996-2001,” in a matter involving disputed investment in long haul capacity in the U.S., June, 2006.

Expert testimony before the Kentucky Public Service Commission, Tennessee Regulatory Authority, and Mississippi Public Service Commission regarding the competitive effects of the proposed AT&T acquisition of BellSouth, June 2006.

Expert testimony before the state regulatory commission of California regarding the competitive landscape in California and the desirability of establishing a Uniform Regulatory Framework for the telecommunications industry in the state of California, February 2006.

Deposition testimony and trial testimony in the Court of Chancery in the state of Delaware In and For New Castle County and in Circuit Court of Cook County, Illinois County Department, Chancery Division, regarding the possibility of “irreparable harm” to Sprint Nextel’s wireless affiliates in connection with Sprint’s acquisition of Nextel Corporation, November 2005 – July 2006.

Expert testimony before the state regulatory commissions of California and Ohio evaluating the economic benefits and competitive impacts of the proposed acquisition of AT&T by SBC, June – August 2005.

Expert testimony before the Oklahoma Corporation Commission regarding the proper economic principles for reduced regulation of retail telecommunications services and regarding the determination of the amount of a supersedeas bond to quantify the economic harm likely to result from the award of a stay of Commission order that would grant pricing flexibility and require broadband investment, June – August 2005.

Expert testimony before the Kansas Corporation Commission regarding the sustainability of competition in Kansas, June 2005.

Cost and economic analysis for a large telecommunications firm regarding tariffed volume and term-discounted pricing plans for special access services based on regulatory requirements for consistency of prices with cost structure, March 2005.

Expert testimony before the Missouri Public Service Commission evaluating the potential competitive reclassification of local service in Missouri, January 2005.

Expert testimony before the state regulatory commissions of Ohio and Wisconsin regarding the effects of UNE pricing on the competitive telecommunications markets, July 2004.

Expert testimony before the Florida Public Utilities Commission and the Georgia Public Service Commission, written expert testimony before the public utilities commissions in Mississippi, Alabama, North Carolina, South Carolina, Tennessee, and Kentucky, and deposition testimony, regarding the proper principles for determining which network elements should be provided to competitors on an unbundled basis at regulated rates; including testimony in support of a business case model of the viability of efficient competitive entry in specific geographic markets in each aforementioned state, January-March 2004.

Ex parte presentation “The Economics of UNE Pricing,” to the Federal Communications Commission staff, with William Rogerson, March 2004.

White Papers, “The Economics of UNE Pricing,” December 2003, and “A Further Analysis of the Economics of UNE Pricing,” January 2004, with William Rogerson, submitted to the Federal Communications Commission in FCC WC Docket No. 03-173: Review of the Commission’s Rules Regarding the Pricing of Unbundled Network Elements and the Resale of Service by Incumbent Local Exchange Carriers.

White Paper, “The Effects Of Below-Cost TELRIC-Based UNE Prices On CLEC And ILEC Investment,” submitted to the Federal Communications Commission in FCC WC Docket No. 03-173: Review of the Commission’s Rules Regarding the Pricing of Unbundled Network Elements and the Resale of Service by Incumbent Local Exchange Carriers, January 2004.

Expert testimony before the Illinois Public Utilities Commission regarding the proper determination of Total Element Long Run Incremental Cost (TELRIC) for establishing prices for network elements, March 2004.

Expert testimony before the Illinois General Assembly regarding the effects of current regulated UNE pricing of telecommunications elements on competitive telecommunications markets in Illinois, May 2003.

Expert testimony before the Public Utilities Commission of Ohio on issues related to rights-of-way fees charged to electric, water, and telecommunications companies in the City of Toledo, Ohio, March 2003.

Reports evaluating the cost impacts and public policy implications of the proposed California Consumer Protection rules on wireless carriers and customers, February 2003 and September 2003.

Expert testimony before the state regulatory commissions in Ohio, Illinois, Indiana, and Kansas on the economic principles for evaluating anticompetitive claims regarding "winback" pricing by incumbent telecommunications carriers, 2002 - 2003.

Report pertaining to the economic and antitrust analysis of price squeezes, and the suitability of imputation rules as a protection against an anticompetitive price squeeze, for a carrier in a foreign market, 2002.

Expert testimony before the Michigan Public Service Commission pertaining to allegations of anticompetitive effects of long term contracts, 2002.

For a small manufacturer of telecommunications equipment, consulting support to evaluate the antitrust implications of a proposed acquisition, 2002.

White Paper submitted to the Texas Public Service Commission pertaining to the competitive effects of "winback" and "retention" pricing, 2002.

In Order Instituting Rulemaking on the Commission's Own Motion to Assess and Revise the new Regulatory Framework for Pacific Bell and Verizon California Incorporated, written declaration submitted to the California Public Utilities Commission pertaining to the economic incentives created by modifications to the State's alternative regulation plan and competitive reclassification of services, 2002.

Statement to the Federal Communications Commission regarding the potential economic causes of sustained price increases for cable television services, 2002.

Expert testimony before the Kansas Corporation Commission regarding the antitrust principles relevant to establishing rules for competitive reclassification of services under governing state law, 2002.

For a national wireless telecommunications carrier, consulting support pertaining to litigation regarding access charges, 2001.

Expert testimony before the Missouri Public Service Commission pertaining to price squeeze allegations in the long-distance market, 2001.

Expert affidavit submitted to the Circuit Court in the state of Wisconsin, pertaining to irreparable harm caused if court declined to grant a stay of disputed performance remedy plan, 2001.

Expert testimony before the public utilities commissions of Illinois, Ohio, California, and Indiana, pertaining to the economic viability of constructing and provisioning ADSL services, including market definition and examination of competitive conditions, 2001.

Expert testimony before the Illinois Commerce Commission pertaining to the proper economic principles governing unbundling obligations, 2001.

In the matter of H & R Mason Contractor's et al. v. Motorola, Inc. et al., before the Circuit Court of Cook County, Illinois, expert affidavit examining the economic impediments to class certification, focusing on the determinants of price in the relevant equipment markets, April 2001.

For a competitive local exchange provider in a foreign market, consulting support regarding the proper determination of avoided costs for resale of incumbent services, April 2001.

For a major Japanese telecommunications equipment manufacturer, evaluated the revenue potential and desirability of entering several advanced services equipment markets worldwide, for the purposes of assisting the client to evaluate a proposed acquisition, February 2001.

Expert testimony in the Illinois Commerce Commission's Investigation Into Certain Payphone Issues, examined the economic and public policy issues pertaining to pricing of access lines for independent pay telephone providers, April 2001.

In the matter of the Illinois Public Utility Commission's Investigation Into Tariff Providing Unbundled Local Switching And Shared Transport, expert testimony regarding economic antitrust perspectives on obligations of firms to affirmatively help their competitors, and related public policy issues, April 2001.

In response to Request for Consultations by the U.S. Trade Representative (USTR) with the Government of Mexico before the World Trade Organization (WTO) regarding barriers to competition in Mexico's telecommunications market, analyzed regulated switched access rates in the U.S. in comparison with those charged by Telmex, November 2000.

Declaration submitted to the Texas Public Utility Commission, analyzed proposed regulation aimed at preventing incumbents from executing a price squeeze; developed a framework for evaluating claims of a price squeeze consistent with antitrust principles of predation, August 2000.

For a taxicab company, analysis of regulatory requirements in the City of Chicago pertaining to valuation of medallions and valuation of capital for purposes of regulatory ratemaking proceeding, 2000.

Written and oral testimony before the public utility commissions of Illinois and Michigan in various arbitration matters pertaining to the proper compensation for the use by competitors of client's facilities for foreign exchange services, 2000.

For a firm in the aluminum fabrication industry, in the matter of a potential merger between vertically integrated competitors, developed a methodology for adjusting the HHI measure of market concentration to account for the vertical control by the merging parties of downstream competitors, 2000.

For a large newspaper publisher, in the possible acquisition of the San Francisco Chronicle, analyzed the potential antitrust impediments to an acquisition by the client of the Chronicle, including issues of geographic and product market definition, the interplay between advertising markets and customer markets, and the relevant implications of the Newspaper Preservation Act, 1999.

Testimony before the Illinois Commerce Commission regarding the proper economic interpretation of the standards for declaring a service competitive under the Illinois Public Utilities Act, and quantification of the extent of competition in relevant Illinois markets, including discussion of market definition; the relevance of entry conditions; the relevance of resale competition and analysis of various resale entry strategies; the interdependence of resale and facilities-based entry strategies; and implementation of a technology-based method of measuring market participation, 1999-2000.

For a firm in the consumer mapmaking business, analyzed market definition, concentration, and efficiencies from a proposed merger, 1999.

Affidavit submitted jointly with Robert G. Harris to the Federal Communications Commission in the matter of "unbundled network elements" and commenting on the proper interpretation of the "Necessary and Impair" standard, including discussion of entry conditions and the business-case approach to valuation of an entry strategy, April 1999; reply affidavit May 1999.

Affidavit, "An Analysis of Market Power in the Provision of High-Capacity Access in the Chicago LATA," submitted to the Federal Communications Commission, including an analysis of the US DOJ merger guidelines and their applicability to regulatory relief in a regulated market, as well as extensive empirical modeling of the costs and business case for network buildout of high capacity facilities, February 1999.

White Paper, "Proper Recovery of Incremental Signaling System 7 (SS7) Costs for Local Number Portability," submitted to the Federal Communications Commission, April 1999.

PROFESSIONAL ORGANIZATIONS

Member, Telecommunications Policy Research Conference Program Committee

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