

**Declaration of  
Timothy J. Tardiff**

**September 24, 2002**

## I. INTRODUCTION<sup>1</sup>

1. My name is Timothy J. Tardiff. My business address is One Main Street, Cambridge, MA 02142. I am a Vice President at National Economic Research Associates, Inc. (NERA). I have specialized in telecommunications policy issues for about the last 20 years. My research has included studies of the demand for telephone services, such as local measured service and toll; analysis of the market potential for new telecommunications products and services; assessment of the growing competition for telecommunications services; and evaluation of regulatory frameworks consistent with the growing competitive trends. Most recently, I have participated in interconnection arbitrations, unbundled element proceedings, universal service investigations, and applications by incumbent local exchange carriers for authorization to provide interLATA long-distance pursuant to the Telecommunications Act of 1996, in over 20 states. I attach a copy of my full resume as Attachment A.
2. The purpose of this declaration is to respond to the economic arguments of those opposing Verizon's request that the FCC forbear from enforcing its current prohibition against Bell Operating Companies (BOCs) and their interLATA long-distance affiliates sharing Operating, Installation, and Maintenance (OI&M) functions, with primary focus on the arguments proffered by Dr. Lee Selwyn.<sup>2</sup> Contrary to their assertions, rather than being necessary for competition, the OI&M restrictions are not only unnecessary to ensure that long-distance services are competitive but they also impose extra costs on BOCs that are inconsistent with the intention of the Telecommunications Act that firms in formerly segregated markets enter other markets and provide consumers with the full benefits that their economies of vertical integration can provide. As Verizon has demonstrated in its opening and reply comments, the OI&M prohibition has proven to be costly in practice.

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<sup>1</sup> Some of this work draws upon analysis of similar issues that I have performed in conjunction with Professor Alfred Kahn. See, for example, Public Interest Affidavit of Alfred E. Kahn and Timothy J. Tardiff, CC Docket No. 00-65, January 10, 2000.

<sup>2</sup> Reply Declaration of Lee L. Selwyn in WC Docket No. 02-112, on behalf of AT&T Corporation, August 26, 2002 (Attached to AT&T's Opposition in this proceeding).

This demonstrates the inefficiencies that are imposed when carriers are prevented from offering a full range of services in complementary markets as was intended in the Telecommunications Act of 1996.

3. As I describe in detail below, actual experience with BOCs offering services on a vertically integrated basis in competition with firms that obtain inputs from them has shown that competition has been successful without such costly OI&M requirements. The most direct example is the intraLATA toll market, where competing carriers have been able to obtain increasing shares of the market despite the fact that the BOCs started with 100 percent of the market and have been allowed to continue providing these services on an unseparated basis with no OI&M restriction. Similarly, past fears that allowing the BOCs to compete in markets such as customer premises equipment and information services on an unseparated basis would allow them to drive out competition have proven to be false – the BOCs have only small shares of these markets, which are highly competitive despite the fact that competing firms must obtain interconnection to the BOC facilities. In addition, the BOCs provide inside wiring maintenance using a combined workforce in much the same way that they would perform OI&M services for their interLATA services without the OI&M restriction, and yet the market is highly competitive. The Commission has successfully used cost accounting rules and rate imputation to protect competition in these markets, and there is no reason to believe that similar safeguards would not be sufficient in the interLATA market.
4. The OI&M restriction is a redundant safeguard that actually harms competition by handicapping the BOCs and by ultimately passing along the costs of this restriction to consumers. The harm to competition and consumers from maintaining this unnecessary requirement is exacerbated by the fact that not only do the BOCs' long-distance and other services compete with services provided by carriers that choose to obtain inputs from the BOCs, but ever increasingly and for very lucrative customers, BOCs must compete with carriers that can provide vertically-integrated services that capture their own scope economies without any need to obtain inputs from the BOCs.

5. In contrast to both the intent and vision of the Telecommunications Act and the subsequent reality that firms in formerly separate markets would enter into and compete against the incumbent providers in these markets, Dr. Selwyn instead attempts to turn back the clock, not merely to 1996, but all the way back to 1984, when the divestiture of AT&T legally separated long-distance and local exchange markets, as shown by his assertion (at p. 4) that relaxation of current separate subsidiary requirements would recreate the conditions that led to the break-up of the Bell System of 1984. Because of the changes in technology, law, regulation, and competition itself, all of which were accelerated by the 1996 Telecommunications Act, 2002 is not 1984. In particular, there is no likelihood that history will repeat itself if regulations such as the OI&M restriction were not applied. More importantly, efficient competition requires that they be removed to fulfill the objectives of the 1996 Act.

## **II. ECONOMIC IMPORTANCE OF SCOPE (VERTICAL INTEGRATION) ECONOMIES: THEORY AND EXPERIENCE**

6. Dr. Selwyn and others argue that realization of more of Verizon's potential economies of scope in serving local exchange and long-distance customers would provide an unfair advantage over their competitors. They are mistaken, for two reasons, one of principle and one of fact – the increasing convergence of markets that I described in the introduction. As for the former, competitive advantages arising out of economies of scope are precisely the kind of efficiency advantages that we expect and *want* to prevail under competition. Integration is fundamentally a *competitive* phenomenon, and the efficiency advantages it confers on the integrated firms are socially beneficent. The first fundamental competitive principle of freedom of entry means, first and foremost under conditions of real-world competition, freedom of existing firms to integrate into other operations or markets that they think they have special qualifications to serve.<sup>3</sup> Competition by integration of existing

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<sup>3</sup> In a book devoted to the proposition that vigorous enforcement of the antitrust laws is necessary for the preservation of fair competition, Professor Alfred Kahn began the chapter "Business Integration and Monopoly" with the proposition:

competition requires ... that business units be free, ordinarily, to take on new products, new functions, or enter new markets—in short, to integrate.

firms into related markets is most likely to be socially productive precisely because it represents an attempt to achieve the benefits of economies of scope, the manifestation of which is the ability of a firm to supply a number of products or services in combination at lower costs than if it were to supply them separately. The source of such economies is the possibility – indeed, the pervasive phenomenon – of existing firms having special capabilities of their physical plant, their managerial or labor forces, technological or marketing skills or reputations taking on the provision of additional products or services at incremental costs lower than the costs of setting up systems to supply those additional services separately.<sup>4</sup>

7. In raising the specter of the long-distance market returning to pre-divestiture conditions,<sup>5</sup> Dr. Selwyn either ignores more recent experience that belies his pessimistic assessment and/or draws the wrong conclusion from history that is most apt, such as intraLATA toll competition. Indeed, there has accumulated, over the period since divestiture, a great deal of actual experience with competition between the BOCs – and other incumbent local exchange carriers (“ILECs”) – on the one side, and rivals dependent on access to their facilities. An ounce of such actual experience is surely weightier than a pound of speculation about possible misdeeds and/or, predictions of re-monopolization. Assertions about the theoretical inadequacies of regulatory safeguards against predation, cross-subsidy and discriminatory treatment of competitors simply ignore this historical evidence. In practice, competition by non-vertically integrated firms with BOC “bottleneck monopolies” has already succeeded in other telecommunications markets that are at least as susceptible

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Joel B. Dirlam and Alfred E. Kahn, *Fair Competition: The Law and Economics of Antitrust Policy*, Ithaca, NY: Cornell University Press, 1954 (reprinted by Greenwood Press, 1970).

<sup>4</sup> See the similar observations in Melvin G. de Chazeau and Alfred E. Kahn, *Integration and Competition in the Petroleum Industry*, New Haven: Yale University Press, 1959, p. 261 and in Alfred E. Kahn, *The Economics of Regulation*, Vol. 2, pp. 260-261.

<sup>5</sup> Dr. Selwyn (p. 9) seems to believe that Verizon has been “too successful” in attracting customers to its long-distance services. To the contrary, as Professor Kahn and I anticipated in our affidavits in support of SBC’s entry into interLATA long-distance (see for example, Kahn and Tardiff, *op. cit.*), this success is the result of the BOCs’ economies that allow it to offer quality services that benefit consumers (e.g., its economies of scope and strong brand identity) as well as the fact that BOCs are offering attractive alternatives to customers (such as smaller-volume residential customers) who had previously not experienced the full benefits of toll competition.

to anti-competitive tactics as the interLATA market<sup>6</sup> -- intraLATA long-distance; geographic corridors in which the BOCs have been permitted to offer interLATA service; voice messaging services (VMS) and other information services; and customer premises equipment (CPE) and inside wiring.<sup>7</sup> The most cogent lessons from this experience are as follows.

### 1. IntraLATA toll

8. Dr. Selwyn correctly observes (pp. 25-26) that ILECs face fewer regulatory restrictions in the provision of intraLATA toll services than they encounter after obtaining 271 approval (even in the event that the OI&M prohibition were relieved). Accordingly, if Dr. Selwyn's assertions about the threat of re-monopolization had any validity, one would expect that intraLATA competition would have been a non-starter. In fact, all states with multiple LATAs permit intraLATA toll competition; and in none of them have the ILECs been required to divest themselves of their toll businesses or even to create separate subsidiaries. When the interexchange carriers (IXCs) entered these markets, they (i) started with small initial market shares, (ii) had few facilities within the LATA, so that they were heavily dependent on the LECs for access to subscribers, (iii) did not have complete dialing parity,

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<sup>6</sup> There are no requirements that the BOCs offer these services through separate affiliates or not share OI&M services between these product lines. This demonstrates that the existing safeguards such as equal access and imputation, which apply when the BOCs provide these services, are by themselves sufficient for the BOCs' offering of interLATA services.

<sup>7</sup> International experience lends further support to the argument that regulatory safeguards other than separate affiliate requirements are sufficient. While the United States was clearly the leader in opening long-distance markets to competition, it has been alone in requiring divestiture and quarantine. And yet, despite their having removed their barriers to entry into those markets well after the United States had done so and despite their having permitted the providers of essential local exchange services to continue to offer the newly competitive services, toll competition has made substantial progress in other countries. For example, until a recent intensification of price competition restored some of their losses, the incumbents in Canada had lost more market share since competition was authorized in 1992 than occurred in the United States over the comparable period after 1984. Similarly, three facilities-based carriers have captured over 45 percent of the Japanese long-distance market since 1987, despite the fact that the incumbent NTT remains vertically integrated. Willie Grieve and Stanford L. Levin, "Telecom Competition in Canada and the U.S.: The Tortoise and the Hare," *Selected Papers from the 25<sup>th</sup> Annual Telecommunications Policy Research Conference*, Alexandria, VA, September 27-29, 1997. Likewise, Spiller and Cardilli report that facilities-based *local* competition has progressed at a healthy pace in the smaller countries they examined (Australia, Chile, Guatemala and New Zealand), even though none of these countries has the extensive unbundling requirements for an indefinite duration that prevail in the United States or has prevented incumbents from vertically integrating. Pablo T. Spiller and Carlo G. Cardilli, "The Frontier of Telecommunications Deregulation: Small Countries Leading the Pack," *The Journal of Economic Perspectives*, Vol. 11 (1997), pp. 127-138.

and (iv) had to compete against inexpensive local calling within the LATA and overcome initial ignorance on the part of subscribers that they now had a choice of providers. Even under these circumstances, LECs are losing significant amounts of market share, particularly for large business customers that combine interLATA and intraLATA traffic on the same dedicated facilities. Despite the fact that dialing parity was not universally required before 1999,<sup>8</sup> the IXC's had already captured 22 percent of that market nationwide by 1995.<sup>9</sup> This amount of market share loss by incumbents is comparable to AT&T's in the interLATA market by 1988 (four years after divestiture) and is all the more remarkable in light of the fact that intraLATA toll competition was not even authorized in two of the states with the largest amounts of intraLATA traffic, which account for 46 percent of all such calling (California and New Jersey), until 1995. Since 1995, the incumbents' market share appears to have fallen even further – to a level substantially lower than AT&T's in interstate long-distance when it was accorded non-dominant status.<sup>10</sup> The success of competition for long distance intraLATA business is strong evidence that the hypothetical dangers of discriminatory treatment of BOC affiliates and their competitors are in fact adequately precluded by other regulatory safeguards, such as equal access and imputation. Neither structural separation in general nor an OI&M restriction in particular were necessary to allow competition to flourish in this market.

## **2. InterLATA corridor traffic**

9. BOCs had routinely provided interLATA services since divestiture under exceptions to the AT&T consent decree, the notable example of which is Bell Atlantic's interLATA service between New York and New Jersey and between Philadelphia and New Jersey. In a

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<sup>8</sup> The Act mandated dialing parity in all areas as of February 1999. Section 271(e)(2).

<sup>9</sup> Affidavit of Professor Marius Schwartz, filed on behalf of the DOJ in response to Southwestern Bell's Oklahoma petition (CC Docket No. 97-121), May 14, 1997, p. 11, fn. 4.

<sup>10</sup> According to ARMIS data, Report 43-08, between 1995 and 2001, the ILECs' intraLATA toll volumes decreased substantially. If the 43 percent decrease in intraLATA toll volume per line represents market share loss from the 78 percent estimated by Schwartz, then the ILEC share by the end of 2001 was about 45 percent (0.78 x 0.57)—noticeably lower than AT&T's share at the time the FCC ruled that it was no longer dominant. Verizon's decrease in intraLATA toll volumes was even larger – 47 percent in the former Bell Atlantic territories and 54 percent overall.

testimonial to the effectiveness and persistence of competition, the FCC *removed* these services from price cap regulation:

As a result of the competition that has developed since the consent decree and the Telecommunications Act of 1996, price cap LECs may now be non-dominant in the provision of corridor and interstate intraLATA toll services, particularly in light of the availability of inter- and intraLATA dialing parity. Although the record in this proceeding is insufficient for us to conduct the analysis outlined in the *Dominant/Non-Dominant Order*, we do conclude that developments in the markets for interexchange services make it unlikely that price cap LECs will be able to exploit over a sustained period any individual market power in their provision of corridor and interstate interLATA toll services.<sup>11</sup>

This occurred despite the fact that the Bell Atlantic was allowed to provide these interLATA services without using a separate affiliate, without using separate facilities, and without using separate OI&M services. The Commission successfully relied on the requirements for equal access and imputation of the same access charges to these services that Bell Atlantic assessed on non-affiliated providers of interLATA services.

### **3. Information Services (e.g., Voice Messaging Service (VMS))**

10. In the Computer III proceeding, the Commission eliminated the requirement that the LEC's provide information services, such as voice messaging services, through separate affiliates.<sup>12</sup> The Commission found that the separate affiliate requirement had undermined the incentive for the LEC's to invest in these services, and that separate affiliates were not needed to protect competition.<sup>13</sup> This decision has proven to be correct, as consumers subsequently benefited from an expansion of information services by the LECs while

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<sup>11</sup> Federal Communications Commission, Fifth Report and Order and Further Notice of Proposed Rulemaking, In the Matter of Access Charge Reform, CC Docket No. 96-262, Price Cap Performance Review for Local Exchange Carriers, CC Docket No. 94-1, Interexchange Carrier Purchases of Switched Access Services Offered by Competitive Local Exchange Carriers, CCB/CPD File No. 98-63, Petition of U S West Communications, Inc. for Forbearance from Regulation as a Dominant Carrier in the Phoenix, Arizona MSA, CC Docket No. 98-157, August 27, 1999, par. 53. The FCC goes on to list as factors ensuring the survivability of competition the ability of the major IXCs to expand capacity and their strong brand identities.

<sup>12</sup> Amendment of Section 64.702 of the Commission's Rules and Regulations (Third Computer Inquiry), Report and Order, 104 F.C.C.2d 958 (1986).

<sup>13</sup> In addition, the FCC has ruled that the Open Network Architecture (ONA) safeguards are sufficient to deter conduct that has been alleged to be anti-competitive in the past. (Bell Operating Companies Joint Petition for Waiver of Computer II Rules, Order, 10 FCC Rcd. 13764, 1995, par. 32.)

competition has continued to grow unabated. Since the BOCs and GTE began offering VMS, consumers have benefited in at least two ways. First, the monthly charge has dropped from \$30 in 1990 to \$5-\$15 in 1995.<sup>14</sup> Second, the LECs began offering VMS to residential and small business customers, a hitherto untapped market segment. In five years, the BOCs' participation in this market increased from zero to over six million subscriptions, yet other competitors have thrived, and the BOCs and GTE together account for just over 15 percent of the total revenues nationally.<sup>15</sup> Similarly, there are hundreds of non-affiliated Internet service providers (ISPs), which need to connect to the BOCs local networks, and the ISPs affiliated with BOCs have only a small share of this activity. If AT&T's claims were true, the ability of the BOCs to offer these services on an integrated basis would have been the death knell for competition in the information services market. Instead, just the opposite occurred. Despite the fact that information services providers use the BOCs for access to end users, there is no evidence that competition has been impeded by allowing the BOCs to offer these services on an integrated basis.

#### **4. Customer premises equipment and inside wiring**

11. Though barred from manufacturing until 1996, Verizon and the other BOCs have been permitted to provide CPE on an unseparated basis. As in the case of interLATA toll, competitors of the BOC must interconnect with the incumbent's network – typically in the form of connecting to a BOC-provided access line. There is no evidence – nor have there, to our knowledge, been even assertions – that they have attempted, by exercising their control over interconnection, to exclude competitors,<sup>16</sup> let alone succeeded. Indeed, the collective share of local telephone companies in CPE distribution has been small, on the order of 15 percent.<sup>17</sup> Similarly, in recognition of its competitive nature, the Commission

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<sup>14</sup> J.A. Hausman and T.J. Tardiff, "Benefits and Costs of Vertical Integration of Basic and Enhanced Telecommunications Services," prepared for filing with the Federal Communications Commission, Computer III Further Remand Proceedings, CC Docket No. 95-20, on behalf of Bell Atlantic, Bell South, NYNEX, Pacific Bell, Southwestern Bell, and U S West, April 6, 1995.

<sup>15</sup> *Ibid.*, pp. 5, 10.

<sup>16</sup> NERA staff reviewed complaints filed against the BOCs with the FCC between 1985 and 1991 and found none about the offering or interconnection of CPE.

<sup>17</sup> North American Telecommunications Association, *1995 Telecommunications Market Review and Forecast*,

has allowed the BOCs to install and maintain inside wiring, which connects directly with their networks, on a deregulated basis for years. There are no structural separation safeguards with regard to either the provision of CPE or inside wiring installation and maintenance. The BOCs are allowed to enjoy the efficiencies of providing these services on an integrated basis, using the same OI&M workforce that supports the wireline network, and to use accounting procedures to allocate costs between these non-regulated services and their regulated network services. Again, the success of nonstructural safeguards in these markets is ample proof that Dr. Selwyn's theory of re-monopolization of the long distance market in the absence of structural separations is far-fetched.

12. The assertion of Dr. Selwyn and other proponents of maintaining restrictions on BOCs that existing restrictions should be removed only when BOCs are devoid of market power in the provision of local exchange service badly misses the point. In addition to the fact that experience indicates that competition can thrive even when competitors require essential inputs from BOCs, the growing competition from both intra- and intermodal competitors renders discrimination and other anticompetitive acts in the provision of network access increasingly counterproductive – in the light of competitive inroads and the concomitant loss of volumes incumbents have recently experienced, such actions would hasten such losses in the future. Further, because unnecessary regulatory restrictions increase the BOCs' costs of providing service and thus deny consumers the economic benefits of efficient supply, undue maintenance of such restrictions is inconsistent with the objectives of the Act to facilitate competition and deregulation. Indeed, the Act properly called for local exchange markets to be open to competition (through satisfaction of the 14-point competitive check-list)<sup>18</sup> and not for any particular market share or market power test to be invoked. Similarly, Section 272 properly calls for sunset of separate subsidiary

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Sections III-1 to III-2.

<sup>18</sup> In light of the historical success of competition between vertically integrated ILECs and competitors using inputs from them, I have argued elsewhere (e.g., in the public interest affidavit with Professor Alfred Kahn cited in note 9) that the market-opening provisions of Section 271 makes most sense when viewed as an incentive for BOCs to open their local markets, rather than as a necessary condition for successful interLATA toll competition.

requirements without reference to any market share/market power metrics applied to local exchange services.

### **III. REPLY TO SPECIFIC ASSERTIONS**

13. Dr. Selwyn makes three specific claims regarding the removal of the shared OI&M prohibition: (1) that removal would provide Verizon with a cost advantage, (2) that removal of the restriction is unnecessary because Verizon's long-distance affiliate is on exactly the same footing as IXCs that obtain access services from it, and (3) that separate subsidiary requirements (including the OI&M prohibition) are necessary because the other safeguards that would continue to prevail, in particular, price cap regulation and the imputation requirements of Section 272, are insufficient to deter anticompetitive conduct.
14. With respect to the cost advantage issue, as a matter of principle, removing unnecessary restrictions will improve Verizon's position vis-à-vis its competitors. But, as I described earlier, allowing all competitors to fully use scope economies and compete on the merits is entirely consistent with how competition is supposed to work as well as the objectives of the Act. The results of such competition (e.g., the resulting structure of the market, who will enter and be successful, and what products will be offered) is difficult to predict a priori (after all, that's why we have markets in the first instance), but the end result is greater benefits for consumers in the form of more choice, richer product offerings, lower prices, and more innovation, as all firms face the proper economic incentives to invest in their networks. Indeed, Dr. Selwyn's discussion seems to be somewhat contradictory on this issue. On the one hand, he seems dubious that cost savings are as large as Verizon reports.<sup>19</sup> If such savings are as immaterial as Dr. Selwyn suggests, it hard to understand his concerns about advantages that would lead to an eventual re-monopolization of toll services. On the other hand, to deny Verizon the opportunity to organize efficiently would inhibit the attainment of the full benefits from vigorous competition that the Act envisioned.
15. With respect to Dr. Selwyn's assertion the current separate affiliate restriction places Verizon and its competitors on equal footing because non-BOC providers rely upon BOC facilities in all but rare instances, I note that he focuses on the number of customer

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<sup>19</sup> Attached to Verizon's reply is additional information to support its cost savings estimates.

*locations* served by non-BOC facilities in making his claim. This focus ignores the fact that competitive local exchange carriers (“CLECs”) (including AT&T) have concentrated their facilities-based competitive responses on the most lucrative of these locations – a relatively small number that account for a disproportionate share of demand. And it is in the service to these customers (for which AT&T and other carriers can provide integrated end-to-end service) that Verizon reports that the OI&M restriction is especially onerous. In fact, the *UNE Fact Report*<sup>20</sup> shows that CLECs provide between 11 and 19 million business lines using their own loop and switching facilities and these account for 20 to 30 percent of *all* business lines in BOC territories (excluding the Verizon’s former GTE territories). Among large business customers concentrated in urban areas, the CLECs’ share is likely much higher. Consequently, contrary to Dr. Selwyn’s claim, non-BOC carriers *can* provide local and long distance services on an integrated basis, and competition on the merits (e.g., without unnecessary and counterproductive restrictions such as the OI&M prohibition) would provide them with the ability and incentive to grow their offerings of integrated services.

16. In fact, Dr. Selwyn’s client – AT&T – is a major and growing supplier of facilities-based local services to both business and residential customers. Its recent annual reports and financial filings clearly indicate the extent of its facilities-based presence.

- As of the second quarter of this year, it had 1.22 million cable telephony customers (16 percent penetration in the areas it serves), up almost 50 percent from the previous year.<sup>21</sup>

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<sup>20</sup> *UNE Fact Report 2002*, prepared for and submitted by BellSouth, SBC, Qwest, and Verizon to the Federal Communications Commission, In the Matter of Review of Section 251 Unbundling Obligations of Incumbent Local Exchange Carriers (CC Docket No. 01-338), Implementation of the Local Competition Provisions of the Telecommunications Act of 1996 (CC Docket No. 96-98), and Deployment of Wireline Services Offering Advanced Telecommunications Capability (CC Docket No. 98-147), April 2002.

<sup>21</sup> AT&T, Earnings Commentary, Quarterly Update—Second Quarter 2002, July 23, 2002. Total cable telephony volume exceeds 2 million subscribers and analysts estimate that within 10 years, most households passed by cable will be able to get phone service. The success of cable providers in gaining subscribers is due in part to their ability to package television, Internet, and phone service (an example of their scope economies). In order to compete effectively, BOCs must respond by offering similar bundles of services. See, for example, Peter Grant, “More Consumers Answer Cable’s Call on Phone Service,” *Wall Street Journal*, September 5, 2002.

- It has 3.3 million business lines—28 percent more than in the previous year. In describing how these lines are provided, AT&T's 2001 10K report described its local networks in 80 cities, which consist of 110 local switches, 17,000 route miles of fiber and access to 6,300 buildings.<sup>22</sup>

17. As Verizon described in its opening comments in WC Docket No. 02-112, not only have new entrants gained substantial volumes in the local exchange market by availing themselves of the unbundling and resale provisions of the Telecommunications Act, Verizon (and other ILECs) face competition from CLECs that serve customers with their own facilities *and* from intermodal (and fully integrated) competitors such as wireless carriers and cable television companies that offer telephone and high-capacity broadband services<sup>23</sup> over upgraded facilities. As a result of this competition (and other factors such as the overall state of the economy), Verizon and other BOCs have experienced decreases in access lines and traffic volumes.<sup>24</sup>

18. Dr. Selwyn (at p. 14) presents one fact from the FCC's most recent assessment of wireless competition – that incumbents have an interest in wireless companies that serve 42 percent of wireless phones – to argue that the BOCs have not faced real competitive loss from wireless competition. That same report examined wireless competition on a number of dimensions, e.g., customer choice, demand growth, price competition, and concluded that there is “a high level of competition for most customers.”<sup>25</sup> This competition, in which the

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<sup>22</sup> In contrast to its description of how it supplied local service to its consumer (residential) long-distance customers (through UNE-P), AT&T's reports make no mention of the use of ILEC-supplied inputs in supplying local exchange services to businesses.

<sup>23</sup> As Verizon described in its opening comments, not only do the broadband services of other providers (e.g., cable modems) constitute a form of vertically-integrated competition, they also illustrate the fact that distinctions that may have made sense at one time can become meaningless as markets converge. For example, the distinction between intraLATA and interLATA communications for Internet telephony services provided over broadband facilities may well be meaningless, and attempts to separate costs according to such distinctions is at best inefficiently costly, and perhaps even impossible.

<sup>24</sup> According to ARMIS data, Report 43-08, between 2000 and 2001, ILECs' switched access lines declined by five percent (from 175.0 million to 166.8 million) and Verizon's decreased by over two percent (from 61.7 million to 60.3 million).

<sup>25</sup> Federal Communications Commission, In the Matter of Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Seventh Report, July 3, 2002, p. 19.

wireless offerings of ILEC-affiliated companies are competing head-to-head,<sup>26</sup> has produced lower prices and greater choice and at the end of 2001, about 60 percent of all US households included wireless users.<sup>27</sup> The FCC also described how wireless offerings are competing directly with the local and long-distance services of incumbent providers, resulting in access line losses for the former and reductions in traffic volumes for the latter.

19. The impact of intermodal competition on the industry has also been acknowledged by Dr. Selwyn's client—AT&T. In describing the competitive environment for its long-distance offerings, AT&T's 10K Annual Report for 2001 noted:

In addition, long-distance telecommunications providers have been facing competition from non-traditional sources, including as a result of technological substitutions, such as Internet telephony, high-speed cable Internet service, e-mail, and wireless services...AT&T currently faces significant competition and expects the level of competition will continue to increase. As competitive, regulatory, and technology changes occur, including those occasioned by the Telecommunications Act, AT&T anticipates that new and different competitors will enter and expand their position in communications services markets. These will include regional phone company competitors in existing states and new states plus entrants from other segments of the communications and information services industry or global competitors seeking to expand their market opportunities. Many of these new competitors are likely to enter with a strong market presence, well-recognized names and pre-existing direct customer relationships.<sup>28</sup>

20. Of course, AT&T has described what from its perspective is the same convergence of markets Verizon identified in noting the significant inroads intra-modal and intermodal competition have made in its services. This is precisely what the Telecommunications Act envisioned and intended to foster. Although, even if there were no vertically integrated intermodal competitors, competitive safeguards such as non-discrimination and imputation

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<sup>26</sup> Consequently, Dr. Selwyn's calculation of collective BOC national market share is not indicative of the competition that a BOC affiliate in its home region faces from other wireless providers, because a large part of this "BOC" market share includes wireless carriers that a BOC owns outside of its own region, where it obviously has no ability to control any essential inputs to other carriers. For example, customers in Verizon's territories can choose among Verizon wireless, Cingular (an SBC affiliate) as well as several other providers that are not affiliated with BOCs, e.g., AT&T wireless. Indeed, because BOC-affiliated carriers from other regions are presumably most knowledgeable about any real risks of anti-competitive conduct directed at them by the incumbent wireline carriers, this head-to-head competition is perhaps the best evidence that participation by BOCs in the wireless business does not impede competition.

<sup>27</sup> *Ibid*, p. 32.

requirements are sufficient without the OI&M prohibition, the presence of intermodal competitors exacerbates the competitive harm of maintaining this unnecessary prohibition. Indeed, the proper regulatory response to these developments is to allow all competitors to use their scope economies in providing services across formerly segregated markets, so that the objective of the Act “to promote competition and reduce regulation in order to secure lower prices and higher quality services for American telecommunications consumers and encourage the rapid deployment of new telecommunications technologies”<sup>29</sup> can be realized. Unnecessary restrictions on particular competitors, including the OI&M prohibition, are inconsistent with the primary purpose of the Act.

21. Turning to Dr. Selwyn’s claims that price cap and imputation safeguards would be ineffective without structural separation and the OI&M restriction, I first note that his claim that the BOCs will cross-subsidize their interLATA services without such restrictions hinges on the (incorrect) proposition that the BOCs have any ability to impose above-cost access charges on other carriers. This proposition is incorrect for a number of reasons. First, the current level of federal access charges is a result of the CALLS settlement (of which AT&T was a participant) and not a unilateral action by Verizon or any ILEC. Indeed, these charges are very low (i.e., the margin above cost is small) and constitute an historically small share of the total cost of long-distance service – originating and terminating access charges on an interLATA calls for carriers subject to federal price cap regulation average about 1.4 cents per conversation minute, which is less than one-sixth of the average revenue per minute of about 9 cents.<sup>30</sup> These carrier access prices continue to be regulated and therefore cannot be increased by the ILECs. Accordingly, the proper focus is not cost allocation, but whether competition is capable of being harmed, given the regulated level of access charges. And the answer is clearly no—as Professor Kahn<sup>31</sup> has

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<sup>28</sup> AT&T 2001 10K, p. 35.

<sup>29</sup> See Telecommunications Act of 1996, preamble.

<sup>30</sup> Federal Communications Commission, *Trends in Telephone Service*, May 2002, Tables 1.4 and 14.3. Current access charge levels are less than 10 percent of what they were when access charges were established immediately after divestiture.

<sup>31</sup> See, for example, Alfred E. Kahn, *Letting Go: Deregulating the Process of Deregulation*, Michigan State University, The Institute of Public Utilities and Network Industries, 1998, pp. 109-113.

pointed out in numerous contexts, imputation provides all efficient firms sufficient ability to compete. Since imputation of access charges under section 272(e)(3) of the Act applies both before and after sunset of the separate affiliate requirements, those requirements in general, and the OI&M restriction in particular, are redundant safeguards that add uneconomic costs without any regulatory benefits.<sup>32</sup>

22. Dr. Selwyn's dismissal (at pp. 37-38) of the imputation requirement as being economically meaningless to the BOC is incorrect. When faced with the decision to offer long-distance at a particular price, a rational ILEC will ask itself whether it can earn more profits by offering the service itself than by selling access to competitors that would serve the volumes in question. The only circumstances under which a rational firm would sacrifice greater profits from offering access (i.e., engage in a price squeeze),<sup>33</sup> would be if it believed it could drive its rivals out of the market and recoup the forgone profits with higher prices subsequent to that exit. Given the competitiveness of interLATA long-distance, such predatory behavior could not succeed.<sup>34</sup>
23. The same considerations demonstrate why his dismissal of price caps is incorrect. In view of the facts that both retail and access prices are capped by federal and state regulation, a rational firm would reduce the price of its interLATA toll service only if it could earn more profits from offering this service than selling access to competitors. Because price caps

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<sup>32</sup> See, for example, Dennis L. Weisman, "The Law and Economics of Price Floors in Regulated Industries," *Antitrust Bulletin*, Vol. 47, 2002, pp. 107-131.

<sup>33</sup> Dr. Selwyn (at fn. 70) makes the puzzling claim that Hausman, et al.'s suggestion that BOCs with 271 authorization take into account their economies of vertical integration when pricing their services implies that they ignore imputation requirements. First of all, Dr. Selwyn's analysis is internally inconsistent—he simultaneously disputes the validity of Hausman's findings that prices are lower in states with 271 authority, yet he credits the explanation ("double marginalization") of why prices are lower. More fundamentally, the fact that vertical integration allows a firm to charge lower prices to end users does not demonstrate that such prices fail an imputation requirement and Dr. Selwyn offers no such demonstration. If fact, if the BOC could earn more profit by selling access than offering retail toll, it would be rational to do so and such a decision would imply that imputation requirements have been satisfied.

<sup>34</sup> Dr. Selwyn (at p. 10) attempts to link a price increase by SBC to eventual monopolization of long-distance by BOCs. The fact that a new entrant adjusts its initial prices as it gains market experience is not unusual. Further, it is not indicative of predatory behavior that would lead to monopolization, because in that instance, price increases occur *after* rivals have left the market. Further, in light of Dr. Selwyn's insinuation that the alleged price increases are competitively problematic, it is curious that he later asserts that BOC long-distance prices are too low, because imputation requirements have been ignored.

preclude the possibility of recouping losses with higher prices from “captive” customers, the issue of how internal “transfer prices” are recorded is irrelevant.<sup>35</sup>

24. Access charges are directly regulated by the FCC and the several states and are subject to imputation requirements not only in the Federal jurisdiction and in most of the states but under the overriding authority of the Act itself. Moreover, as of 1999, thirty-six (36) states and the District of Columbia as well as the FCC had substituted price caps for traditional cost-plus, rate base/rate of return regulation.<sup>36</sup> Price caps represent an improvement over the traditional methods of regulation in two ways. First, they supply stronger incentives on the part of the regulated firms to improve their efficiency, since they retain the benefits of any such cost reductions – subject of course to reexamination of the price cap formulas. Second, and more directly pertinent in the present context, they can eliminate the incentive of the regulated firms to engage in predation or otherwise cross-subsidize competitive services because, by breaking the link between the firms’ overall profits and regulated rates, they eliminate – to the extent the price cap regimes are pure<sup>37</sup> -- the opportunity to recover

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<sup>35</sup> Dr. Selwyn even goes so far as to suggest that rate-of-return regulation for regulated retail and access services (presumably the competitive toll service would be unregulated) would be superior to price caps. In fact, if ILECs managed to gain approval for an *increase* in carrier access charges, that higher price would be factored into the decision on whether a particular price for toll would be profitable relative to selling access to competitors and the irrationality of a price squeeze would still remain.

<sup>36</sup> *State Telephone Regulation Report*, August 20 and September 3, 1999.

<sup>37</sup> That is to say, to the extent that they do not provide for sharing between companies and ratepayers of excesses or inadequacies of profits and are not promptly “corrected” to eliminate excessive profits or losses, either retroactively or prospectively. The majority of the plans are indeed “pure” in the former sense: of the (at least) 29 states we counted as having adopted some form of price cap regulation as of June 1996, only two had provisions for sharing either surpluses or deficiencies in achieved rates of return with ratepayers; and one of them, California, has suspended that sharing provision and the other, New Jersey, has just eliminated sharing.

As for “purity” in the sense of a complete abandonment of tests of the price cap formulas or freezes against achieved rates of return, no plan to our knowledge rigidly excluded the possibility of such a test—in this sense, no plan was “pure.” On the other hand, our survey, as of June 1996, of price cap plans adopted in the previous three years disclosed that the commissions were typically planning on an approximately five year interval before subjecting the formulas to review. The periods (in years) were: Illinois—3; Iowa—4; Kansas—5; Kentucky—at least 4; Maine—5; Massachusetts—at least 6; Michigan—2; New Jersey—6; North Carolina—5; Ohio—6; Pennsylvania—5; South Carolina—1; and Wisconsin—6.

Finally, competitive forces are growing sufficiently strong so that both federal (e.g., the FCC’s mechanism for special access price flexibility) and state regulators are freeing services from price cap regulation. (See, for example, New Jersey Board Of Public Utilities, Board Meeting in Docket No. T001020095 – In the Matter of the Application of Verizon-New Jersey, Inc. for Approval (i) of a New Plan for an Alternative Form of Regulation and (ii) to Reclassify Multi-Line Rate Regulated Business Services as Competitive Services, and Compliance Filing, June 19, 2002; Massachusetts Department of Telecommunications and Energy, DTE 01-31-

all of those costs or losses from monopoly customers. Unsurprisingly, state regulators and Federal courts have ruled that price cap regulation can be an effective safeguard against cross-subsidization and other such anti-competitive behavior.<sup>38</sup>

#### IV. CONCLUSIONS

25. Despite Dr. Selwyn's claims to the contrary, the pre-divestiture long distance market is a relic of the past with no prospects of returning. Developments in technology, law, regulation, as well considerable successful experience with vertically-integrated BOCs competing with companies that acquire inputs from them demonstrate that the non-discrimination and imputation safeguards that will remain after interim separation requirements such as the OI&M expire are sufficient. Maintenance of unnecessary requirements is not only superfluous in meeting the objective of safeguarding competition,

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Phase I, Investigation by the Department of Telecommunications and Energy on its own Motion into the Appropriate Regulatory Plan to succeed Price Cap Regulation for Verizon New England, Inc. d/b/a Verizon Massachusetts' intrastate retail telecommunications services in the Commonwealth of Massachusetts, May 8, 2002; and New York Public Service Commission, Order Instituting Verizon Incentive Plan, Cases 00-C-1945 and 98-C-1357, February 27, 2002.)

<sup>38</sup> For example:

[A] well designed price cap plan insulates ratepayers from investment risk and subsidization of new ventures. Massachusetts Department of Public Utilities, *NYNEX Price Cap*, D.P.U. 94-50 (May 12, 1995), p. 121.

A properly designed alternative regulation plan affords the opportunity not only for the Company to transition itself to a more competitive environment, but allows this Commission to implement safeguards and allocate risk in a fashion that protects the interests of all interested parties. Illinois Commerce Commission, 92-0448/93-0239 Consol. (October 11, 1994), p. 19.

We find attractive many aspects of a pure price cap model for establishing revenue levels .... The utility and its shareholders would be completely at risk for their operational decisions, and incentives to cross-subsidize more competitive activities with monopoly profits from basic services would be greatly reduced. California Public Service Commission, Decision 89-10-031, In the Matter of Alternative Regulatory Frameworks for Local Exchange Carriers (October 12, 1989), at 172-173.

[T]he FCC has taken specific affirmative steps designed to deter and detect cross-subsidization by introducing price caps as well as further strengthening its cost accounting rules. We conclude that with the implementation of these measures, the FCC ... has demonstrated that the BOCs' incentive and ability to cross-subsidize will be significantly reduced. *California v. FCC*, No. 92-70083 and Consolidated Cases, 39 F.3d 919 (9<sup>th</sup> Cir. 1994) ("California III") at 926-927.

[Price cap regulation] reduces any BOC's ability to shift costs from unregulated to regulated activities, because the increase in costs for the regulated activity does not automatically cause an increase in the legal rate ceiling. *United States v. Western Elec. Co.*, 301 U.S. App. D.C. 268, 993 F.2d 1572 (D.C. Cir.), cert. Denied, 114 S. Ct. 487 (1993) at 1580.

but positively harmful in increasing the costs of production of firms subject to them, thus denying consumers the full benefits of competition.

26. The benefits to consumers from firms utilizing their scope economies from vertically integrating in order to offer attractive product bundles (one-stop shopping) and the harm to competition from impeding the use of such economies become increasingly important with the convergence of formerly separated markets. Consistent with the objectives of the Telecommunications Act, firms are making large investments in their facilities in order to provide voice, data, Internet, and video services in a way in which old distinctions between intra- and interLATA services are increasingly meaningless. Attempts to maintain the old distinctions by applying counterproductive safeguards such as the OI&M prohibition increase production costs, harm incentives to make investments necessary to compete effectively, and ultimately deny consumers of the full benefits from innovative bundles of services at attractive prices that efficient competition can deliver.

I declare under penalty of perjury that the foregoing is true and correct. Executed on  
September 23, 2002.

  
Timothy J. Tardiff

## TIMOTHY J. TARDIFF

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Dr. Tardiff received a B.S. with honors in Mathematics from the California Institute of Technology in Pasadena and a Ph.D. degree in Social Science from the University of California, Irvine, under a National Science Foundation Pre-doctoral Fellowship and an NSF Grant for Improving Dissertation Research in the Social Sciences.

Dr. Tardiff joined the faculties of the Department of Civil Engineering and the Division of Environmental Studies at the University of California, Davis. He taught undergraduate and graduate level courses in transportation and environmental policy analysis. His research included applications of econometric models of consumer choice to transportation planning problems. Dr. Tardiff's research was funded by the National Science Foundation, the Institute of Transportation Studies and the California Department of Transportation.

Prior to joining NERA, Dr. Tardiff's work included transportation, energy, public utility and telephone industry projects for the U.S. Departments of Transportation and Energy, the California Energy Commission, and several telephone and electric utilities.

Since joining NERA, he has evaluated pricing policies for increasingly competitive telecommunications markets, including appropriate mechanisms for pricing access services to competitors; studied actual and potential competition for services provided by telephone operating companies; analyzed the demand and revenue impacts of new telephone rate structures; developed and evaluated damage studies used in major telecommunications antitrust actions; analyzed the demand for wireless telephony; evaluated the investment and marketing programs of telephone companies; and developed a demand model for analyzing the market potential for alternative employee health care plans, including health maintenance organizations.

Dr. Tardiff has published extensively in the transportation literature. He has presented and published papers on the telecommunications industry. These papers address the issues of pricing and costing policies for emerging competition in telecommunications markets; evaluating and forecasting the impacts of telephone rate plans such as local measured service; analyzing the markets for new telecommunications products and services; and local competition policy issues.

## EDUCATION

UNIVERSITY OF CALIFORNIA, IRVINE  
Ph.D., Social Sciences, 1974

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## EMPLOYMENT

### NATIONAL ECONOMIC RESEARCH ASSOCIATES, INC.

1992 Vice President. Works on cases, mainly legal and regulatory, on issues of pricing policy, assessing demand for new and existing products and services, and economic damages. This work involves studies, often involving econometric demand analysis methods, for telecommunications, utilities and other clients. Specific areas have included: assessment of competition in the telecommunications industry; analysis of alternative approaches for regulating telephone utilities; evaluation of the benefits from telecommunication products and services; analyzing the demand for local services, toll, and carrier access; evaluation of the prudence of telephone company investments; damage studies for telecommunications antitrust cases; evaluation of methods for environmental damage assessment; and analysis of energy conservation /programs.

1984-1992 Senior Consultant

### CHARLES RIVER ASSOCIATES, INC.--Boston, Massachusetts

1979-1984 Director of Marketing Research. Managed program to apply econometric customer demand models to marketing research problems in telecommunications, electric utilities, transportation and other industries.

Senior Research Associate. Performed studies on urban transportation, freight transportation, energy and telecommunications issues.

### UNIVERSITY OF CALIFORNIA, DAVIS--Davis, California

1974-1979 Assistant Professor, Department of Civil Engineering and Division of Environmental Studies. Taught undergraduate and graduate course in transportation and environmental policy and quantitative research methods; conducted research on passenger transportation demand, (including econometric issues).

## **FELLOWSHIPS, GRANTS, AWARDS**

First Place, Dissertation Contest of the Transportation Science  
Section of the Operations Research Society of America.

NSF Research Initiation Grant (Engineering Division), 1976-1978.

NSF Grant for Improving Doctoral Dissertation Research in the Social Sciences,  
1973-1974.

NSF Predoctoral Fellowship, 1972-1974.

Public Health Service Traineeship, 1971-1972.

## **AFFILIATIONS**

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## TESTIMONY

Affidavit of Timothy J. Tardiff on unbundled network element pricing, prepared for filing with the Federal Communications Commission on behalf of ACS, WC Docket No. 02-201, July 24, 2002.

Reply Declaration of Alfred E. Kahn and Timothy J. Tardiff in the triennial review of unbundled network elements, prepared for filing with the Federal Communications Commission on behalf of Verizon, CC Docket Nos. 01-338, 96-98, and 98-147, July 17, 2002.

Statement of Alfred E. Kahn and Timothy J. Tardiff on funding the telecommunications service (universal service) obligation, prepared for filing with the New Zealand Commerce Commission on behalf of Telecom Corporation of New Zealand, June 10, 2002.

Supplemental Surrebuttal Testimony of Timothy Tardiff and Francis Murphy on the use of the FCC's Synthesis Model for evaluating the costs of unbundled network elements, prepared for filing with the Florida Public Service Commission on behalf of Verizon-Florida, Docket No. 990649B-TP, April 22, 2002.

Surrebuttal Testimony of Timothy Tardiff and Francis Murphy on the use of the FCC's Synthesis Model for evaluating the costs of unbundled network elements, prepared for filing with the Florida Public Service Commission on behalf of Verizon-Florida, Docket No. 990649B-TP, March 18, 2002.

Surrebuttal Testimony of Howard Shelanski and Timothy Tardiff on economic principles for determining the costs of unbundled network elements, prepared for filing with the Pennsylvania Public Utility Commission on behalf of Verizon-Pennsylvania, Docket No. R-00016683, February 8, 2002.

Rebuttal Testimony of Timothy J. Tardiff and Joseph A. Gansert on the application of the Modified Synthesis Model for the costs of unbundled network elements, prepared for filing with the Pennsylvania Public Utility Commission on behalf of Verizon-Pennsylvania, Docket No. R-00016683, February 8, 2002.

Rebuttal Testimony of Howard Shelanski and Timothy Tardiff on economic principles for determining the costs of unbundled network elements, prepared for filing with the Pennsylvania Public Utility Commission on behalf of Verizon-Pennsylvania, Docket No. R-00016683, January 11, 2002.

Rebuttal Testimony of Timothy J. Tardiff on the application of the Modified Synthesis Model for the costs of unbundled network elements, prepared for filing

with the Pennsylvania Public Utility Commission on behalf of Verizon-Pennsylvania, Docket No. R-00016683, January 11, 2002.

Supplemental Rebuttal Testimony of Timothy J. Tardiff on the application of the Modified Synthesis Model for the costs of unbundled network elements, prepared for filing with the Federal Communications Commission on behalf of Verizon-Virginia, CC Docket Nos. 00-218, 00-249, and 00-251, November 16, 2001.

Declaration of Timothy J. Tardiff on the use of the HAI, Release 5.2a for deriving an unbundled switch cost reduction, prepared for filing with the California Public Utilities Commission on behalf of Pacific Bell, October 30, 2001.

Declaration of Timothy J. Tardiff on the use of the HAI, Release 5.2a for deriving an unbundled loop cost reduction, prepared for filing with the California Public Utilities Commission on behalf of Pacific Bell, October 19, 2001.

Surrebuttal Testimony of Howard Shelanski and Timothy J. Tardiff on economic principles for determining the costs of unbundled network elements, prepared for filing with the Federal Communications Commission on behalf of Verizon-Virginia, CC Docket Nos. 00-218, 00-249, and 00-251, September 21, 2001.

Rebuttal Testimony of Timothy J. Tardiff on the application of the Modified Synthesis Model for the costs of unbundled network elements, prepared for filing with the Maryland Public Service Commission on behalf of Verizon-Maryland, Case No. 8879, September 5, 2001.

Declaration of Timothy J. Tardiff on the use of the HAI, Release 5.2a and Modified Synthesis Models for unbundled loop and switch costs, prepared for filing with the California Public Utilities Commission on behalf of Pacific Bell, September 4, 2001.

Rebuttal Testimony of Timothy J. Tardiff on the application of the Modified Synthesis Model for the costs of unbundled network elements, prepared for filing with the Federal Communications Commission on behalf of Verizon-Virginia, CC Docket Nos. 00-218, 00-249, and 00-251, August 27, 2001.

Affidavit of Timothy J. Tardiff on the use of proxy costs models for unbundled network elements, prepared for filing with the Regulatory Commission of Alaska, on behalf of Alaska Communications Systems, Docket No. U-96-89, July 27, 2001.

Rebuttal Testimony of Timothy J. Tardiff on the application of the Hatfield Model for the costs of unbundled network elements, prepared for filing with the

Massachusetts Department of Telecommunications and Energy on behalf of Verizon-Massachusetts, Docket No. D.T.E. 01-20, July 18, 2001.

Rebuttal Testimony of Timothy J. Tardiff on the application of the Hatfield Model for the costs of unbundled network elements, prepared for filing with the New Jersey Board of Public Utilities on behalf of Verizon-New Jersey, Docket No. TO00060356, October 12, 2000.

Supplemental Rebuttal Testimony of Timothy J. Tardiff on the Hatfield Model of unbundled network elements, prepared for filing with the State of Maine Public Utilities Commission on behalf of Bell Atlantic-Maine, Case No. 97-505, October 10, 2000.

Public Interest Affidavit before the Federal Communications Commission in the matter of Application of SBC Communications Inc. Nevada Bell Telephone Company and Southwestern Bell Communications Services, Inc. d/b/a Nevada Bell Long Distance for Provision of In-Region InterLATA Services in Nevada (with Alfred E. Kahn), July 24, 2000.

Responsive Testimony on the HAI Model of unbundled network elements, prepared for filing with the New York Public Service Commission on behalf of Bell Atlantic-New York, Case 98-C-1357 (filed as part of panel testimony), June 26, 2000.

Affidavit of Timothy J. Tardiff on avoided cost discounts for wholesale services, prepared for filing with the Regulatory Commission of Alaska, on behalf of Alaska Communications Systems, Docket Nos. U-99-141, U-99-142 and U-99-143, April 17, 2000.

Third Affidavit of Timothy J. Tardiff on costs models for unbundled network elements, prepared for filing with the Regulatory Commission of Alaska, on behalf of Alaska Communications Systems, Docket Nos. U-99-141, U-99-142 and U-99-143, March 24, 2000.

Second Affidavit of Timothy J. Tardiff on costs models for unbundled network elements, prepared for filing with the Regulatory Commission of Alaska, on behalf of Alaska Communications Systems, Docket Nos. U-99-141, U-99-142 and U-99-143, February 25, 2000.

Rebuttal Testimony of Timothy J. Tardiff on collocation costs models, prepared for filing with the Delaware Public Service Commission on behalf of Bell Atlantic-Delaware, Docket No. 99-251, February 24, 2000.

Affidavit of Timothy J. Tardiff on costs models for unbundled network elements, prepared for filing with the Regulatory Commission of Alaska, on behalf of Alaska Communications Systems, Docket Nos. U-99-141, U-99-142 and U-99-143, February 11, 2000.

Public Interest Affidavit before the Federal Communications Commission in the matter of Application of SBC Communications Inc. Southwestern Bell Telephone Company and Southwestern Bell Communications Services, Inc. d/b/a Southwestern Bell Long Distance for Provision of In-Region InterLATA Services in Texas (with Alfred E. Kahn), January 10, 2000.

Rebuttal Testimony of Timothy J. Tardiff on collocation costs models, prepared for filing with the Pennsylvania Public Utility Commission on behalf of Bell Atlantic-Pennsylvania, Docket Nos. R-00994697 and R-00994697C0001, December 21, 1999.

“Relaxed Regulation of High Capacity Services in Phoenix and Seattle: The Time is Now,” prepared for filing with the Federal Communications Commission on behalf of US WEST Communications, Petitions of US WEST Communications for Forbearance from Regulation as a Dominant Carrier in the Phoenix and Seattle MSAs (with Alfred E. Kahn), July 21, 1999.

Rebuttal Testimony of Timothy J. Tardiff on the HAI Model of unbundled network elements, prepared for filing with the Pennsylvania Public Utility Commission on behalf of Bell Atlantic-Pennsylvania, Docket Nos. P-00991648 and P-00991649, June 15, 1999.

“High Capacity Competition in Seattle: Reply to Comments of Intervening Parties,” prepared for filing with the Federal Communications Commission on behalf of US WEST Communications, Petition of US WEST Communications for Forbearance from Regulation as a Dominant Carrier in the Seattle, Washington MSA (with Alfred E. Kahn), March 10, 1999.

Rebuttal Testimony of Timothy J. Tardiff on collocation costs models, prepared for filing with the California Public Utilities Commission on behalf of Pacific Bell, February 8, 1999.

Surrebuttal Testimony of Alfred E. Kahn and Timothy J. Tardiff, filed with the Missouri Public Service Commission, in support of the Applications of SBC Communications, Inc., Southwestern Bell Telephone Company, and Southwestern Bell Communications Services, Inc., for Provision of In-Region InterLATA Services in Missouri, Docket No. TO 99-227, February 4, 1999.

Rebuttal Testimony of Timothy J. Tardiff on the HAI Model of unbundled network elements, prepared for filing with the Rhode Island Public Utilities Commission on behalf of Bell Atlantic-Rhode Island, Docket No. 2681, January 15, 1999.

Reply Testimony of Timothy J. Tardiff on collocation costs models, prepared for filing with the California Public Utilities Commission on behalf of Pacific Bell, January 11, 1999.

“Economic Evaluation of High Capacity Competition in Seattle,” prepared for filing with the Federal Communications Commission on behalf of US WEST Communications, Petition of US WEST Communications for Forbearance from Regulation as a Dominant Carrier in the Seattle, Washington MSA (with Alfred E. Kahn), December 22, 1998.

Testimony of Timothy J. Tardiff on collocation costs models, prepared for filing with the California Public Utilities Commission on behalf of Pacific Bell, December 18, 1998.

“Measuring and Recovering the Costs of Long-Term Number Portability: Implications of Price Cap Regulation,” Prepared for Southwestern Bell for presentation to the Federal Communications Commission, December 10, 1998.

Direct Testimony of Alfred E. Kahn and Timothy J. Tardiff, filed with the Missouri Public Service Commission, in support of the Applications of SBC Communications, Inc., Southwestern Bell Telephone Company, and Southwestern Bell Communications Services, Inc., for Provision of In-Region InterLATA Services in Missouri, Docket No. TO 99-227, November 20, 1998.

“High Capacity Competition in Phoenix: Reply to Comments of Intervening Parties,” prepared for filing with the Federal Communications Commission on behalf of US WEST Communications, Petition of US WEST Communications for Forbearance from Regulation as a Dominant Carrier in the Phoenix, Arizona MSA (with Alfred E. Kahn), October 28, 1998.

“Measuring and Recovering the Costs of Long-Term Number Portability,” Prepared for Southwestern Bell for presentation to the Federal Communications Commission, October 28, 1998 (with Alfred E. Kahn).

Declaration of Timothy J. Tardiff on the economic impacts of separate subsidiary requirements for the offer of advanced services by incumbent local exchange carriers, prepared for filing with the Federal Communications Commission on behalf of Bell Atlantic, in the matter of Deployment of Wireline Services Offering Advanced Telecommunications Capability, October 15, 1998.

“An Analysis of the HAI Model Release 5.0a,” Rebuttal Testimony filed with the Florida Public Service Commission, Docket No. 980696-TP, on behalf of GTE Florida, September 2, 1998 (with Gregory M. Duncan, Karyn E. Model, Christian M. Dippon, Jino W. Kim, Francis J. Murphy, Robert P. Cellupica, and Thomas F. Guarino).

“Economic Evaluation of High Capacity Competition in Phoenix,” prepared for filing with the Federal Communications Commission on behalf of US WEST Communications, Petition of US WEST Communications for Forbearance from Regulation as a Dominant Carrier in the Phoenix, Arizona MSA (with Alfred E. Kahn), August 14, 1998.

Rebuttal Testimony of Timothy J. Tardiff on the HAI Model of unbundled network elements, prepared for filing with the New Hampshire Public Utilities Commission on behalf of Bell Atlantic-New Hampshire, Docket No. DE-97-1171, June 22, 1998.

Rebuttal Affidavit before the Arkansas Public Service Commission in the matter of the Application of Southwestern Bell Telephone Company Seeking Verification that It Has Fully Complied with and Satisfied the Requirements of Section 271 (c) of the Telecommunications Act of 1996, June 11, 1998.

Rebuttal Testimony before the State Corporation Commission of the State of Kansas in the matter of Southwestern Bell Telephone Company – Kansas’ Compliance With Section 271 of the Federal Telecommunications Act of 1996, Docket No. 97-SWBT- 411-GIT (with Alfred E. Kahn), May 27, 1998.

Rebuttal Affidavit Before the Public Utilities Commission of the State of California in support of Pacific Bell’s Draft Application for Authority to Provide InterLATA Services in California (with Alfred E. Kahn), May 20, 1998.

“An Analysis of the Hatfield Model Release 4.0,” prepared for filing with the California Public Utilities Commission on behalf of GTE California, May 1, 1998 (with Gregory M. Duncan, Karyn E. Model, Christian M. Dippon, Jino W. Kim, Francis J. Murphy, Robert P. Cellupica, and Thomas F. Guarino).

Reply Testimony of Timothy J. Tardiff on unbundled network element prices and retail service price floors, prepared for filing with the California Public Utilities Commission on behalf of Pacific Bell, April 27, 1998.

Rebuttal Testimony of Alfred E. Kahn and Timothy J. Tardiff, filed with the Oklahoma Public Service Commission, in support of the Applications of SBC

Communications, Inc., Southwestern Bell Telephone Company, and Southwestern Bell Communications Services, Inc., for Provision of In-Region InterLATA Services in Oklahoma, Case No. PUD 970000560, April 21, 1998.

Reply Affidavit before the Federal Communications Commission in the matter of Application of SBC Communications Inc. Southwestern Bell Telephone Company and Southwestern Bell Communications Services, Inc. d/b/a Southwestern Bell Long Distance for Provision of In-Region InterLATA Services in Texas (with Alfred E. Kahn), April 17, 1998.

Testimony of Timothy J. Tardiff on unbundled network element prices and retail service price floors, prepared for filing with the California Public Utilities Commission on behalf of Pacific Bell, April 8, 1998.

Affidavit before the Federal Communications Commission in the matter of Application of SBC Communications Inc., Pacific Bell, and Pacific Bell Communications for Provision of In-Region InterLATA Services in California (with Alfred E. Kahn), March 31, 1998.

“Economic Principles Governing Measurement of Nonrecurring/OSS Costs: An Analysis of the AT&T/MCI Recommendations,” prepared for filing with the California Public Utilities Commission on behalf of GTE California and Pacific Bell, March 4, 1998 (with Gregory M. Duncan).

“Analysis of the Hatfield Model Release 5.0a,” Rebuttal Testimony filed with the North Carolina Utilities Commission, Docket No. P-100, Sub 133d, on behalf of GTE South, March 2, 1998 (with Gregory M. Duncan, Rafi A. Mohammed, Christian M. Dippon, Aniruddha Banerjee, Karyn E. Model, Francis J. Murphy, Robert P. Cellupica, and Thomas F. Guarino).

“Analysis of the Hatfield Model Release 5.0a,” Rebuttal Testimony filed with the South Carolina Public Service Commission, on behalf of GTE South, March 2, 1998 (with Gregory M. Duncan, Rafi A. Mohammed, Christian M. Dippon, Aniruddha Banerjee, Karyn E. Model, Francis J. Murphy, Robert P. Cellupica, and Thomas F. Guarino).

Affidavit before the Federal Communications Commission in the matter of Application of SBC Communications Inc. Southwestern Bell Telephone Company and Southwestern Bell Communications Services, Inc. d/b/a Southwestern Bell Long Distance for Provision of In-Region InterLATA Services in Texas (with Alfred E. Kahn), March 2, 1998.

“Analysis of the Hatfield Model Release 5.0a,” Rebuttal Testimony filed with the Kentucky Public Service Commission, on behalf of GTE South, February 26, 1998 (with Gregory M. Duncan, Rafi A. Mohammed, Christian M. Dippon, Aniruddha Banerjee, Karyn E. Model, Francis J. Murphy, Robert P. Cellupica, and Thomas F. Guarino).

Affidavit before the Federal Communications Commission in the matter of Application of SBC Communications Inc. Southwestern Bell Telephone Company and Southwestern Bell Communications Services, Inc. d/b/a Southwestern Bell Long Distance for Provision of In-Region InterLATA Services in Arkansas (with Alfred E. Kahn), February 24, 1998.

Testimony before the State Corporation Commission of the State of Kansas in the matter of Southwestern Bell Telephone Company – Kansas’ Compliance With Section 271 of the Federal Telecommunications Act of 1996, Docket No. 97-SWBT- 411-GIT (with Alfred E. Kahn), February 17, 1998.

“Analysis of the Hatfield Model Release 5.0,” Rebuttal Testimony filed with the Alabama Public Utilities Commission, on behalf of GTE South, February 13, 1998 (with Gregory M. Duncan, Rafi A. Mohammed, Christian M. Dippon, Aniruddha Banerjee, Karyn E. Model, Francis J. Murphy, Robert P. Cellupica, and Thomas F. Guarino).

Affidavit before the Federal Communications Commission in the matter of Application of SBC Communications. Inc. Southwestern Bell Telephone Company and Southwestern Bell Communications Services, Inc. d/b/a/ Southwestern Bell Long Distance for Provision of In-Region InterLATA Services in Oklahoma (with Alfred E. Kahn), February 13, 1998.

“Analysis of the Hatfield Model Release 5.0,” Rebuttal Testimony filed with the North Carolina Utilities Commission, Docket No. P-100, Sub 133b, on behalf of GTE South, January 30, 1998 (with Gregory M. Duncan, Rafi A. Mohammed, Christian M. Dippon, Aniruddha Banerjee, Karyn E. Model, Francis J. Murphy, Robert P. Cellupica, and Thomas F. Guarino).

Supplemental Rebuttal Testimony of Timothy J. Tardiff on switching costs, prepared for filing with the State of Maine Public Utilities Commission on behalf of Bell Atlantic-Maine, Case No. 97-505, December 22, 1997.

“Reply to AT&T Recommendations for Regulatory Treatment of OSS Costs,” prepared for filing with the California Public Utilities Commission on behalf of GTE California and Pacific Bell, December 15, 1997 (with Gregory M. Duncan).

Rebuttal Testimony of Timothy J. Tardiff on the Hatfield Model of unbundled network elements, prepared for filing with the Vermont Public Service Board on behalf of Bell Atlantic-Vermont, Case No. 57-13, November 21, 1997.

Reply Affidavit of Timothy J. Tardiff on the Hatfield Model, filed with the New York Public Service Commission on behalf of Bell Atlantic-New York, Case 94-C-0095 and Case 28425, November 17, 1997.

Rebuttal Testimony of Timothy J. Tardiff on the Hatfield Model of unbundled network elements, prepared for filing with the State of Maine Public Utilities Commission on behalf of Bell Atlantic-Maine, Case No. 97-505, October 21, 1997.

Rebuttal Testimony of Timothy J. Tardiff on the application of the Hatfield Model to universal service funding requirements, prepared for filing with the New Jersey Board of Public Utilities on behalf of Bell Atlantic-New Jersey, Docket No. TX95120631, October 20, 1997.

“Analysis of the Hatfield Model Release 4.0,” filed with the Pennsylvania Public Utility Commission on behalf of GTE North, October 20, 1997 (with Gregory M. Duncan, Rafi A. Mohammed, Christian M. Dippon, Francis J. Murphy, Robert P. Cellupica, and Thomas F. Guarino).

Supplemental Rebuttal Testimony of Timothy J. Tardiff on toll and carrier access demand elasticities and universal service rate rebalancing, prepared for filing with the California Public Utilities Commission on behalf of Pacific Bell, October 10, 1997.

Rebuttal Testimony of Timothy J. Tardiff on toll and carrier access demand elasticities and universal service rate rebalancing, prepared for filing with the California Public Utilities Commission on behalf of Pacific Bell, September 30, 1997.

Rebuttal Testimony of Timothy J. Tardiff on the Hatfield Model of unbundled network elements, prepared for filing with the State Corporation Commission of Virginia on behalf of Bell Atlantic-Virginia, Case No. PUC970005, June 10, 1997.

Reply Affidavit of Alfred E. Kahn and Timothy J. Tardiff, filed with the Federal Communications Commission, in support of the Applications of SBC Communications, Inc., Southwestern Bell Telephone Company, and Southwestern Bell Communications Services, Inc., for Provision of In-Region InterLATA Services in Oklahoma, May 26, 1997.

Rebuttal Testimony of Timothy J. Tardiff on the Hatfield Model of unbundled network elements, prepared for filing with the District of Columbia Public Service Commission on behalf of Bell Atlantic-DC, Formal Case No. 962, May 2, 1997.

Declaration of Timothy J. Tardiff on OANAD Cost Studies, prepared for filing with the California Public Utilities Commission on behalf of Pacific Bell, April 16, 1997.

Rebuttal Testimony of Timothy J. Tardiff on the Hatfield Model of unbundled network elements, prepared for filing with the Maryland Public Service Commission on behalf of Bell Atlantic-Maryland, Case No. 8731-II, April 4, 1997.

“Economic Evaluation of the Hatfield Model, Release 3.1,” filed with the Washington Utilities and Transportation Commission on behalf of GTE, March 28, 1997 (with Gregory M. Duncan and Rafi Mohammed).

“Economic Evaluation of the Hatfield Model, Version 2.2, Release 2,” prepared for filing with the California Public Utilities Commission on behalf of GTE California and Pacific Bell, March 18, 1997 (with Gregory M. Duncan).

Statement of Alfred E. Kahn and Timothy J. Tardiff, “Funding and Distributing the Universal Service Subsidy,” Prepared for US West for presentation to the Federal Communications Commission, March 13, 1997.

Testimony of Timothy J. Tardiff on toll and carrier access demand elasticities, prepared for filing with the California Public Utilities Commission on behalf of Pacific Bell, March 6, 1997.

Surrebuttal Testimony of Timothy J. Tardiff on the Hatfield Model of unbundled network elements, prepared for filing with the Pennsylvania Public Utility Commission on behalf of Bell Atlantic-Pennsylvania, Dockets A-310203F0002, A-310213F0002, A-310236F0002, A-310258F0002, February 21, 1997.

Affidavit of Alfred E. Kahn and Timothy J. Tardiff, filed with the Oklahoma Public Service Commission, in support of the Applications of SBC Communications, Inc., Southwestern Bell Telephone Company, and Southwestern Bell Communications Services, Inc., for Provision of In-Region InterLATA Services in Oklahoma, February 21, 1997.

“Reply to Kravtin/Selwyn Analysis of the Gap Between Embedded and Forward-Looking Costs,” affidavit filed with the Federal Communications Commission, In the Matter of Access Charge Reform, Price Cap Performance Review for Local

Exchange Carriers, Transport Rate Structure and Pricing, on behalf of GTE, February 14, 1997.

Rebuttal Testimony of Timothy J. Tardiff on the Hatfield Model of unbundled network elements, prepared for filing with the Arkansas Public Service Commission on behalf of Southwestern Bell Telephone Company, Docket 96-395-U, January 9, 1997.

Rebuttal Testimony of Timothy J. Tardiff on the Hatfield Model of unbundled network elements, prepared for filing with the Kansas Corporation Commission on behalf of Southwestern Bell Telephone Company, Docket 97-AT&T-290-Arb, January 6, 1997.

Rebuttal Testimony of Timothy J. Tardiff on the Hatfield Model of unbundled network elements, prepared for filing with the Massachusetts Department of Public Utilities on behalf of New England Telephone and Telegraph Company, Docket 96-80/81, October 30, 1996.

Statement of Alfred E. Kahn and Timothy J. Tardiff, "Joint Marketing, Personnel Separation and Efficient Competition Under the Telecommunications Act of 1996," Prepared for US West for presentation to the Federal Communications Commission, October 11, 1996.

Rebuttal Testimony of Timothy J. Tardiff on the Hatfield Model of unbundled network elements, prepared for filing with the Oklahoma Public Service Commission on behalf of Southwestern Bell Telephone Company, September 30, 1996.

Rebuttal Testimony of Timothy J. Tardiff on the Hatfield Model of unbundled network elements, prepared for filing with the Missouri Public Service Commission on behalf of Southwestern Bell Telephone Company, Case No. TO-97-040 & TO 97-40-67, September 30, 1996.

"Economic Evaluation of Version 2.2 of the Hatfield Model," prepared for filing in interconnection arbitrations in Pennsylvania, California, Florida, Indiana, North Carolina, Oklahoma, Iowa, Texas, Virginia, Minnesota, Hawaii, Nebraska, Kentucky, Washington, and Missouri on behalf of GTE, September 1996 (with Gregory M. Duncan).

Testimony of Timothy J. Tardiff on the Hatfield Model of unbundled network elements, prepared for filing with the Texas Public Utility Commission on behalf of Southwestern Bell Telephone Company, Docket Nos. 16189, 16196, 16226, 16285, 16290, September 6, 1996.

“Economic Analysis of MFS’s Numerical Illustration,” prepared for filing with the Federal Communications Commission, In the Matter of Implementation of the Non-Accounting Safeguards of Sections 271 and 272 of the Communications Act of 1934, as amended and Regulatory Treatment of LEC Provision of Interexchange Services Originating in the LEC’s Local Exchange Area, on behalf of US West, August 30, 1996.

Affidavit of Timothy J. Tardiff on proxy rates for unbundled local switching, prepared for filing with the Federal Communications Commission on behalf of GTE Corporation, petition for a stay of the First Report and Order in the Matter of Implementation of the Local Competition Provisions of the Telecommunications Act of 1996, August 28, 1996.

Rebuttal Testimony of Timothy J. Tardiff on the Hatfield Model of unbundled network elements, prepared for filing with the New York Public Service Commission on behalf of New York Telephone, July 15, 1996

Reply Testimony of Timothy J. Tardiff on local exchange service price floors, prepared for filing with the California Public Utilities Commission on behalf of Pacific Bell, July 10, 1996.

“Economic Evaluation of Version 2.2 of the Hatfield Model,” attached to Reply Testimony of Timothy J. Tardiff , prepared for filing with the California Public Utilities Commission on behalf of GTE California, July 10, 1996. Also presented to the Federal Communications Commission as attachment to letter from Whitney Hatch of GTE to William F. Caton, In the Matter of Implementation of the Local Competition Provisions of the Telecommunications Act of 1996, July 11, 1996.

Testimony of Timothy J. Tardiff on local exchange service price floors, prepared for filing with the California Public Utilities Commission on behalf of Pacific Bell, June 14, 1996.

Declaration of Alfred E. Kahn and Timothy J. Tardiff, prepared for filing with the Federal Communications Commission, In the Matter of Implementation of the Local Competition Provisions of the Telecommunications Act of 1996, on behalf of Bell Atlantic, May 30, 1996.

Declaration of Timothy J. Tardiff on Round I and Round II OANAD Cost Studies, prepared for filing with the California Public Utilities Commission on behalf of Pacific Bell, May 24, 1996.

“Economic Evaluation of Pacific Bell’s Round I and Round II Cost Studies: Reply Comments,” prepared for filing with the California Public Utilities Commission on behalf of Pacific Bell, April 17, 1996.

“Incremental Cost Principles for Local and Wireless Network Interconnection,” prepared for filing with the Federal Communications Commission on behalf of Pacific Telesis, March 4, 1996 (with Richard D. Emmerson).

“Economic Evaluation of Selected Issues from the Fourth Further Notice of Proposed Rulemaking in the LEC Price Cap Performance Review: Reply Comments,” Prepared for filing with the Federal Communications Commission on behalf of the United States Telephone Association, March 1, 1996 (with William E. Taylor and Charles J. Zarkadas).

Declaration of Timothy J. Tardiff on the toll and carrier access demand stimulation caused by the January 1, 1995 price reductions (update), prepared for filing with the California Public Utilities Commission on behalf of Pacific Bell, January 19, 1996.

“Universal Service Funding and Cost Modeling,” prepared for filing with the California Public Utilities Commission on behalf of Pacific Bell, January 19, 1996.

“Changes in Interstate Price Regulation: Reply Comments,” prepared for filing with the Federal Communications Commission on behalf of Pacific Bell and Nevada Bell, January 10, 1996.

“Economic Evaluation of Selected Issues from the Fourth Further Notice of Proposed Rulemaking in the LEC Price Cap Performance Review,” Prepared for filing with the Federal Communications Commission on behalf of the United States Telephone Association, December 18, 1995 (with William E. Taylor and Charles J. Zarkadas).

“Changes in Interstate Price Regulation: An Economic Evaluation of the Pacific Bell and Nevada Bell Proposal,” prepared for filing with the Federal Communications Commission on behalf of Pacific Bell and Nevada Bell, December 11, 1995 (with Alfred E. Kahn).

“Evaluation of the Benchmark Cost Model,” prepared for filing with the California Public Utilities Commission on behalf of Pacific Bell, December 1, 1995.

Affidavit of William E. Taylor and Timothy J. Tardiff on interconnection regulation, prepared for filing with the Mexican Secretariat of Communications

and Transport on behalf of Southwestern Bell International Holdings Corporation, October 18, 1995.

Participant, California Public Utilities Commission, Full Panel Hearing on Universal Telephone Service, September 29, 1995.

“Incentive Regulation and Competition: Reply Comments,” prepared for filing with the California Public Utilities Commission on behalf of Pacific Bell, September 18, 1995 (with Richard L. Schmalensee and William E. Taylor).

“Incentive Regulation and Competition: Issues for the 1995 Incentive Regulation Review,” prepared for filing with the California Public Utilities Commission on behalf of Pacific Bell, September 8, 1995 (with Richard L. Schmalensee and William E. Taylor).

“Preserving Universality of Subscription to Telephone Service in an Increasingly Competitive Industry,” prepared for filing with the California Public Utilities Commission on behalf of Pacific Bell, September 1, 1995 (with Alfred E. Kahn).

Declaration of Timothy J. Tardiff and Lester D. Taylor on the toll and carrier access demand stimulation caused by the January 1, 1995 price reductions, prepared for filing with the California Public Utilities Commission on behalf of Pacific Bell, September 1, 1995.

“Economic Evaluation of Proposed Long-Run Incremental Cost (LRIC) Methodology,” prepared for filing with the California Public Utilities Commission on behalf of Pacific Bell, July 13, 1995 (with Richard D. Emmerson).

“California Public Utilities Commission Proposed Rules for Local Competition: An Economic Evaluation,” prepared for filing with the California Public Utilities Commission on behalf of Pacific Bell, May 24, 1995.

“Benefits and Costs of Vertical Integration of Basic and Enhanced Telecommunications Services,” prepared for filing with the Federal Communications Commission, Computer III Further Remand Proceedings, CC Docket No. 95-20, on behalf of Bell Atlantic, Bell South, NYNEX, Pacific Bell, Southwestern Bell, and U S West, April 6, 1995 (with Jerry A. Hausman).

“Evaluation of the MCI’s Universal Service Funding Proposal,” prepared for filing with the California Public Utilities Commission on behalf of Pacific Bell, March 10, 1995.

“Franchise Services and Universal Service,” prepared for filing with the California Public Utilities Commission on behalf of Pacific Bell, March 10, 1995 (with Richard D. Emmerson).

Illinois Commerce Commission on behalf of GTE North: surrebuttal testimony on the benefits of intraMSA presubscription, September 30, 1994.

Illinois Commerce Commission on behalf of GTE North: rebuttal testimony on the benefits of intraMSA presubscription, September 16, 1994.

“Economic Evaluation of OIR/OII on Open Access and Network Architecture Development: Reply Comments,” prepared for filing with the California Public Utilities Commission on behalf of Pacific Bell, March 31, 1994 (with Richard D. Emmerson).

“Declaration of Timothy J. Tardiff on Pacific Bell's Productivity Under Price Caps,” prepared for filing with the Federal Communications Commission, on behalf of Pacific Bell, February 28, 1994.

“Regulation of Mobile and Wireless Telecommunications: Economic Issues,” prepared for filing with the California Public Utilities Commission on behalf of Pacific Bell, February 25, 1994

“Economic Evaluation of OIR/OII on Open Access and Network Architecture Development,” prepared for filing with the California Public Utilities Commission on behalf of Pacific Bell, February 8, 1994 (with Richard D. Emmerson).

“Access to Intelligent Networks: Economic Issues,” prepared for filing with the Federal Communications Commission, on behalf of Pacific Bell, December 1, 1993.

“The Effect of SFAS 106 on Economy-Wide Wage Rates,” prepared for filing with the California Public Utilities Commission on behalf of Pacific Bell, October 1, 1993

“Economic Evaluation of the NRF Review: Reply Comments,” prepared for filing with the California Public Utility Commission on behalf of Pacific Bell, May 7, 1993. William E. Taylor and Timothy J. Tardiff, Study Directors.

"Performance Under Alternative Forms of Regulation in the U.S. Telecommunications Industry," prepared for filing with the Canadian Radio-television and Telecommunications Commission on behalf of AGT Limited, April 13, 1993. Timothy J. Tardiff and William E. Taylor, Study Directors.

“Pacific Bell's Performance Under the New Regulatory Framework: An Economic Evaluation of the First Three Years,” prepared for filing with the California Public Utility Commission on behalf of Pacific Bell, April 8, 1993. William E. Taylor and Timothy J. Tardiff, Study Directors.

“Pricing Interconnection and the Local Exchange Carrier's Competitive Interstate Services,” prepared for filing with the Federal Communications Commission, on behalf of Pacific Bell, February 19, 1993.

“The Treatment of FAS 106 Accounting Changes Under Price Cap Regulation: Reply Comments,” prepared for filing with the Federal Communications Commission on behalf of Pacific Bell, July 1992. William E. Taylor and Timothy J. Tardiff, Study Directors.

“Costs and Benefits of IntraLATA Presubscription,” prepared for filing with the State of New York Public Service Commission on behalf of New York Telephone, May 1, 1992. Timothy J. Tardiff and William E. Taylor, Study Directors.

“The New Regulatory Framework 1990-1992: An Economic Review,” prepared for filing with the California Public Utility Commission on behalf of Pacific Bell, May 1, 1992. William E. Taylor and Timothy J. Tardiff, Study Directors.

“The Treatment of FAS 106 Accounting Changes Under Price Cap Regulation,” prepared for filing with the Federal Communications Commission on behalf of Pacific Bell, April 15, 1992. William E. Taylor and Timothy J. Tardiff, Study Directors.

“The Treatment of FAS 106 Accounting Changes Under Pacific Bell's Price Regulation Plan: Economic Analysis of the DRA Supplemental Testimony,” prepared for filing with the California Public Utilities Commission on behalf of Pacific Bell, January 21, 1992. William E. Taylor and Timothy J. Tardiff, Study Directors.

“The Treatment of FAS 106 Accounting Changes Under Pacific Bell's Price Regulation Plan,” prepared for filing with the California Public Utilities Commission on behalf of Pacific Bell, November 15, 1991. William E. Taylor and Timothy J. Tardiff, Study Directors.

California Public Utilities Commission on behalf of Pacific Bell: economic principles for pricing flexibility for Centrex service, Filed November 1990.

Expert Witness on State Transportation Energy Forecasting, California Energy Commission, Sacramento, September 1980.

## SELECTED CLIENT REPORTS

*Enhancing Competition for Broadband Services: The Case for Removing the Prohibition against High-Speed InterLata Transmission by Regional Bell Operating Companies*, With Alfred E. Kahn, Prepared for the United States Telecom Commission, May 22, 2000 (released April 2001).

*An Analysis of Resale in Long Distance Telecommunications Markets*, With William E. Taylor and J. Douglas Zona (Confidential) Prepared for plaintiffs in *Darren B. Swain, Inc. d/b/a U.S. Communications v. AT&T Corp.*, November 15, 1995.

*An Analysis of Long Distance Telecommunications Markets*, With William E. Taylor and J. Douglas Zona (Confidential) Prepared for plaintiffs in *US WATS, Inc. and USW Corp. v. AT&T Corp.*, August 22, 1995.

*Economic Significance of Interconnection*, Prepared for Japan Telecom, June 1995.

*The Effect of Competitive Entry into Local Exchange and State Toll Markets on the Revenues of Southern New England Telephone*, with J.D. Zona, (Confidential), Prepared for Southern New England Telephone, February 1995.

*Long-Distance Call Alert (LDCA) Study: Customer Choice Model Findings*, with C.J. Zarkadas, (Confidential), Prepared for Southwestern Bell, August 9, 1994.

*Pricing Principles for LEC Services*, (with R.D. Emmerson), Prepared for BellSouth Communications, July 8, 1994.

*Quantifying the Handicaps of Unequal Access*, (Confidential) Prepared for Japan Telecom, January 1994.

*Overcoming Unequal Access: The International Experience*, with S. Krom, (Confidential) Prepared for Japan Telecom, January 1994.

*Market Potential For Cellular Radio And Other Personal Communications Products*. (Confidential) Prepared for Pac Tel Corporation, July 1990.

*Customer Demand for Local Telephone Services: Models and Applications*. Prepared for South Central Bell Telephone Company, August 1987.

*Evaluation Plans for Conservation and Load Management Programs*. Prepared for New England Electric System, July 1987.

*Telecommunications Competition for Large Business Customers in New York* (Confidential). Prepared for NYNEX Corporation, June 1987.

*Demand for Intrastate Long Distance Optional Calling Plans by Business and Residential Customers*, with J.A. Hausman and A. Jaffe, (Confidential), Prepared for Southern New England Telephone, December 1985

“Estimation of Residential Conservation Service Program Electricity Savings,” Prepared for Southern California Edison Company, July 1984.

*The Demand for Local Telephone Service Upon the Introduction of Optional Local Measured Service*. In part. Final report, prepared for Southern New England Telephone, July 1982.

*Transit Strategies to Improve Air Quality in the Philadelphia Region*. In part. Final report prepared for the Delaware Valley Regional Planning Commission, April 1982.

*Estimation of Energy Impacts of State Transportation Improvement Program Projects*. In part. Final report prepared for the California Energy Commission, January 1982.

*Consumer Representation for Transportation Energy Conservation*. In part. Final report prepared for the U.S. Department of Energy, July 1981.

*Indicators of Supply and Demand for Transportation Fuels*. In part. Prepared for the California Energy Commission, December 1980.

*State of the Art in Research on Consumer Impacts of Fuel Economy Policies: Recent Findings and Recommendations for Further Research*. In part. Prepared for the National Highway Traffic Safety Administration, January 1980.

## SELECTED PUBLICATIONS AND PRESENTATIONS

Tardiff, T.J., "Pricing Unbundled Network Elements and the FCC's TELRIC Rule: Economic and Modeling Issues," *Review of Network Economics*, Vol. 1, Issue 2, 2002, pp. 132-146. An earlier version was presented at the Rutgers University, Center for Research in Regulated Industries, Advanced Workshop in Regulation and Competition, 21<sup>st</sup> Annual Conference, Newport, Rhode Island, May 23, 2002.

R.W. Hahn and T.J. Tardiff, "The Benefits of Broadband and the Impact of Regulation," Prepared for the AEI-Brookings Joint Center Conference on Broadband Regulation, October 4-5, 2001.

Tardiff, T.J., "Valuing the Use of Incumbent Telecommunications Networks," Presented at the Rutgers University, Center for Research in Regulated Industries, Advanced Workshop in Regulation and Competition, 20<sup>th</sup> Annual Conference, Tamiment, Pennsylvania, May 24, 2001.

Tardiff, T.J., "State of Competition for Local Exchange Services: Implications for Telecommunications Policy," Presented at the Law Seminars International 2<sup>nd</sup> Annual Conference on Telecommunications in the Southwest, Phoenix, Arizona, February 15, 2001.

Tardiff, T.J., "New Technologies and Convergence of Markets: Implications for Telecommunications Regulation," *Journal of Network Industries*, Vol. 1, No. 4, 2000, pp. 447-468. Also presented at the Thirteenth Biennial Conference of the International Telecommunications Society, Buenos Aires, Argentina, July 3, 2000

Tardiff, T. J., "Cost Standards for Efficient Competition," in M.A. Crew, ed., *Expanding Competition in Regulated Industries*, Boston: Kluwer, 2000. Also presented at the Competitive Entry in Regulated Industries Seminar, Rutgers University Center for Research in Regulated Industries, Newark, New Jersey, October 22, 1999.

Tardiff, T.J., "Demand for High-Speed Services: Implications for RBOC Entry Into InterLATA Services," Presented at the 2000 International Communications Forecasting Conference, Seattle, Washington, September 28, 2000.

Tardiff, T.J., "Universal Access to Telephone Service and Implications of the USO," Presented at the Rutgers University, Center for Research in Regulated Industries, 8<sup>th</sup> Conference on Postal and Delivery Economics, Vancouver, Canada, June 10, 2000

Tardiff, T.J., "Universal Access to Telephone Service: Theory and Practice," Presented at the Rutgers University, Center for Research in Regulated Industries, Advanced Workshop in Regulation and Competition, 19<sup>th</sup> Annual Conference, Lake George, New York, May 25, 2000.

Tardiff, T.J., "The Forecasting Implications of Telecommunications Cost Models," and "Forward-Looking Telecommunications Cost Models," in J. Alleman and E. Noam, eds., *The New Investment Theory of Real Options and its Implications for Telecommunications Economics*, Boston: Kluwer, 1999. The first article was also presented at the 1999 International Communications Forecasting Conference, Denver, Colorado, June 17, 1999.

Kahn, A.E., Tardiff, T.J., and Weisman, D.L., "The Telecommunications Act at Three Years: An Economic Evaluation of Its Implementation by the Federal Communications Commission," *Information Economics and Policy*, Vol. 11, No. 4, December 1999, pp. 319-365.

Tardiff, T.J., "Effects of Large Price Reduction on Toll and Carrier Access Demand in California," in L.D. Taylor and D.G. Loomis, *The Future of the Telecommunications Industry: Forecasting and Demand Analysis*, Boston: Kluwer, 1999. Also presented at the 1996 International Communications Forecasting Conference, Dallas, Texas, April 18, 1996.

W.A Grieve and T.J. Tardiff, "Universal Service in the United States and Canada: Funding High-Cost Areas," Presented at the Telecommunications Policy Research Conference, Alexandria, Virginia, September 27, 1999.

Tardiff, T.J., "The Growth of Local Exchange Competition: Implications for Telecommunications Regulation," Presented at the Rutgers University, Center for Research in Regulated Industries, Advanced Workshop in Regulation and Competition, 12<sup>th</sup> Annual Western Conference, San Diego, California, July 8, 1999.

Tardiff, T.J., "Trends in Local Exchange Competition," Presented at the 25<sup>th</sup> Annual Rate Symposium, St. Louis, Missouri, April 27, 1999.

Tardiff, T.J., "Regional Bell Operating Company InterLATA Entry and the Public Interest," Presented at the 25<sup>th</sup> Annual Rate Symposium, St. Louis, Missouri, April 26, 1999.

Tardiff, T.J., "Cost Standards for Pricing Unbundled Elements and Retail Services," Presented at the Institute for International Research Fourth Annual

Conference for Competitive Pricing of Telecommunications Services, Washington, DC, March 25, 1999.

Tardiff, T.J., Speaker: Cost of Hypothetical Providers vs. Real Providers Panel, INDETEC International, Cost and Public Policy: 1999, February 10, 1999.

Tardiff, T.J. Discussant: "TELRIC: An Overview," Presented at The Columbia University New Investment Theory of Real Options and its Implications for the Cost Models in Telecommunications Conference, New York, New York, October 2, 1998.

Tardiff, T.J., Workshop Leader, Wholesale and Retail Pricing Workshop, Presented at the Institute for International Research Third Annual Conference for Competitive Pricing of Telecommunications Services, Chicago, IL, July 22, 1998.

Tardiff, T.J., "Pricing Essential Inputs and Efficient Competition," Presented at the Rutgers University, Center for Research in Regulated Industries, Advanced Workshop in Regulation and Public Utility Economics, 11<sup>th</sup> Annual Western Conference, Monterey, California, July 9, 1998.

Tardiff, T.J., "Incremental Cost Basis for Interconnection Pricing," Presented at the Institute for International Research Interconnection '98 Conference, Washington, D.C., April 29, 1998.

Tardiff, T.J., "Regulatory Implications of Local Exchange Cost Models," Presented at the 24<sup>th</sup> Annual Rate Symposium, Kansas City, Missouri, April 28, 1998.

Tardiff, T.J., "What's Happening in Local Competition," Presented at the 24<sup>th</sup> Annual Rate Symposium, Kansas City, Missouri, April 27, 1998.

Tardiff, T.J. "Pricing and New Product Options with Telecommunications Competition," in D.R. Dolk, ed., *Proceedings of the Thirty-First Annual Hawaii International Conference on Systems Sciences, Vol. V, Modeling Technologies and Intelligent Systems Track*, Los Alamitos: IEEE Computer Society, January 6-9, 1998, pp. 416-425.

Froeb, L.M., T.J. Tardiff, and G.J. Werden, "The Demsetz Postulate and the Effects of Mergers in Differentiated Products Industries," in F.S. McChesney, ed., *Economic Inputs, Legal Outputs: The Role of Economists in Modern Antitrust*, New York: Wiley, 1998. Also presented at the Annual Meeting of the American Economics Association, Washington, D.C. January 8, 1995.

Tardiff, T.J., "Pricing and Product Offerings for the New Competitive Telecommunications Environment," Presented at the Canadian Institute Competitive Strategies Telecommunications Conference, Toronto, Canada, September 29, 1997.

Tardiff, T.J., "Cost Basis for Pricing: Embedded or Incremental," Presented at the Institute for International Research Cost Allocation Forum, Atlanta, Georgia, September 17, 1997.

Tardiff, T.J. "Costing and Pricing for Local Exchange Competition: Experience Under the U.S. Telecommunications Act," in P. Enslow, P. Desrochers, and I. Bonifacio, eds., *Proceedings of the Global Networking '97 Conference*, Amsterdam: IOS Press, June 15-18, 1997, pp. 286-292.

Tardiff, T.J., "Unbundling and Resale: Lessons from South of the Border," presented at the Bell Canada Total Competition Briefing Session, Toronto, Canada, April 16, 1997.

Tardiff, T.J., "Unbundling and Resale Under the Telecommunications Act and the FCC's Interconnection Order: Implications for Industry Structure and Competitive Strategies," presented at the International Communications Group Telecommunications Business Environment Conference, Denver, Colorado, January 7, 1997.

Hausman, J. and T. Tardiff, "Valuation of New Services in Telecommunications," in A. Dumont and J. Dryden, *The Economics of the Information Society*, Luxembourg: Office for Official Publications of the European Communities, 1997, pp. 76-80; Also presented to the OECD Workshop on the Economics of the Information Society, Toronto, Canada, June 28, 1995.

Tardiff, T.J., "Universal Service with Full Competition," in S.L. Hansen, ed., *Universal Service with Network Competition*, University of Auckland, 1996, pp. 51-64. Also presented at the Eleventh Biennial Conference of the International Telecommunications Society, Seville, Spain, June 18, 1996 and on my behalf by J. Oliver at the Telecommunications Universal Service Symposium, Wellington, New Zealand, July 2, 1996.

Tardiff, T.J., "Efficient Pricing of Competitive Local Exchange Services: Understanding the Costing Principles," presented at the Institute for International Research Conference on Competitive Costing Strategies for Local Exchange Services, New Orleans, Louisiana, October 24, 1996.

Tardiff, T. J. and Taylor, W.E., "Revising Price Caps: The Next Generation of Incentive Regulation Plans," in M.A. Crew, ed., *Pricing and Regulatory Innovations Under Increasing Competition*, Norwell, MA: Kluwer, 1996, pp. 21 - 38. Also presented at the Rutgers University Center for Research in Regulated Industries Research Seminar, May 3, 1996.

Tardiff, T.J., "New Product and Pricing Options for the Competitive Telecommunications Environment: Lessons from Consumer Choice Studies," presented at the International Communications Group Business Opportunities in Telecommunications Conference, Denver, Colorado, July 31, 1996.

Tardiff, T.J., "Efficient Local Competition and Universal Service," presented at the International Communications Group Business Opportunities in Telecommunications Conference, Denver, Colorado, July 31, 1996.

Tardiff, T.J., "Pricing and Product Offerings in a Competitive Environment," presented at the Canadian Institute Conference on Telecommunications Pricing, Toronto, Ontario, Canada, March 7, 1996.

Werden, G.J., Froeb, L.M., and Tardiff, T.J. "The Use of the Logit Model in Applied Industrial Organization," *International Journal of the Economics of Business*, Vol. 3, No. 1, 1996, pp. 83-105.

Tardiff, T.J. "Incentive Regulation and Competition: The Next Generation," presented at the 27th Annual Conference of the Institute of Public Utilities at Michigan State University, Williamsburg, Virginia, December 12, 1995.

Tardiff, T.J., "Effects of Presubscription and Other Attributes on Long-Distance Carrier Choice," *Information Economics and Policy*, Vol. 7, No. 4, December 1995, pp. 353-366. Also presented at the 1994 National Telecommunications Forecasting Conference, Boston, Massachusetts, May 24, 1994.

Tardiff, T.J. and J.D. Zona, "Effects of Competitive Entry on Capital Recovery," presented at the United States Telephone Association Capital Recovery Seminar, Chicago, Illinois, October 19, 1995.

Tardiff, T.J. and L.J. Perl, "Price Regulation and Productivity," presented to the Public Staff of the North Carolina Utilities Commission, Raleigh, North Carolina, September 6, 1995.

Hausman, J.A. and T.J. Tardiff, "Efficient Local Exchange Competition," *Antitrust Bulletin*, Vol. 40, No. 3, Fall 1995, pp. 529-556.

Instructor, "Seminar in Current Economic Issues", United States Telephone Association course, Orlando, Florida, April 3-5, 1995.

Tardiff, T.J., W.E. Taylor, and C.J. Zarkadas, "Periodic Review of Price Cap Plans: Economic Issues," presented at the Telecommunications Policy Research Conference, Solomons, Maryland, October 2, 1994.

Participant in AGT International Symposium on Local Interconnection Policy, Emerald Lake, British Columbia, Canada, May 27-28, 1994.

Tardiff, T.J., "Access Charges and Toll Prices in the United States: An Economic Evaluation," Presented to representatives of Japanese Long-Distance Companies, New York, New York, May 16, 1994.

Tardiff, T.J. and W.E. Taylor, "Telephone Company Performance Under Alternative Forms of Regulation in the U.S.," presented at the Telecommunications Policy Research Conference, Solomons, Maryland, October 4, 1993.

Tardiff, T.J., "Interconnection and LEC Competitive Services: Pricing and Economic Efficiency," presented at the Telestrategies Conference: The Access Charge Revolution, Washington, D.C. May 18, 1993.

Hausman, J., T. Tardiff, and A. Belinfante, "The Effects of the Breakup of AT&T on Telephone Penetration in the United States," *The American Economic Review*, Vol. 83, May 1993, pp. 178-184.

Tardiff, T.J., "Assessing the Demand for New Products and Services: Theory and Practice," presented at the NRRI Conference on Telecommunications Demand for New and Existing Services, Denver, Colorado, August 6, 1992.

Tardiff, T.J., "Price and Cost Standards for Increasingly Competitive Telecommunications Services," presented at the Ninth International Conference of the International Telecommunications Society, Sophia Antipolis, France, June 17, 1992.

Tardiff, T.J. "Modeling The Demand For New Products and Services," presented at the NTDS Forum, Santa Fe, New Mexico, September 27, 1991.

Tardiff, T.J. and C. Zarkadas, "Forecasting Tutorial," presented at the National Telecommunications Forecasting Conference, May 29, 1991.

Tardiff, T.J. and W.E. Taylor, "Pricing the Competitive Services of Regulated Utilities," National Economic Research Associates, Working Paper No. 7, May 1991.

Hausman, J.A. and T.J. Tardiff, "Growth in New Product Demand Taking into Account The Effects of Price and Competing Products: Mobile Telecommunications," Presented at the Massachusetts Institute of Technology Telecommunications Business and Economics Program Second Annual Symposium, Cambridge, Massachusetts, November 1990.

Tardiff, T.J., "Structuring Telecommunications in Other Countries: View from the UK, Europe and Canada," Presented at the United State Telephone Association Affiliated Interest Issues Committee 1990 Fall Conference, Traverse City, Michigan, September 1990.

Tardiff, T.J. and M.O Bidwell, Jr., "Evaluating a Public Utility's Investments: Cash Flow vs. Revenue Requirement," *Public Utilities Fortnightly*, May 10, 1990.

Tardiff, T.J. and C.J. Zarkadas, "Forecasting Demand for New Services: Who, What, and When," Presented at the Bellcore/Bell Canada Demand Analysis Forum, Hilton Head South Carolina, April 1990.

Tardiff, T.J., "Consumer Welfare with Discrete Choice Models: Implications for Flat versus Measured Local Telephone Service," Presented at the Bellcore/Bell Canada Demand Analysis Forum, Hilton Head South Carolina, April 1990.

Tardiff, T.J., "Telephone Regulation in California: Towards Incentive Regulation and Competition," Presented to the Bell Canada Economic Council, Hull, Quebec, Canada, February 1990.

Tardiff, T.J., "Measuring Competitiveness in Telecommunications Markets," in National Economic Research Associates, *Telecommunications in a Competitive Environment*. Proceeding of the Third Biennial Telecommunications Conference, Scottsdale, Arizona, April 1989, pp. 21-34.

Hausman, J.A., T.J. Tardiff, and H. Ware, "Competition in Telecommunications for Large Users in New York," in National Economic Research Associates, *Telecommunications in a Competitive Environment*. Proceeding of the Third Biennial Telecommunications Conference, Scottsdale, Arizona, April 1989, pp. 1-19.

Perl, L.J. and T.J. Tardiff, "Effects of Local Service Price Structures on Residential Access Demand," Presented at the International Telecommunications Society North American Regional Meeting, Ottawa, Ontario, Canada, June 1989.

Tardiff, T.J. and W.E. Taylor, "Costing Principles for Competitive Assessment," in *Telecommunications Costing in a Dynamic Environment*, Proceedings of the Bellcore-Bell Canada Conference on Telecommunications Costing, 1989, pp. 497-518.

Tardiff, T.J., "Forecasting the Impact of Competition for Local Telephone Services." Presented at the Bellcore National Forecasting Conference, New Orleans, April 1987.

Tardiff, T.J., "Is Bypass Still a Threat," in National Economic Research Associates, *Telecommunications in a Competitive Environment*. Proceedings of Conference held in Scottsdale, Arizona, March 1987, pp. 27-41.

Tardiff, T.J., "Benefit Measurement with Customer Choice Models." Presented at the Bellcore Telecommunications Demand Modeling Conferences, New Orleans, October 1985.

Tardiff, T.J., "The Economics of Bypass," Presented at the Bellcore Competitive Analysis and Bypass Tracking Conference. Denver, March 1985.

Tardiff, T.J., "Class of Service Choice Model." Presented at the Telecommunications Marketing Forum. Chicago, September 1984.

Tardiff, T.J., "Demand for New Telecommunications Product and Services." Presented at the Fifth International Conference on Futures Analyses, Forecasting and Planning for Telecommunications. Vancouver, July 1984.

Tardiff, T.J., "Pricing and Marketing in the Competitive Local Access Market." In Present and Future Pricing Issues in Electric, Gas, and Telecommunications Industry. Proceeding of the Ninth Annual Rate Symposium on Problems of Regulated Industries. Columbia: University of Missouri, 1983.

Tardiff, T.J., J. Hausman and A. Baughcum, "The Demand for Optional Local Measured Service." In Adjusting to Regulatory, Pricing and Marketing Realities. Proceedings of the Fourteenth Annual Conference of the Institute of Public Utilities. East Lansing: Michigan State University, 1983.

Tardiff, T.J., W.B. Tye, L. Sherman, M. Kinnucan, and D. Nelson, *Application of Disaggregate Travel Demand Models*. National Cooperative Highway Research Program Report 253, 1982.

Tardiff, T.J., D. Wyckoff, and B. Johnson, "Shippers' Preferences for Trucking Services: An Application of the Ordered Logit Model." *Proceedings of the Transportation Research Forum*, Vol. 23, 1982.

Tardiff, T.J., P. M. Allaman, and F. C. Dunbar, *New Approaches to Understanding Travel Behavior*. National Cooperative Highway Research Program Report 250, 1982.

Tardiff, T.J., E. Ziering, J. Benham and D. Brand, "Energy Impacts of Transportation System Improvements." *Transportation Research Record* 870: 10-15, 1982.

Tardiff, T.J. and O.S. Scheffler, "Destination Choice Models for Shopping Trips in Small Urban Areas." *Proceedings of the Transportation Research Forum*, Vol. 22, 1982.

Tardiff, T.J., J.L. Benham and S. Greene, *Methods for Analyzing Fuel Supply Limitations on Passenger Travel*. National Cooperative Highway Research Program Report 229, 1980.

Tardiff, T.J., "Vehicle Choice Models: Review of Previous Studies and Directions for Further Research." *Transportation Research* 14A: 327-336, 1980.

Tardiff, T.J., "Specification Analysis for Quantal Choice Models." *Transportation Science* 13: 179-190.

Tardiff, T.J., "Attitudinal Market Segmentation for Transit Design, Marketing and Policy Analysis." *Transportation Research Record* 735: 1-7, 1979.

Tardiff, T.J., "Definition of Alternatives and Representation of Dynamic Behavior in Spatial Choice Models." *Transportation Research Record* 723: 25-30, 1979.

Tardiff, T.J., "Use of Alternative Specific Constants in Choice Modeling." Institute of Transportation Studies, University of California, Berkeley and Irvine, Report No. UCI-ITS-SP-78-6, December 1978.

Tardiff, T.J. and G.J. Fielding, "Relationship Between Social-Psychological Variables and Individual Travel Behavior." *Proceedings of the Transportation Research Forum*, Vol. 19, 1978.

Tardiff, T.J., T.N. Lam, and B.F. Odell, "Effects of Employment and Residential Location Choices on Urban Structure: A Dynamic Stochastic Simulation." *Transportation Research Record* 673: 86-93, 1978.

Tardiff, T.J., "Casual Inferences Involving Transportation Attitudes and Behavior." *Transportation Research* 11: 397-404, 1977.

Tardiff, T.J., "A Note on Goodness of Fit Statistics for Probit and Logit Models." *Transportation* 5: 377-388, 1976.

Tardiff, T.J., "The Effects of Socioeconomic Status on Transportation Attitudes and Behavior." Ph.D. Dissertation, School of Social Science, University of California, Irvine, 1974.

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