188. Indeed, as Mr. Huels explains, denying CLECs access to the high frequency portion of the loops they lease would directly impede voice competition, because the high frequency portion of the loop can itself be used to provide voice services. The availability of such "derived" voice lines – and, as Mr. Huels explains in Part IV of his declaration, several such lines can be provided over a single ILEC loop – represent one of the greatest competitive threats to the ILECs' continuing local dominance and thus could generate great public interest benefits. I understand that AT&T, for one, plans to roll out a new service offering that would provide consumers with not just high speed Internet access, but also three or more voice telephone lines over a single loop, and that all but one of the voice lines will be provided over the high frequency portion of the loop. It is difficult to conceive how the public interest could be served by denying consumers such competitive alternatives that could, for the first time, apply some real competitive pressure to the ILECs' voice offerings.

189. It is equally clear that strictly enforced unbundling requirements – and the intramodal DSL-based competition that would be facilitated by such requirements – could yield important consumer benefits in the provision of broadband services. As noted, the ILECs recently implemented substantial high speed Internet access price increases. Those price increases came only after most of the ILECs' DSL-based competitors had either been put out of business or significantly scaled back their offerings in the wake of the ILECs' well-documented campaigns of delay, discrimination and outright refusals to comply with unbundling obligations. Intermodal competition from cable did not prevent the ILECs from raising their prices presumably because (1) some customers valued a single

supplier of voice and data enough to pay the ILECs' higher high speed Internet access rates, and (2) although some customers chose cable in the wake of the price increases, others simply retained (or switched to) dial-up narrowband service over lines purchased from the ILECs. Vibrant intramodal DSL-based competition facilitated by strictly enforced unbundling requirements could discourage ILECs from raising their DSL prices in hopes of increasing second line sales, because consumers would then have voice/DSL alternatives from carriers that would not have to match the ILEC price increases.

190. The death of intramodal DSL-based competition that would accompany any effort to wall off "broadband" facilities from unbundling would also seriously undermine broadband competition. Strong intramodal competition – and strictly enforced requirements to provide loops on nondiscriminatory terms – could be expected to go a long way toward discouraging ILEC price increases aimed at slowing broadband growth and the erosion of second line revenues. If ILEC customers could turn to a DSL-based competitor to obtain their voice and high speed data services over a single line at competitive rates, they would obviously be less inclined to stay with the ILEC (either as a purchaser of its broadband service or as a purchaser of its second line) in the face of a substantial price increase. In sum, unbundling requirements continue to play a critically important role in both voice and broadband competition, and any retreat from those requirements could be expected to cause substantial harm to competition and consumers.

C. There Is No Basis For Distinctions Between "Old" And "New" Investment Or Between "Old" and "New" Wires.

191. Thus far, I have addressed the suggestion that there should be some kind of a general prohibition on the ability of CLECs to use UNEs in providing broadband services. The

ILECs have also made a superficially more modest proposal that would distinguish between "new" and "old" investments. Under this proposal, ILECs would have no unbundling obligations with respect to some or all of the particular loops or other "wires" that ILECs upgraded or installed following some particular date.

192. In the abstract, there maybe superficial appeal to distinctions between "old" and "new" investments. The notion might be that there is a category of new investments in which ILECs and CLECs stand on precisely the same footing, and that just as CLECs are free to make these investments without unbundling obligations, so too should ILECs.

193. This concept has no application whatever to the loop infrastructure investments that ILECs are making today, and will be making over the next three years. These are purely incremental and fundamentally consist of modifications or upgrades to the feeder portions of existing loops – *e.g.*, the installation of fiber feeder in existing loops or new DLC electronics in existing loops – and the local loops are quintessential local bottleneck facilities that are characterized by immense economies of scale and other features that mean CLEC could not replicate them. There is no sense in which these are "new" wires that could be equally well installed by a CLEC. To exempt such investments from unbundling requirements would defeat the whole object of the Act.

194. I also note that even if ILECs were to start installing hypothetical "fiber to the curb" systems, the same principles would apply. The ILECs would take the existing fiber feeder portion of the loop and would extend fiber from it closer to customers' homes. Here, too, the ILEC would be replacing a part of an existing loop – and would fundamentally be extending the fiber feeder closer to customers' homes – and if that were

economic, it would be because the ILEC can use its existing trenches, structures, and conduit and can aggregate its installed base of traffic from the customers in the area on the fiber. CLECs could not do the same.

195. Finally, I note that the concept would have no concrete application even if an ILEC were stringing new fiber from its central office to one or more homes in an area. If that were economic for an ILEC, it would be because of scale economies and first mover advantages that apply to it alone, and that would not apply to a CLEC. First, the ILEC would install the fiber as an "overlay" on top of its existing loops. It would use existing trenches, structures, and conduits and the rights of way. By contrast, the CLEC would have to incur those fixed costs and acquire rights of way. Second, the ILEC would inherently have the traffic to fill the facility, as it could aggregate the traffic of multiple customers over it, and even if the ILEC lost the customer who had requested the facility in the first instance, the ILEC could fill it with traffic from other customers. In short, the scale economies and first mover advantages that give ILECs inherent and prohibitive cost advantages in deploying loops generally would apply even to a hypothetical overlay facility.

IX. UNBUNDLING OBLIGATIONS SHOULD NOT BE ELIMINATED BASED ON SPECULATION THAT ALTERNATIVE "INTERMODAL" PLATFORMS CAN BE DEVELOPED.

196. The *Notice* appropriately recognized that firms that combine UNEs with self-provisioned switches are facilities-based carriers and can provide important alternatives to ILEC service. Yet the *Notice* also seeks comments on an ILEC attack on the whole concept of UNEs that would preclude the UNE-L arrangement as well as UNE-P. The argument is

that the only form of competition that matters is intermodal competition that would exist if telephone service were offered over multiple "platforms" – telephone, cable television, wireless, and satellite. Rather than enforce unbundling obligations that assure nondiscriminatory access to ILEC loops and other UNEs, the argument is that the Commission should eliminate or minimize restrictions on ILECs in order to allow intermodal competition to develop.

197. In addition to the fact such an approach is inconsistent with the 1996 Act, it would represent exceedingly bad policy and would represent a wholly inappropriate attempt by the Commission to engage in industrial policy by trying to pick outcomes that it believes are most desirable and to engineer them – without regard to technological, economic, and market forces. This is peculiarly ill-advised because enforcing unbundling obligations will produce immediate and future benefits in "platforms" built on local loops without inhibiting any other "platforms" and because it is sheer speculation whether other multiple "platforms" can ever develop.

198. As I outlined above, economic principles and critical market experience teach that UNE-P competition produce immediate benefits, has no adverse effect on facilities investment, and in fact fosters it. Unbundling obligations both produce short-run and long-run benefits and will not inhibit other platforms from developing if they are technically and economically feasible. Indeed, as explained below, the availability of UNEs has not prevented CLECs from making multibillion investments in wireless systems (which failed) and in cable TV-based systems (which while no final assessment can be made, hold promise for creating only one alternative for residential customers, a clearly

undesirable result).

199. To jettison unbundling would be peculiarly inappropriate, as the Commission obviously cannot decree the development of other platforms and is in no position to determine whether or when they will develop. It is the sheerest conjecture whether most of the alternative platforms will develop at all, and there are open questions about the effectiveness of the one platform (cable television) that has enjoyed some commercial success.

200. For example, persons have been hypothesizing that wireless could provide alternatives to the last mile of telephone networks for decades. Indeed, in 1990, Peter Huber and the ILECs' lawyers had proclaimed that radio was a lower cost method of providing local service[53] and speculation above whether radio could break the local bottleneck reached a fever pitch about the time of the AT&T-McCaw merger. Notably, AT&T did in fact attempt commercially to deploy a fixed wireless-based local exchange service based on the "Project Angel" technology. But, as noted above, AT&T Wireless abandoned that project, wrote off over $1 billion in investment, and sold the associated business. Others who invested in wireless technologies for local services have had similar fates, and it is, to say the least, speculative whether or when there ever could be wireless alternatives to local loops that provide adequate substitutes at economic costs – given the limitations on available spectrum and interference problems. Further, because wireless systems use leased landline facilities to connect radio transmitters to the "wireless" system's

[53] P. Huber, M. Kellogg & J. Thorne, *Geodesic Network II* (1990).

switching center, wireless services are built on the underlying wireline infrastructure and are not, strictly speaking, a "purely" separate "mode" of providing service.

201. Satellite systems are also discussed. DBS obviously enjoys success as an alternative to the multi-channel videoprogramming services of cable television, but satellites have encountered formidable difficulties offering limited mobile telephone service in competition with cellular. Any notion that satellites could ever provide alternatives to basic local telephone services is sheer conjecture.

202. By contrast, certain cable television operators have, to date, succeeded in offering local telephone service over their facilities, and cable television surely has the potential to develop as an economic and viable competitor. But it is far too early to make any final assessment. Many operators (*e.g.*, Time Warner) are not persuaded that the required cable investments will pay off, for they have declined to roll out services on a broad basis in their markets. While the AT&T and Cox systems have achieved some not insignificant penetrations in certain areas, it remains to be seen how scalable are their operations and whether they will be viable in the long run. Of course, even if cable telephone services proves to be viable, it would not likely provide consumers with all the benefits of the competition that would result from open availability of UNE's to many additional competitors.

203. And the overriding reality is that the availability of UNEs will have no adverse effect on the development of any feasible wireless, satellite, or cable television based platform – as demonstrated by the fact that the alternatives were pursued aggressively over the past five years, despite the availability of UNEs. Moreover, UNEs provide the prospect of

development of multiple "platforms" that are based on the existing infrastructure of landline local loops and associated transport facilities. In particular, once electronic means of transferring loops to third party switches are deployed and efficient high capacity transport made available, there appears to be every reason to believe that this infrastructure can support multiple providers who would rely on facilities shared with incumbents for raw transmission, but would deploy their switches and associated databases that would be differentiated from one another and that would themselves represent a diverse set of alternative "platforms" that are built on local loop and transport infrastructure. This competition would be "intramodal" in the sense that competitors all share the loop infrastructure (and much of transport), but it nonetheless permits competition and service differentiation in the switching/database/service platforms that electronically plug into loops. This "intramodal" competition would benefit consumers even if it were certain that some or all of the hypothesized forms of intermodal competition will prove effective. And because it is conjectured whether or when they will develop, it would be a tremendous mistake to jettison unbundling on speculation about intermodal alternatives.

204. This analysis holds even if one were to consider only "broadband" intramodal competition. To be sure, cable modem services is a viable competitor to ILEC DSL services. However, it is still the case that there is not full, effective intermodal competition for broadband and that strong unlimited intramodal DSL-based competition would provide significant public interest benefits.

205. As I explained in greater detail in my LEC Broadband Declaration, few businesses are

served by cable, and for the great majority of small businesses, the only real broadband choice is DSL-based service.[54] Nor does cable yet serve even all residential areas. Residential consumers in a particular area can take service only from broadband providers that serve that area, and in many locations ILEC DSL offerings face no cable-based competition.

206. In this regard, the proof is in the pudding. As noted above, when the year 2001 began, DSL-based and cable modem services were typically priced at the same level,[55] with the most common price being $39.95 per month.[56] Then in February 2001, SBC raised its high speed Internet access price by 25%, from $39.95 to $49.95.[57] In succeeding months, this price increase was widely followed by other DSL-based providers – notwithstanding the prediction by some analysts that competition from cable companies would keep the other regional Bell operating companies ("RBOCs") from raising their prices.[58] In May

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[54] Satellite-based services, which today are generally high speed in only one direction, have attracted few subscribers. As I pointed out in another docket, Hughes currently has only about 100,000 residential and business subscribers to its broadband Internet access service, and Echostar has only about 40,000 subscribers. This technology, like fixed wireless, is promising but not widely used.

[55] All of the prices discussed in this section include both the high-speed connection as well as access to an Internet Service Provider. This is how both DSL and cable modem service are usually marketed.

[56] Broadband Intelligence, Inc., *Competitive Analysis of DSL and Cable Modems: Quarterly Report Analysis – Q3 2001*, at 1 (2001) ("*Broadband Intelligence Report*").

[57] *Id.*; Teledotcom, *SBC's Coast Is Clear for DSL Rate Hikes* (Mar. 5, 2001) (available at http//www.teledotcom.com/article/TEL20010301S0009) ("*Teledotcom SBC Article*"); *SF Chron. SBC Article*.

[58] After SBC raised its prices, an analyst at TeleChoice stated "that strong competition from cable operators Comcast Corp. (Philadelphia), AOL Time Warner Inc. and AT&T should keep Verizon Communications from charging more than $39.95 for DSL." *Id.*

2001, both Verizon and BellSouth followed suit, raising their high speed Internet access prices from $39.95 to $49.95.[59] Intermodal competition did not constrain the ILECs from raising their high speed Internet access price by 25%, or from charging significantly more than their cable competitors.

207. Vigorous *intra*modal competition could have prevented these price hikes and provide the ILECs with greater incentive to deploy DSL technology. During 2001, the growth in DSL-based services was a good deal lower than many had predicted, and it is widely believed by industry analysts that the lack of meaningful competition from the CLECs will provide little impetus for the ILECs to drive DSL expansion at a faster rate.

> [T]he first half of this year witnessed a major shakeout among DSL wholesalers and independent ISPs. In its wake came a reversal of last year's downward pricing pressure.[60]
>
> Competition for DSL subscribers in the telecom market is non-existent as more CLECs and DLECs become insolvent.[61]
>
> Now that upstart competitors, such as defunct NorthPoint Communications, no longer threaten the ILECs, the race for DSL subscribers has slowed . . . The ILECs now dominate the US DSL market, and with a dearth of competition, the ILECs no longer have an incentive to aggressively market and deploy DSL service.[62]
>
> Perhaps most importantly, the fall of the competitive local exchange carriers (CLECs) has given the ILECs room to retire to 'Bell Standard Time' after years of trying to move in sync with 'Internet Time'. The result has been lower than expected DSL rollout rates in the US. In contrast, the worldwide ADSL sky has not fallen. Deployment has gone

[59] Evan Blackwell, *Will What Goes Up Come Back Down?*, Broadband Week, (May 21, 2001) (available at http://www.broadbandweek.com/news/010521/print/ 010521_biz_price.htm).

[60] *Broadband Intelligence Report* at 1.

[61] *RHK Broadband Access Report* at 1.

[62] IDC, *US DSL Market Shares by Vendor, 1H01*, at 2 (Aug. 2001).

much more smoothly in several regions such as South Korea, Japan, and most of Europe.[63]

208. Thus, the prevailing view among industry analysts is that the highs speed Internet access prices charged by ILECs would be lower if the CLECs had a larger presence. If true, this suggests that the ILECs *do* have market power as providers of broadband Internet-access service, and that their market power is not sufficiently constrained by intermodal competition from cable modem service and other technologies. For consumers, the consequences of a dormant CLEC sector has been higher prices and reduced choice. Accordingly, rather than endorsing ILEC proposals to finish off the CLEC industry, the Commission should be exploring policies to re-establish intramodal DSL-based competition.

X. THE LONG DISTANCE EXPERIENCE SHOWS THAT FACILITIES-BASED LOCAL COMPETITION WILL DEVELOP ONLY IF EXTRAORDINARY MEASURES ARE ADOPTED IN ORDER TO ASSURE COMPETITORS NON-DISCRIMINATORY ACCESS TO ILEC NETWORK FACILITIES AND IF THE COMMISSION IS PATIENT AND PERSISTENT IN ENFORCING THESE REQUIREMENTS.

209. The Commission should bear in mind the experience in the long distance market as it fashions its local competition rules, as there are obvious analogies to be drawn from that experience. Long distance service, too, was formerly provided by a single integrated enterprise over facilities that had been designed to accommodate a single long distance carrier, and the incumbents there, too, had no incentives to make the design changes and to implement the other arrangements required to allow multiple interexchange carriers ("IXCs") to provide service over the infrastructure. Long distance competition became

[63] Salomon Smith Barney, *Communications Components*, at 2 (Nov. 23, 2001).

effective only after (1) new entrants had been given unrestricted rights of access to the intercity "long line" facilities of the incumbent, (2) the major ILECs had been excluded from long distance, (3) ILECs had been ordered to modify their local facilities so that customer loops and transport facilities could be seamlessly and electronically connected to the long distance carrier of the customer's choice – with the costs spread between the incumbent and the new entrants – and (4) ILECs had been given powerful economic incentives to implement these equal access requirements (in the form of the elimination of a 55% discount that they were forced to give new entrants before equal access was implemented in an office.).

210. Prior to 1968, long distance service was a monopoly that was jointly provided by the 22 BOCs, the other incumbent LECs, and AT&T. Each LEC was the exclusive provider of long distance service to customers in its calling area. The call would be originated over the serving LECs facilities, and it would be terminated over AT&T's intercity network and the facilities of other LECs. AT&T and the BOCs were then part of the integrated Bell System, and the Bell System and the nation's then 1600 independent telephone companies fundamentally provided long distance service as a partnership in which long distance revenues were divided based on each carrier's expenses and net investment.

211. The intercity facilities of the Bell System were unquestionably characterized by substantial economies of scale, and many contended that they, too, were natural monopolies. Indeed, as late at 1990, the ILECs' lawyers Peter Huber, Michael Kellogg, and John Thorne continued to so claim. P. Huber, M. Kellogg, & J. Thorne, *Geodesic Network II* (1990).

212. In the late 1960s, the Commission began to attempt to introduce competition into the long distance market. In 1968, the Commission authorized MCI to build and operate a microwave link between St. Louis and Chicago that would interconnect with Bell's local network and would provide interstate private line services in competition with AT&T's long distance services.[64] Three years later, the Commission adopted rules permitting other carriers to build similar intercity links, and those rules were ultimately held to authorize competing long distance carriers to offer any and all long distance services.[65] The Commission also required BOCs to provide competing carriers with interconnection and access to local networks on the same terms as received by the BOCs' long distance operations.[66]

213. These general rules proved wholly ineffective in promoting broad-based long distance competition. New entrants could not immediately build facilities that connected all major cities and that would allow them to terminate calls ubiquitously. And, more critically, the LECs did not provide long distance competitors with access to their local facilities on the same terms and conditions and at the same economic cost as the LECs' long distance arm enjoyed.[67] The fundamental problem was that, just as local loops are today "hardwired"

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[64] *See Microwave Communications, Inc.*, 18 F.C.C.2d 953 (1968).

[65] *See Specialized Common Carriers*, 29 F.C.C.2d 870 (1971), *aff'd sub nom.*, *Washington Utilities Comm'n* v. *FCC*, 513 F.2d 1142 (9th Cir. 1975); *MCI Telecommunications* v. *FCC*, 561 F.2d 365 (D.C. Cir. 1978); *MCI Telecommunications v. FCC*, 580 F.2d 590 (D.C. Cir. 1979).

[66] *Bell System Tariff Offerings of Local Distribution Facilities for Use by Other Common Carriers*, 46 F.C.C.2d 413 (1974), *aff'd sub nom. Bell Tel. Co. of Pa.* v. *FCC*, 503 F.2d 1250 (3d Cir. 1974).

[67] *See United States v. AT&T*, 524 F. Supp. 1331 (D.D.C. 1982); *United States v. AT&T*, 552 F. Supp. 131 (D.D.C. 1982), *aff'd*, 460 U.S. 1003 (1983).

to the incumbents switch and there is no economic and efficient way to transfer the loop to the switch of a CLEC, local customers were then effectively hardwired to a single long distance carrier. To reach a different long distance carrier, a customer would have to obtain a private line directly to that carrier's switch (which could be used only for long distance traffic) or to dial 7 or 10 digits and place a separately billed (sometimes toll) call to reach the IXC switch and then dial the number of the called party. It was perfectly understandable that the local facilities had been designed in this way, but the ILECs simply had no incentive to change them – so long as they were affiliated with the incumbent long distance carrier, they had overwhelming incentives not to change them and to exploit the network's design to thwart the incumbent's competitors.

214. There were four decisive steps in the development of effective long distance competition.

215. *Resale And Access To Long Distance Facilities At Competitive Rates.* First, the Commission adopted rules requiring that long distance carriers permit firms to obtain their volume services at wholesale, regulated rates and to resell them. In 1976, the Commission authorized resale of private line services, and in 1980, it authorized resale of WATS, MTS, and switched services. *Resale and Shared Use Order*, 83 F.C.C.2d 167 (1980). These decisions allowed competing carriers to provide long distance services by acting as (1) switchless resellers who owned no network facilities and provided only back office and retail functions, (2) switch-based resellers who combined transmission facilities leased from incumbents and other carriers with their own switches, and (3) carriers who owned switches and transmission facilities between certain LATAs but who leased facilities from incumbents to provide connections within their own networks or to

terminate calls to areas that they did not serve.

216. In the 1980's, many carriers entered the market as resellers and then became facilities-based carriers on a regional basis, and some of these carriers finally grew to become national facilities-based carriers.[68] Today, many long distance carriers continue to rely on leased facilities to provide their service in whole or in part. To my knowledge, the Commission never doubted that the resulting resale competition is "real" competition that benefits consumers in the short term and that would lead carriers to construct alternative facilities when that is economically and technically feasible.

217. *Exclusion Of ILECs From Long Distance Services.* Second, antitrust decrees were entered to eliminate the incentives of the ILECs to use their control over monopoly facilities to favor the incumbent. The MFJ ordered the divestiture of the BOCs from AT&T, and it enjoined the BOCs from providing long distance service until they had lost the ability and incentive to leverage their local monopolies into long distance services. The GTE Decree, in turn, barred GTE's LECs from providing long distance services.

218. *Mandating Electronic Equal Access.* Third, the antitrust decrees required that the BOC and GTE LECs' modify all their switches so that they would provide 1+ access to all long distance carriers and provide low cost electronic means of switching a customer's service from one IXC to another. The Commission thereupon required all other LECs to convert their switches to provide equal access in these ways. *MTS and WATS Market*

[68] In the beginning, resale was limited to switched-based resale; after the advent of SDN technology, switchless resale became feasible.

Structure, Phase III, 100 F.C.C.2d 860 (1985). The conversion to equal access was a process that was going to be enormously expensive and would take years to implement, and it was treated as a general network upgrade that was paid for largely by the incumbent (AT&T) and other IXCs through access charges assessed on them in proportion to their own traffic.

219. *Incentives To Provide Equal Access.* Finally, the Commission adopted measures to incent the ILECs to modify their switches to provide equal electronic access to all IXCs. To remedy the discrimination in favor of AT&T, the Commission had adopted regulations under which competing IXCs paid access charges for the use of the local loop that represented a 55% discount off the rates that AT&T "paid" to the BOCs and other ILECs under the applicable division of revenue process before divestiture (and under the exchange access tariffs after divestiture). *ENFIA Order*, 71 F.C.C. 2d 440, ¶¶ 17-18 (1979). The Commission used the access charge system to provide the ILECs with incentive to implement equal access as expeditiously as possible. Under rules the Commission adopted in 1983, AT&T paid "premium" access charges for the higher quality access that it received, while its competitors continued to pay much lower access charges in any area where the ILEC had not yet upgraded its network to provide access equal in quality to that which AT&T received. *See MTS and WATS Market Structure*, 93 F.C.C.2d 241 (1983). But once equal access was implemented in an office, all IXCs paid the higher premium access charges.

220. The BOCs implemented equal access quickly. At the beginning of 1984, when the decree become effective, equal access had yet to be implemented anywhere in the country, but

by the end of 1985, 43 percent of the nation's telephone lines had been converted to equal access; by 1986, two thirds of all lines had been converted; and by 1990, 93 percent had been converted.

221. These changes coincided with the advent of truly effective long distance competition. At the beginning of 1984, AT&T still controlled over 90 percent of the long distance market, but following divestiture and the conversion to equal access, AT&T's market share began a steady decline,[69] and, in my view, the market quickly became effectively competitive. By 1995, other IXCs had constructed sufficient capacity that the Commission found that AT&T no longer had market power over long distance services and it was declared nondominant.

222. The long distance experience has substantial lessons for the Commission's local service rules. First, it counsels that the Commission must be patient. Although long distance competition only required that facilities be constructed to reach a single point in only 192 different local calling areas ("LATAs"), it required in excess of 10 years for effective competition to develop. Because local competition requires facilities that provide connections to far greater points, the Commission should expect it to take at least an equally long time. Second, because of the potency of the ILEC's incentives and opportunities to thwart competition – and the fact that there are not being excluded from providing exchange and exchange access services – he Commission should recognize that extraordinary measures will be required to secure equal access for local competitors, and

[69] *See AT&T Nondominance Order*, 11 FCC Rcd. 3271, App. B, Figure 1 (1995) (showing decline in AT&T market share beginning in 1984).

that strict measures likely will be required to incent ILECs to make the changes to their switches required to accommodate a world in which multiple switch-based carriers will be accessing local loops. Finally, the experience teaches that although unrestricted rights of access are granted to use incumbent facilities at regulated rates, new entrants will built alternative facilities when that is economically and technically feasible.

VERIFICATION PAGE

I hereby declare under penalty of perjury that the foregoing is true and and accurate to the best of my knowledge and belief.

Robert Willey

April 3, 2002

Exhibit 1

EXHIBIT 1

Facilities-Based Providers	Change in Mkt. Cap.[i]	Current Financial Situation
Adelphia Business Solutions	-98.75%	On March 1, 2002, the Company was unable to make $15.3 million scheduled interest payment owed on bonds and is in danger of defaulting if it does not make the payment by March 31st;[ii] Company was spun off by parent Adelphia Communications with $1.4 billion debt which analysts predict will force into sale, radical restructuring, or bankruptcy;[iii] announced in January 2002 no dividend payments forthcoming on preferred stock following Salomon Smith Barney report that it faces "near-term restructuring or bankruptcies;"[iv] rumors of impending bankruptcy have caused stock to plunge and cut off new capital;[v] announced in September 2001 significant capital expenditure reductions for 2001-2003 and is eliminating further investment in approximately 10 markets;[vi] Moody's lowered its rating to "negative" on roughly $1.2 billion of debt securities;[vii] 2nd Quarter 2001 net loss of $82.2 million ($0.82 per share); 1st Quarter 2001 net loss of $103 million ($1.33 per share);[viii] scaled back expansion plans and laid off 8% of staff in January 2001.[ix] Suffered net loss of $115.9 million in 2000.[x]
Allegiance Telecom	-83.79%	Reported 3rd Quarter 2001 loss of $106.5 million;[xi] reported 2nd Quarter 2001 loss of $103 million;[xii] Moody's announced in October 2001 review to determine downgrading credit rating;[xiii] lost $275.5 million for year 2000;[xiv] stock dropped approximately 90% from May 2000 to May 2001;[xv] reported a net loss of $84.1 million (77 cents per share) on revenue of $95 million for the fourth quarter of 2000, compared with a net loss of $60.1 million (62 cents) on revenue of $39.3 million from 1999.[xvi]
Birch Telecom	n/a	Reported 2nd Quarter 2001 EBITDA loss of $17.6 million;[xvii] retreated from growth strategy, withdrew initial public offering in May 2001 and eliminated 28% of workforce in late 2000-early 2001;[xviii] reported 1st Quarter 2001 net losses of $46.9 million.[xix]
Broadview Networks	n/a	Never generated positive cash flow;[xx] laid off more than 90 employees in September 2001;[xxi] withdrew IPO offer in Fall 2000.[xxii] Net losses for 3rd Quarter and first nine months of 2000 of $441,202 and $283,721, respectively, with lower sales as compared to 1999.[xxiii]
Broadwing Local Services, Inc.	-69.60%	In Feb. 2002, asked FCC to allow the discontinuation of intrastate resold services in Indiana, Kentucky, and Ohio so that the Company can focus on a core business as a reseller[xxiv]
Broadspan (D.b.a. Primary Network), MCG	n/a	Primary Network acquired by MPower Communications in April 2000;[xxv] eliminated 339 collocations and delayed expansion into

Facilities-Based Providers	Change in Mkt. Cap.[1]	Current Financial Situation
		Northeast and Northwest markets; EBITDA loss for 2000 was $154.0 million, compared to a $39.8 million loss reported in 1999.[xxvi]
Cablevision Systems Corp.	-49.97%	Announced in December 2001 plans to take a $55 million 4th Quarter 2001 restructuring charge and eliminate 600 jobs (4% of work force);[xxvii] rumors of likely acquisition by larger entity, including possibly AOL Time Warner;[xxviii] reported 3rd Quarter 2001 loss of $77.1 million[xxix] and 17% drop in cash flow.[xxx]
CoreComm (ATX Communications)	-94.12%	Reported 3rd Quarter 2001 loss of $51 million;[xxxi] lost $313.8 million in 2000;[xxxii] Nasdaq has sought to delist stock since July 2001 and may do so in January 2002;[xxxiii] closed Ohio office and discontinued service there, eliminating 180 positions, in August 2001;[xxxiv] eliminated 110 jobs in July 2001;[xxxv] cut 210 jobs in May 2001.[xxxvi]
DSL.net	-46.15%	Company reported a $0.07 loss per share for 4th Quarter 2001,[xxxvii] Reported 3rd Quarter 2001 net loss of $10.4 million;[xxxviii] Stephens Inc. dropped coverage in August 2001 because it believes DSL.net will run out of cash in next few months and be forced to file for bankruptcy;[xxxix] Nasdaq contacted in July 2001 regarding possible delisting;[xl] applied to FCC in July 2001 to discontinue interstate special access DSL service for high-speed Internet access in 22 states;[xli] reported 2nd Quarter 2001 net loss of $23.6 million, and 1st Quarter net loss of $25.7 million;[xlii] announced in July 2001 elimination of 90 jobs and closing of 250 operational central offices, and expects to record a loss of $80 to $90 million in 2001;[xliii] reported on April 2, 2001 that DSL.net expects operating losses and negative cash flows to continue into at least 2002.[xliv]
eLEC (Essex Communications)	-85.71%	Hearing on Nasdaq's potential delisting of stock to be held January 31, 2002;[xlv] lost $4.1 million in first three quarters 2001.[xlvi]
Focal Communications	-98.24%	On Feb. 26, 2002 the Company could not give financial forecast beyond March, causing the price of its stock to drop 28.2% and close at $0.28 per share;[xlvii] reported 3rd Quarter 2001 loss of $63.7 million and substantially lowered revenue expectations for 4th Quarter 2001 and year 2002;[xlviii] Moody's announced in October 2001 review to determine downgrading credit rating;[xlix] barely staved off bankruptcy with $450 million recapitalization in August 2001;[l] reported 2nd Quarter 2001 net loss of $39.4 million ($0.64 per share) and eliminated 175 jobs (13% of workforce);[li] reported 1st Quarter 2001 loss of $33.5 million;[lii] lost $105.9 million for year 2000.[liii]

Facilities-Based Providers	Change in Mkt. Cap.[i]	Current Financial Situation
GST Telecommunications	n/a	Filed for bankruptcy in May 2000 and wrote a letter of intent to sell most of its assets to Time Warner Telecom.[liv]
Hughes Electronics Corp.	n/a	Reported year 2001 net loss of $621.6 million, 4th Quarter 2001 net loss of $132.6 million, and has agreed to sell its DirecTV satellite television unit to EchoStar Communications Corp;[lv] satellite Internet subsidiary (Hughes Network Systems) laid off 200 workers in December 2001,[lvi] cut forecasts for new subscribers and reported negative 3rd Quarter 2001 EBITDA of $22.6 million.[lvii]
Intermedia Communications	n/a	Cutting 1,000 jobs (25% of workforce) as of October 2001; acquired by WorldCom on July 1, 2001.[lviii]
ITC DeltaCom	-96.03%	Moody's announced in October 2001 review to determine downgrading credit rating;[lix] announced in September 2001 elimination of 472 jobs (20% of workforce), reduction of capital expenditures by $150 million, will incur a 3rd Quarter charge over $80 million.[lx]
Jato	n/a	Ceased all operations as of December 31, 2000.[lxi]
KMC Telecom	n/a	Withdrew its proposed initial public offering in October 2001, is not fully funded, and is heavily leveraged;[lxii] net losses of $185.6 million for the first six months of 2000.[lxiii]
Knology	n/a	Posted earnings losses of $701,000 for 2nd Quarter 2001 and $1.7 million for 1st Quarter 2001;[lxiv] has never achieved a profitable quarter since its inception and does not expect one in near term, and had amassed a deficit of $244.8 million at the close of 1st Quarter.[lxv]
Level 3 Communications	-80.40%	Potentially averted crisis by purchasing CorpSoft for $89 million, in order that the software firm's $1 billion in revenues will help Level 3 comply with loan agreements;[lxvi] reported 4th Quarter 2001 net loss of $3.3 billion and indicated it may violate a bank covenant if sales do not improve;[lxvii] Moody's announced in October 2001 review to determine downgrading credit rating;[lxviii] reported 2nd Quarter 2001 loss of $731 million ($1.99 per share);[lxix] eliminating 1,400 employees (23.7% of workforce) and expects to post bigger loss this year than previously anticipated;[lxx] posted 1st Quarter 2001 loss of $535 million and laid off 325 employees (6% of workforce) in April 2001.[lxxi]
Logix Communications	n/a	Reported 2nd Quarter 2001 revenue decrease of 7.2%,[lxxii] year 2000 revenue decrease of 4.6%,[lxxiii] and year 1999 loss of $37.7.[lxxiv]

Facilities-Based Providers	Change in Mkt. Cap.[i]	Current Financial Situation
Maverix	n/a	Ceased operations in December 2000.[lxxv]
MCImetro (WorldCom, MFS)	n/a	As of February 13, 2002, MCI Group stock had been hitting series of 52-week lows following poor 4th Quarter 2001 results and analysts believed company would not make dividend payment;[lxxvi] WorldCom announced in August 2001 cut in capital spending by $2 billion for 2002;[lxxvii] reported in July 2001 decreased net income of 85%, earnings decrease of 26%, revenue decrease of 4.6%, and lowered outlook for full year, while MCI Group reported net loss of $29 million and revenue decrease of 15%;[lxxviii] laid off 6,300 employees (6-7% of workforce) in February 2001,[lxxix] 361 in March 2001,[lxxx] and 832 in April 2001,[lxxxi] and 1,000 across Europe in October 2001.[lxxxii]
Navigator Telecommunications	n/a	Told Arkansas Public Service Commission would not take new orders for residential service, citing its operational and pricing issues with Southwestern Bell.[lxxxiii]
Network Access Solutions (NAS)	-87.00%	Laid off 23% of its work force in November 2000 and 38% of the remaining employees in May 2001;[lxxxiv] lost $25 million (48 cents per share) in 2001 1st Quarter and $55.1 million ($1.15 per share) in 2000 4th Quarter.[lxxxv]
Network Plus	n/a	Filed for Chapter 11 bankruptcy on Feb. 5, 2002;[lxxxvi] reported 2nd Quarter $4.9 million EBITDA loss.[lxxxvii]
New Edge Networks	n/a	Since February 2001 has scaled back service (shifted focus away from DSL to wide-area networks and virtual private networking, as well as retreated from markets in Georgia and Florida) and expansion plans (installed equipment in half the number of central offices nationwide as originally intended), altered business plan because could not secure additional money to pay for expensive start-up/expansion, and laid off 40% of workforce since November 2000.[lxxxviii]
NewSouth Communications	n/a	Scaled back plans to build networks, shut down its Raleigh, N.C. network facility, and laid off 20 engineers in December 2000.[lxxxix]
PentaStar Communications, Inc.	-91.71%	As of February 5, 2002, was restructuring to de-emphasize underperforming markets and had laid of approximately 31% of its workforce (100 employees).[xc]
Prism Communications	n/a	Services terminated November 17, 2000.[xci]
PSINet	-99.04%	Announced in April 2001 that it would file for bankruptcy.[xcii]
Qwest (U.S. West)	-76.53%	Revenue growth declined for the second straight quarter in fourth-quarter 2000.[xciii]

Facilities-Based Providers	Change in Mkt. Cap.[i]	Current Financial Situation
RCN	-37.54%	1st Quarter 2001 Net losses widened from a year ago widened to $257.9 million ($2.95 per share) compared with a loss of $153.6 million ($1.95 per share), in the same period 2000.[xciv]
Sprint	-37.11%	In past year the Company has dramatically reduced planned CLEC activity and in 2001 it decided not to pursue local market entry through resale or UNE-P;[xcv] discontinued residential and business offerings through the Sprint ION service in October 2001; as of February 5, 2002 Sprint's market capitalization was down over $14 billion from the end of 2000 and down over $80 billion from the end of 1999, subscriber numbers were not expected to grow as much as was previously thought, and customer churn had increased from a year ago;[xcvi] 3rd Quarter 2001 earnings were expected to be nearly $0.20 lower than the year before;[xcvii] 2nd Quarter 2001 net income declined 21% because of rising costs and lackluster sales of long-distance service, and revenue slipped 3.1%;[xcviii] reported 72% drop in earnings for first-quarter 2001.[xcix]
StarBand	n/a	Laid off 30% of employees in 2001, and has not made a profit for investors due in part to slower than expected demand.[c]
Startec Global Communications	-98.67%	Filed for Chapter 11 bankruptcy in December 2001 with $160 million of debt.[ci]
Talk America Holdings (formerly Talk.com)	-83.53%	California Public Utilities Commission investigating allegedly deceptive telemarketing practices ("slamming" and "cramming");[cii] reported 2nd Quarter 2001 loss of $62.7 million, total revenue drop of $133.7 million, and lost $72.8 million for first six months of 2001;[ciii] reported 1st Quarter 2001 loss of $10.7 million and revenue drop of $137.8 million.[civ]
Teligent Services	-99.76%	As of Jan. 10, 2002, the Company had approximately 2000-3000 customers (down from 11,000) and only 150 employees (down from 3,600);[cv] filed for Chapter 11 bankruptcy protection in May 2001 and has drastically reduced operations, scaling back from 43 markets to 11 and eliminating 20% of workforce in August 2001,[cvi] 200 employees in February 2001,[cvii] and 780 employees (22% of workforce) in November 2000;[cviii] posted fourth-quarter 2000 net loss of $270.7 million.[cix]
Time Warner	-89.57%	In Feb. 2002, the Company asked the FCC to allow the Company to stop providing service to approximately 1,000 New York City residential customers because of "changed market conditions"[cx]
The Other Phone Co. (AccessOne)	n/a	Acquired by Talk America, Inc. (formerly know as Talk.com Holding Corp.) in 2000;[cxi] Talk America reported 2nd Quarter 2001 loss of $62.7 million, total revenue drop of $133.7 million, and

Facilities-Based Providers	Change in Mkt. Cap.[1]	Current Financial Situation
		lost $72.8 million for first six months of 2001;[cxii] reported 1st Quarter 2001 loss of $10.7 million and revenue drop of $137.8 million.[cxiii]
Viatel	-99.31%	Filed for bankruptcy in May after spending $2 billion on fiber-optic network in Europe[cxiv]
Williams Communications Group	-99.07%	On February 25, 2002 Williams announced that its restructuring plan may include filing for bankruptcy protection and on March 1st the NYSE halted trading on the Company's shares; Company debt was calculated at $5.2 billion; lawsuits allege that Williams Communications and its parent, Williams Co., misled investors;[cxv] as a result of the announcement, the Company's stock price fell 78% to $0.11 per share before closing at $0.23;[cxvi] in February 14, 2002 stock was trading around 70 cents per share, compared with $18 per share a year before;[cxvii] as of Feb. 6, 2002 parent company Williams Co. was planning to sell a Midwest petroleum pipeline to bolster balance sheet;[cxviii] reported $546.6 million net loss for fourth-quarter 2001.[cxix]
XO Communications, Inc.	-99.62%	As of March 4, 2002 the Company had sold off all of European assets and was trying accumulate two-thirds approval of bondholders to file a "prepackaged" bankruptcy and accept renegotiation terms whereby new investors would own close to 80% of the restructured firm;[cxx] Delisted by Nasdaq and erased value of public stock as part of $800 million restructuring plan to avoid bankruptcy;[cxxi] reported 3rd Quarter 2001 loss of $50.8 million and Standard & Poor's downgraded credit rating in November 2001;[cxxii] announced in October 2001 elimination of 600 jobs (8% of workforce) and reported 2nd Quarter EBITDA loss of $70.7 million;[cxxiii] posted 1st Quarter 2001 loss of $443.5 million ($1.31 per share), cutting $2 billion from planned capital expenditures over the next five years, halting European expansion, delaying some domestic expansions, and curtailing some costly services that had limited potential.[cxxiv]
Z-Tel Technologies	-56.14%	Reported 4th Quarter loss of $0.26 per share;[cxxv] Reported 2nd Quarter 2001 loss of $108 million, with $89 million worth of charges ($16 million more than revenues), and has reduced subscribers to 300,000 in 30 states;[cxxvi] eliminated over 40% of its workforce, ceased telemarketing, wrote off 80,000 deadbeat subscribers at cost of $30 million;[cxxvii] significantly slowing its acquisition of new subscribers and its expansion into new markets;[cxxviii] reported 1st Quarter 2001 loss of $20.1 million and year 2000 loss of $111.7 million.[cxxix]

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[xciv] *See* Reuters, *RCN Corp. first-quarter loss widens* (May 3, 2001) <http://news.morningstar.com/news/PR/M05/D03/88908841702.html>.

[xcv] See *Sprint Comments in CC Docket No. 02-35*. March 4, 2002.

[xcvi] *See* Suzanne King, *Sprint Units Still Taking It on Chin.*, THE KANSAS CITY STAR, February 6, 2002, *available at* 2002 WL 4534291

[xcvii] *See* Suzanne King, *Decision time near for ION; Sprint's broadband service could be pared back or discontinued*, THE KANSAS CITY STAR, October 13, 2001, *available in* 2001 WL 27060831.

[xcviii] *See* Andrea Peterson, *Sprint Profit Drops: Its Wireless Division Posts Narrower Loss*, THE WALL STREET JOURNAL, July 20, 2001, *available in* 2001 WL-WSJ 2870177.

[xcix] *See* Reuters, *Research Alert – Telecoms View Cut After Sprint* (April 18, 2001) <http://www.reuters.com/news_company.jhtml?storyid=NEWS.REUT.20010418.N18697244rtr&ticker=FON.N>.

[c] Yuki Noguchi, *Slow to Take Off; Internet Service Via Satellite Remains an Expensive Choice*, THE WASHINGTON POST, August 8, 2001, *available in* 2001 WL 23185389; Nir Goldberg, *Gilat Satellite Networks' unsuccessful investments*, ISRAEL BUSINESS ARENA, July 14, 2001, *available in* 2001 WL 24719066; *The Satellite News Financial Ticker*, SATELLITE NEWS, August 20, 2001, *available in* 2001 WL 523096.

[ci] *See* Webb, Cynthia. *Startec Global Files for Chapter 11 Bankruptcy.* WASHTECH.COM. (Dec. 14, 2001)

[cii] *See Calif. PUC Looks At Talk America's Marketing Practices*, DOW JONES (September 4, 2001) <http://news.morningstar.com/news/DJ/M09/D04/99623299550.html>.

[ciii] *See Financial: In Brief*, THE WASHINGTON POST, August 9, 2001, *available in* 2001 WL 23185609.

[civ] *See Financial: In Brief*, THE WASHINGTON POST, May 4, 2001, *available in* 2001 WL 17626053.

[cv] Lazaroff, Leon. *Winstar Auction Results Chill Telecom Sector.* www.thedeal.com. (Jan.9, 2002)

[cvi] *See* Yuki Noguchi, *New Firm Agrees to Bid for Teligent Phone Assets*, WASHINGTON POST, August 25, 2001, *available in* 2001 WL 23189391.

[cvii] *See* Bruce Sullivan, *Teligent Reorganizes, Lays Off 200*, COMMUNICATIONS TODAY, February 20, 2001, *available in* 2001 WL 6733241.

[cviii] *See* Scott Woolley, *Cloudy Skies: Once the Darlings of Wall Street, Wireless Broadband Carriers are Now Staring at Insolvency. Is there Hope Left?*, FORBES, December 11, 2000, at 210, *available in* 2000 WL 25964135.

[cix] *See* Reuters, *Teligent Gets 'Going Concern' Comment From Auditors* (April 3, 2001) <http://www.reuters.com/news_company.jhtml?storyid=NEWS.REUT.20010403.N03441986rtr&ticker=TGNT.O>.

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(continued . . .)

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[cxi] *See* Michele Chandler, *Merchants Balk; Visa Changes Mind*, THE MIAMI HERALD, October 11, 2001, *available in* 2001 WL 29141343.

[cxii] *See Financial: In Brief*, THE WASHINGTON POST, August 9, 2001, *available in* 2001 WL 23185609.

[cxiii] *See Financial: In Brief*, THE WASHINGTON POST, May 4, 2001, *available in* 2001 WL 17626053.

[cxiv] *See* Lazaroff, Leon. *Winstar Auction Results Chill Telecom Sector.* www.thedeal.com. (Jan.9, 2002)

[cxv] *Few Good Words for Williams Communications.* BUSINESS WEEK ONLINE. (March 4, 2002)

[cxvi] *See* Kelsey, David. *Williams Considers Chapter 11, Shares Plunge*. NEWSBYTES. (Feb. 25, 2002)

[cxvii] *See Business Brief: Williams Communication Group Inc.: Revenue Expected to Grow By at Least 20% in Quarter,* THE WALL STREET JOURNAL, February 14, 2002, *available at* 2002 WL-WSJ 3386030

[cxviii] *See* McCartney, Scott. *Williams Cos. Will Sell Pipeline to Shore Up Its Balance Sheet*. THE WALL STREET JOURNAL. (Feb. 6, 2002)

[cxix] *See* Reuters, *Williams Communications Loss Widens* (Feb. 5, 2001) <http://quote.fool.com/news/symbolnews.asp?symbols=WCG&currticker=WCG&format=decimal&lpp=10&dtfrom=1%2F19%2F2001+3%3A33%3A53+PM&dtto=4%2F19%2F2001+3%3A33%3A53+PM&sourcetype=1&exch=NYSE%2CNASDAQ%2CAMEX%2CMF%2CU%2CUS%2CUSMF&cdnsortby=Date&sid=554129&pos=57&action=gs>.

[cxx] See *Fpr XO, the Inevitable May Be Delayed No Longer.* THE WASHINGTON POST. (March 4, 2002)

[cxxi] *See* Carol M. Cooper, *Where to Invest: Strategies for Stock & Bonds: The Pros*, BUSINESSWEEK, December 31, 2001, *available in* 2001 WL 26536113; *XO is Forced into Bailout Erasing its Stock Value*, TELECOM MANAGER'S VOICE REPORT, *available in* 2001 WL 23837639; Jerry Knight, *Telecom Firms Knew Market Wouldn't Be All That Fell*, THE WASHINGTON POST, December 3, 2001, *available in* 2001 WL 30330083.

[cxxii] *S&P Downgrades XO's Debt Rating*, COMMUNICATIONS TODAY, November 12, 2001, *available in* 2001 WL 29446532.

[cxxiii] *See XO Cuts 600 Jobs*, COMMUNICATIONS TODAY, October 3, 2001, *available in* 2001 WL 673406; *XO Communications Inc.: Layoffs of 600 Are Planned, 'Primarily' in Staff Support*, THE WALL STREET JOURNAL, October 2, 2001, *available in* 2001 WL-WSJ 2877288.

[cxxiv] *See* Shawn Young, *XO Reports Wide Loss for First Quarter, Gets $250 Million in Additional Funding*, THE WALL STREET JOURNAL, April 27, 2001, *available in* 2001 WL-WSJ 2861760.

[cxxv] See *Z-Tel 4th Quarter Operating Loss 26 Cents A Share.* MORNINGSTAR.COM. (Feb. 28, 2002)

[cxxvi] *See* Jeff Harrington, *Tampa, Fla., Phone Company's Losses Swell to $108 Million in Second Quarter*, ST. PETERSBURG TIMES, August 14, 2001, *available in* 2001 WL 26624340.

[cxxvii] *See* Cherie Jacobs, *Z-Tel Technologies of Florida Cuts Costs, Losses*, TAMPA TRIBUNE, June 29, 2001, *available in* 2001 WL 2447401.

[cxxviii] *See* Press Release, *Z-Tel Offers Guidance on Revised Business Model, Expected Results for 2nd Quarter, 3rd Quarter and 2001*, (June 20, 2001) <http://biz.yahoo.com/bw/010620/0194.html>.

[cxxix] *See* Scott Barancik, *A Friendly Reminder from the Boss*, ST. PETERSBURG TIMES, May 21, 2001, *available in* 2001 WL 22043411.

Exhibit 2

Appendix 2 -Econometric Analysis of ILEC Investment

I. Introduction

1. The purpose of this appendix is to describe the details of the econometric analysis of the effects of UNE pricing on ILEC investment that is referred to in Part VI.C. of my declaration.

2. As described in the text of the declaration, two different views of the relationship between UNE pricing and ILEC investment have been advanced in this proceeding. According to one, the level of ILEC investment is positively related to UNE prices. The rationale for this argument is that low UNE prices encourage entry by CLEC providers who will, in effect, appropriate some portion of the ILEC's investment. Deprived of the return to some portion of its investment, the ILEC has a diminished incentive to undertake the investment in the first place. By contrast, when UNE prices are high, CLEC providers are discouraged from undertaking entry that relies on the use of ILEC facilities. The ILEC internalizes a greater portion of the full benefit of its investment, and, therefore, has a greater incentive to undertake the investment.

3. The other view of this relationship focuses on the role of competition as a force that encourages investment. By this line of reasoning, facilities investment is both costly and risky. ILEC providers are more reluctant to undertake new investment when they face less risk that failure to invest will persuade their customers to defect to competing providers. When UNE prices are high, entry by CLEC providers is diminished, competitive pressures are relieved; and investment is less compelling. When UNE prices are low, CLEC entry is encouraged and the resulting elevated level of competition induces greater ILEC investment because it is more necessary for market-place success.

4. These contrasting views of the relationship between UNE pricing and ILEC investment may be empirically distinguished, since they offer diametrically opposing predictions of the direction of the relationship between UNE prices and ILEC investment.

II. The Relationship Between UNE Pricing and ILEC Investment

5. In order to estimate the relationship of interest between UNE prices and ILEC investment, we specify a model of the determinants of ILEC investment that takes explicit account of the role of CLEC competitive activity. As a general proposition, economic theory and the institutional nature of telecommunications markets teach that ILEC investment is determined by a relationship with the following structure:

$$\begin{pmatrix} ILEC \\ Investment \end{pmatrix} = f\begin{pmatrix} Demand \\ Factors \end{pmatrix}, \begin{pmatrix} Current \\ Revenue \end{pmatrix}, \begin{pmatrix} ILEC\ Cost\ of \\ Investment \end{pmatrix}, \begin{pmatrix} Regulatory \\ Regime \end{pmatrix}, \begin{pmatrix} CLEC \\ Activity \end{pmatrix},$$

where ILEC investment is an increasing function of factors that increase demand for telecommunications services and the revenues that can be earned selling such services, and a decreasing function of the cost of investment. In this context the cost of investment refers both to the cost of raising financial capital to fund the investments and to the prices of the tangible equipment and services that will constitute the physical capital that is needed to be installed in the geographic area in question. The fourth element, the regulatory regime, reflects the fact that ILEC providers are regulated by the states in varying ways, and that the character of a state's regulatory mechanism may affect the ILEC's incentive to invest. The fifth term reflects the effect of present and anticipated competitive activity by CLEC providers, and determining the existence and direction of this effect is one of the main goals of the empirical inquiry.

6. Similarly, economic theory identifies the determinants of the level of CLEC activity to include factors driving demand for telecommunications, the revenue levels indicative of

market opportunities for CLEC competitive success and the CLECs' cost of participation in the market. That is:

$$\begin{pmatrix} CLEC \\ Activity \end{pmatrix} = g\begin{pmatrix} Demand \\ Factors \end{pmatrix}, \begin{matrix} Current \\ Revenue \end{matrix}, \begin{matrix} CLEC\ Cost\ of \\ Participat\ ion \end{matrix}\Bigg).$$

Economic theory anticipates that this relationship will be increasing in factors that increase demand for telecommunications and in current revenue, and decreasing in the CLECs' cost of participation.

7. The two relationships described thus far are an example of a common phenomenon in economics, namely that the determination of certain quantities are inter-related. The archetypical example of this is the determination of price and quantity in simple competitive markets where quantity demanded depends on price according to one relationship, quantity supplied depends on price according to another relationship, and price is determined by equating of supply and demand. Systems of this kind are modeled with the mathematical language of simultaneous systems, that is a system of mathematical relationships that collectively and simultaneously determine the values of one set of variables ("endogenous" variables) as functions of another set of predetermined variables ("exogenous" variables). In models of simple competitive markets, the endogenous variables are price and quantity and the exogenous variables are all the factors other than price that affect demand and supply. In the problem considered here, ILEC investment and the CLEC activity are the simultaneously determined endogenous variables, and the exogenous variables are the demand factors, the costs of ILEC investment and CLEC participation, and the nature of the regulatory regime.

8. In the context of a simultaneous system like the one described here, there are two different ways of representing the forces determining the endogenous variables. On the

one hand, one can focus attention directly on the relationships like those described in paragraphs 5 and 6. These are often called "structural forms" because their structure more directly embodies the economic reasoning behind the model. On the other hand, one can solve the system for the values of the endogenous variables as functions of the exogenous variables only. In the context of our inquiry here, this would give rise to a relationship like

$$\begin{pmatrix} ILEC \\ Investment \end{pmatrix} = R\begin{pmatrix} Demand \\ Factors \end{pmatrix}, \begin{pmatrix} Current \\ Revenue \end{pmatrix}, \begin{pmatrix} ILEC\ Cost\ of \\ Investment \end{pmatrix}, \begin{pmatrix} CLEC\ Cost\ of \\ Participation \end{pmatrix}, \begin{pmatrix} Regulatory \\ Regime \end{pmatrix}.$$

This relationship is often called a "reduced form" because the interdependent relationships in the original system have been reduced to a simple function.

9. Ultimately, the disagreement between the two competing views of the UNE price / ILEC investment relationship described in paragraphs 2 and 3 above comes down to a disagreement about the reduced form relationship in paragraph 8. The UNE price is one of the factors that determines the cost of participation for CLECs. If granting CLECs inexpensive access to UNEs discourages ILEC investment, then this relationship will be positive, but if inexpensive access to UNEs for CLECs encourages ILEC investment, then this relationship will be negative. Thus, one empirical strategy for distinguishing between the two hypotheses is to estimate the reduced form relationship directly, and to examine the sign of the relationship between the CLEC cost of participation as it is affected by UNE prices and the rate of ILEC investment.

10. Estimation of the reduced form is attractive both because it addresses the question that is at issue directly and because it has the virtue of simplicity. On the other hand, it is simple precisely because the mechanism whereby an exogenous factor, like UNE prices, affects an endogenous variable, like ILEC investment, is suppressed. Thus, estimation of the

reduced form is less attractive than the structural form because it does not allow the same opportunity to check the statistical results for consistency with the underlying economic reasoning that led to specification of the model. Therefore, we estimate the relationship both ways.

III. The Data

11. We have assembled a set of cross-section data in which each observation is a separate state. Data on ILEC investment by state are provided in the FCC's ARMIS reports, which include data by state and by year for each of the major ILECs in Table 43-02 B6 *Summary of Investment and Accumulated Depreciation.*[1] Gross investment is reported as "Telephone Plant Additions." Net TPIS is computed as "Total Plant in Service at end of year" minus "Accumulated Depreciation at end of year." From these data, a measure of the net capital at the end of each year is constructed as the difference between the Total Plant in Service (TPIS) and the Accumulated Depreciation at the end of each year from 1992 through 2000, or:

$$\begin{matrix}\textit{Net}\\ \textit{Capital}\end{matrix} = \begin{matrix}\textit{Total Plant in}\\ \textit{Service}\end{matrix} - \begin{matrix}\textit{Accumulated}\\ \textit{Depreciation}\end{matrix}.$$

Net investment may then be calculated as the difference in net capital from one year to another. We focus on the change in net capital, net TPIS, over the four year period from 1996 to 2000 to smooth out any year-to-year variations in measured investment that may arise from differences in accounting and economic conventions for measuring capital. Finally, we calculate net investment per capita, using the year 2000 population, as

[1] The ARMIS reporting data are available on-line at http://www.fcc.gov/wcb/armis/db/.

reported in the 2000 Census data[2] in order to measure ILEC investment relative to the size of the state. Thus, the ILEC investment variable in our econometric analysis is

$$\begin{matrix} \textit{ILEC} \\ \textit{Investment} \end{matrix} = \frac{\begin{matrix} \textit{Net Capital} \\ \textit{Year } 2000 \end{matrix} - \begin{matrix} \textit{Net Capital} \\ \textit{Year } 1996 \end{matrix}}{\textit{Population Year } 2000}.$$

12. Data on ILEC total plant in service and depreciation are available for both 1996 and 2000 for each of the lower 48 states, as is 2000 population. The equations in which ILEC investment is the dependent variable also include a measure of ILEC total plant in service per capita in 1996 to allow for the possibility that investment over the period 1996-2000 was affected by the level of capital with which the firms began. Data to represent the average revenue per residential line were calculated by AT&T based on the state's residential line distribution by density zone, tariffed local service rates, TNS Telecoms Bill Harvesting Study: 1Q01-3Q01 for features, local minutes of use drawn from ARMIS business and residential data, and toll-related minutes of use drawn from TNS Telecoms Bill Harvest research. These data are available for each of the lower 48 states.

13. The ILEC cost of investment is measured by TELRIC costs as estimated by the FCC's Synthesis Model for Universal Service.[3] We use the access-line-weighted state average

[2] The data on population, per capita income, and employment composition by state are from the 2000 Census as reported in the State Annual Tables that report State Economic Profiles (SA-3) which are produced by the Bureau of Economic Analysis of the U.S. Department of Commerce (September 2001). These data are available at http://www.census.gov.

[3] The TELRIC estimate of the cost of the network platform (UNE-P) is derived from the FCC's Synthesis Model for universal service, adjusted to yield total switched local network costs. This model estimates the TELRIC for providing local telephone and access services. It includes a return for invested capital and an allowance for general overhead costs (see *Fifth Report and Order*, In the Matter of Federal-Joint Board on Universal Service (CC-Docket No. 96-45) and Forward Looking Mechanism for High Cost Support for Non-Rural LECs (CC-Docket No. 97-160), Before the Federal Communications Commission, October 28, 1998. The model may be obtained from the FCC's website at http://www.fcc.gov/ccb/apd/hcpm/). The adjustments to the model to include costs for providing intraLATA toll and access services are explained in *Ex Parte Presentation by AT&T to Federal Communications Commission*, In the Matter of Application by Verizon New England, Inc. Bell Atlantic Communications, NYNEX

(continued . . .)

across all switched access lines for all density zones. The TELRIC costs are available for all of the lower 48 states. Since our sample is a cross section, there is no variation in the financial cost of capital over time with which we need to be concerned. Our specification assumes that this factor does not vary in the cross section from state to state.

14. We employ three variables to measure various determinants and drivers of statewide demand for telecommunications services. First, on the grounds that the overall level of economic activity and employment contributes to demand for telecommunications, we include the average, over the four-year period from 1996 – 2000, state-wide unemployment rate for each state. These data were obtained from the US government Bureau of Labor Statistics for each year and for almost every state. The figures from 1997, 98, 99, and 2000 for the state of Michigan, however, are missing from the government data. Second, on the grounds that growth in population contributes to growth in demand for telecommunications services and infrastructure, we include for each state the rate of growth in population between censuses from 1990 to 2000. These are calculated from population data obtained from the US Bureau of the Census, and are available for all of the lower 48 states.[4] Third, on the grounds that the relative importance of industries that make intensive use of telecommunications services may contribute to demand for those services, we include the percentage of the labor force employed in

(. . . continued)
Long Distance Company, and Verizon Global Networks to Provide In-Region InterLATA Services in Massachusetts, CC Docket No. 01-9, February 1, 2001

[4] See note 2, *supra*.

finance, investment, and real estate (PFIRE). These data are available for the year 2000 from the US Bureau of the Census for all of the lower 48 states.[5]

15. Data on the nature of the regulatory regime as it pertains to the major ILEC in each state are available from the National Regulatory Research Institute.[6] This report characterizes the regulatory regime in each state as of October 2000 in one of five categories: 1) Rate of Return Regulation, 2) Price Cap Regulation, 3) Price Cap with Interim Rate Freeze, 4) Rate Freeze with Non-indexed Caps, and 5) Deregulation. For purposes of estimation we have assigned each state the regulatory form applicable to residential service provided by the major ILEC, and have constructed five indicator variables, one for each form. The indicator variables, commonly called dummy variables, take on the value 1 in each state where that regulatory form prevails, and are zero elsewhere, with rate of return regulation taken to be the "omitted" dummy variable in the estimating equations. These data are available for each of the lower 48 states.

16. We measure the level of CLEC activity in each state by counting the number of CLEC firms that are registered or licensed to operate there as of June, 2001. These data are available for each state from the Federal Communications Commission.[7] We decided to use the number of firms as the measure of CLEC activity in a state for two reasons: First, the only alternative available to us was the number of CLEC lines. Unfortunately, the availability of these data is constrained by confidentiality rules. In order to ensure that confidential firm-specific data cannot be inferred from published data, the FCC does not

[5] See note 2, *supra*.

[6] The source of the data is from a table "Forms of Regulation for Basic Service in the U.S. States," from the *State Telephone Regulation White Paper*, National Regulatory Research Institute, as of October 2000.

publish the number of CLEC lines in any state where the number of CLEC carriers is three or fewer. Second, while the roster of CLEC carriers might include carriers that are presently very small or are active in the state only to "test the waters," their presence in a state may, none the less, serve as a signal to ILECs that future competition is or may be imminent, and that defensive investment is called for. In that case, the number of CLEC firms would be a relatively less noisy variable appropriate to specify as a measure of CLEC activity for purposes of estimating the determinants of ILEC investment.

17. The cost of CLEC participation is measured in part by UNE prices. In particular, we use the cost at the UNE prices that are specified by the state regulators for the collection of UNEs required to serve customers in Zone 1. Zone 1 is the most densely populated portion of the state and, therefore, we understand, the part of the state that is most attractive to CLEC entry. These data are obtained from calculations by AT&T for 40 states, based on UNE rates and non-recurring cost rates in effect in each state, density zone distributions of loops, and average local and toll usage of switching and transport. A CLEC may also provide local service to some customers for some stretch of time via total service resale, for which it pays to the ILEC the retail rates for the services, less a discount factor that is prescribed by each state's regulators. The larger is this discount factor, the smaller is the cost to the CLEC. We employ this discount factor as a variable in the reduced form equation and in the structural equation for the level of CLEC activity.

IV. Estimation

(. . . continued)

[7] Industry Analysis Division, Common Carrier Bureau, Federal Communications Commission; Local Telephone Competition: Status as of June 30, 2001; February 2002; Table 8.

18. The reduced form equation is estimated using ordinary least squares and the two structural form equations are estimated together as a system using three stage least squares (3SLS). The results are reported in Appendix 3, with each equation's results in a separate column. At the top, Appendix 3 identifies the dependent variable in each equation, and the following rows list the estimated coefficients for each explanatory variable. The estimated coefficients represent estimates of the numerical effect on the dependent variable of a one unit change in the explanatory variable. The figures reported in parentheses under each estimated coefficient are statistics (t-statistics for OLS and z-statistics for 3SLS) that identify whether or not an estimated coefficient is statistically significant, a term that means that the size of the calculated estimate could not, but for a small threshold probability, have been obtained by chance.

19. Statisticians calculate levels of statistical significance because statistical conclusions can never be 100% certain. Therefore, when a result is obtained that is supportive of some particular hypothesis, there is some chance that the hypothesis is nonetheless false, but that the operation of random chance produced the observed result. Statisticians deal with this difficulty by performing calculations that measure the probability that the observed result would be obtained when it were false. Where that probability is very low, the statistician has confidence in the result. A regression analysis calculates an estimated coefficient for the effect of each explanatory variable on the dependent variable. If the explanatory variable, in fact, had no influence on the dependent variable, then the true value (unknown to the statistician) of the coefficient would be zero. When calculations show that the probability is below a specified threshold that the estimated coefficient would be as far from zero as observed if the true coefficient were zero, then the estimated

coefficient is said to be statistically significant. In Appendix 3, the coefficients that are statistically significant at the 5% level (*i.e.*, the threshold probability is 5%) are marked with a pair of asterisks (**). Those that are statistically significant at the 10% level are marked with a single asterisk (*).

20. At the bottom of each column, a number of summary statistics is reported. The R^2 statistics describe the proportion of variance in the dependent variable that is accounted for by the regression.[8] The summary statistics also include a P Value for the regression. This summarizes a test of the statistical significance of the regression as a whole. It calculates the likelihood of obtaining the observed results if, in fact, there were no relationship at all between the dependant and explanatory variables. If this value is less than .05, the regression is statistically significant at the 5% level. In the case of OLS estimation the calculation of the P Value is based on the F-statistic and in the case of 3SLS the P Value is obtained from the χ^2 statistic.

21. Each equation includes four of the five indicator variables for regulatory regime. All five can not be included along with the constant term in the regression, since collectively the five would sum to the same value as the constant in every observation, and this would make calculation of the regression estimates mathematically impossible. The indicator variable that is omitted is the variable for rate of return regulation. Therefore, the coefficient on each of the remaining four indicators that are included should be interpreted as the effect on the dependant variable of the indicated regime relative to rate of return regulation.

[8] Ordinary least squares estimation also allows one to calculate an "adjusted" R^2, which takes account of the effect that adding variables to a regression would have on the conventional R^2.

V. Results

22. The results from both the reduced form and the structural system reject the proposition that lower UNE prices discourage ILEC investment, and support the counter-proposition that lower UNE prices are associated with greater ILEC investment. The structural system shows with statistical significance that lower UNE prices are associated with more CLEC activity, and that more CLEC activity statistically significantly is associated with elevated ILEC investment

23. In the first column of Appendix 3 the negative effect of zone 1 UNE prices on ILEC investment may be seen in the negative sign of the coefficient on that variable. The appendix indicates that this coefficient is statistically significant at the 10% level. In fact, it is significant at the 6% level. This result is obtained in the context of a regression that accounts for 86% of the variation in the dependent variable and in which population growth contributes positively and statistically significantly to investment.

24. The first column of Appendix 3 also shows that the effect of TELRIC costs on ILEC investment is negative and statistically significant. Since the TELRIC costs measure the cost to an ILEC provider of providing service, this is consistent with the underlying economics, and it provides reassurance that TELRIC costs have been successfully controlled for so that the estimated coefficient on the UNE price reflects a separate effect.[9]

25. In the first column of Appendix 3, some of the indicator variables for different regulatory regimes have coefficients that are almost or that are statistically significant. Recalling

[9] It would be natural to expect that TELRIC cost and UNE prices would be closely correlated. Although their pair-wise correlation is statistically significant, its value of 0.38 is rather modest.

that the omitted indicator variable identifies states with rate-of-return regulation, these results suggest that some of the price cap regulatory modes seem to be associated with greater ILEC investment than rate of return regulation, although that may be due to chance rather than causality in this data set.. The deregulation dummy is statistically significantly negative, but this may be more indicative of the situation of the one state (Nebraska) that falls into the category rather than indicative of the impact of deregulation. It is worth noting that this specification permitted these effects to be successfully controlled for, providing a robustness check that the estimated impact of the UNE price is not standing in for the nature of the regulatory environment.

26. The results of estimating the structural equations, shown in the second and third columns of Appendix 3, add further strength and confirmation to the conclusions that can be drawn from the reduced form. In the structural form CLEC activity equation, shown in the third column, the level of CLEC activity (as measured by the logarithm of the number of firms) is affected negatively and statistically significantly by the UNE price. In other words, CLEC providers *do* respond to the incentives embodied in UNE prices when deciding whether or not to enter a state. It is noteworthy that CLECs are also shown with statistical significance to respond positively to relatively favorable levels of the total service resale discount level. The number of firms is also positively and statistically significantly affected by the share of a state's labor force in telecommunications intensive industries, and at the 10% level of statistical significance it is also affected by the population growth rate. The equation accounts for 62% of the variation in the dependent variable.

27. In the structural form ILEC investment equation, shown in the second column of Appendix 3, the estimated results for the effects of TELRIC costs, population growth, and regulatory regime are essentially the same as they were in the reduced form equation. The UNE price does not appear in this regression, but the logarithm of the number of CLEC firms does. The effect of this variable on ILEC investment is positive and statistically significant at the 1% level.

28. Taken together, the two structural form equations provide a behavioral basis for the results of the reduced form equation. When UNE prices are lowered, additional CLEC firms enter a state. The increased number of CLEC firms induces ILEC firms to increase their investment. Thus, not only does the structural estimation confirm the same conclusions as the reduced form, but the details of the structural estimates illuminate a mechanism that is consistent with sound economic theory. It is also possibly significant to recognize that the additional CLEC activity that is shown here to induce added ILEC investment may itself be stimulated at least in part by relatively attractive total service resale discount levels.

VI. Conclusion

29. Econometric analysis of the available cross-sectional state data on ILEC investment and UNE prices rejects the hypothesis that UNE pricing that encourages CLEC investment serves to discourage ILEC investment. The data support the proposition that UNE pricing that encourages entry by CLECs also encourages enhanced investment by ILECs. Moreover, the data provide support for interpreting the latter result as a manifestation of an ILEC competitive response to CLEC entry. In light of these findings, policy proposals to increase or sustain UNE prices above the best estimates of the actual cost of capacity,

or to put other non-cost impediments in the way of CLEC entry should be viewed with great suspicion. If the purported rationale of such policies is to encourage ILEC investment, then those policies are likely to be at best ineffective and will probably be decidedly counter-productive.

Exhibit 3

EXHIBIT 3

REGRESSION RESULTS

	OLS Reduced Form[a]	3SLS Structural Form[b]	
Dependent Variable	ILEC Investment	ILEC Investment	LN(Number of CLECS)
Estimated Coefficients			
LN(Number of CLECS)		22.5525 **	
		(2.569)	
ILEC Plant in Service 1996	0.0480	0.0701 *	
	(1.139)	(1.927)	
Labor Share in FIRE	481.1275	27.1826	16.9779 **
	(1.329)	(0.059)	(2.446)
Population Growth Rate	291.4105 **	232.5556 **	1.8190 *
	(5.318)	(5.233)	(1.730)
Average Unemployment Rate	-5.2543	-5.1001	0.0678
	(-1.004)	(-1.195)	(0.666)
Average Residential Revenue	2.0202	2.2525	-0.0384
	(1.234)	(1.551)	(-1.268)
UNE Price (Zone 1)	-1.3774 *		-0.0274 **
	(-1.947)		(-2.057)
TELRIC Average Cost	-3.4097 **	-3.3716 **	
	(-2.919)	(-2.536)	
Total Service Rebate	113.1172		7.1587 **
	(1.261)		(3.994)
Price Cap Regulation	14.2168	7.1237	
	(1.006)	(0.564)	
Price Cap/Interim Freeze	25.4240	22.9183 *	
	(1.702)	(1.736)	
Rate Freeze/Non-Indexed Cap	30.3740	31.5454 **	
	(1.625)	(2.066)	
Deregulation	-104.4046 **	-106.5063 **	
	(-3.336)	(-4.120)	
Constant	-49.6593	-72.1680	0.3202
	(-0.696)	(-1.195)	(0.247)
Observations	38	37	37
F(12, 25)	12.8300		
χ^2		220.7218	63.50096
Regression P Value	0.0000 **	0.0000 **	0.0000 **
R^2	0.8603	0.8546 [c]	0.6282 [c]
Adjusted R^2	0.7933		

Notes

** Statistically significant at the 95% confidence level.

* Statistically significant at the 90% confidence level.

a Figures in Parentheses are t-statistics.

b Figures in Parentheses are z-statistics.

c Reported R^2 for 3SLS estimates is "pseudo-"R^2.