not deploy the technology either, because if the new services prosper, competitors will be able to buy them piece by piece, at sharp discounts, and capture the profits.

Finally, many of the traditional sources of profit allowed by regulators to support below-cost residential service in local markets are immediately put in jeopardy by new broadband services. The new digital lines will overwhelmingly be categorized as "enhanced services," from which local phone companies do not currently collect long-distance access charges. High-bandwidth lines will also displace profitable second lines and other vertical services – the main sources of revenues that allow local phone companies to comply with regulatory mandates to set the price of basic residential service well below cost.

The stated goal of the 1996 Telecommunications Act is "to accelerate rapidly private sector deployment of advanced telecommunications and information technologies." As the experience in Connecticut has shown, less regulation promotes more investment. Section 706 of the 1996 Act gives regulators the flexibility they need to learn from the Connecticut experience. It authorizes both the FCC and state authorities to "encourage the deployment . . . of advanced telecommunications capability" through "price cap regulation, regulatory forbearance, measures that promote competition in the local telecommunications market, or other regulating methods that remove barriers to infrastructure investment."

In sum, regulators have in hand all the authority they need to unleash local competition and spur rapid new investment in high-bandwidth infrastructure. It is time to use it.

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LOCAL EXCHANGE COMPETITION UNDER THE 1996 TELECOM ACT

Red-Lining The Local Residential Customer[*]

1. LOCAL COMPETITION

Open Entry. The primary objective of the Telecommunications Act of 1996 was to "open[] all telecommunications markets to competition."[1] The Act therefore eliminates legal barriers to entry.[2] The framers of the Act fully recognized that in some local markets "a facilities-based competitor is not likely to emerge in the near term."[3] In writing standards for when Bell Companies would be permitted to enter long-distance markets, Congress therefore rejected all metric tests of competition in favor of a clear statutory "test of when markets are open."[4]

As of November 1997, over 280 companies had signed interconnection agreements to provide competitive local exchange service of some description in over 450 cities. **Figure 1**. These new "CLECs" include companies like MFS/WorldCom or TCG (formerly called "competitive access providers" or "CAPs"), cable companies, interexchange carriers, providers of personal communications services (PCS), providers of shared tenant services, and others. **Table 1**.

---

[*]***This report was researched by Telecom Policy and Analysis Group and written by Peter W. Huber. The work was funded by SBC Communications Inc. and BellSouth Corporation. The views expressed are those of the author.***

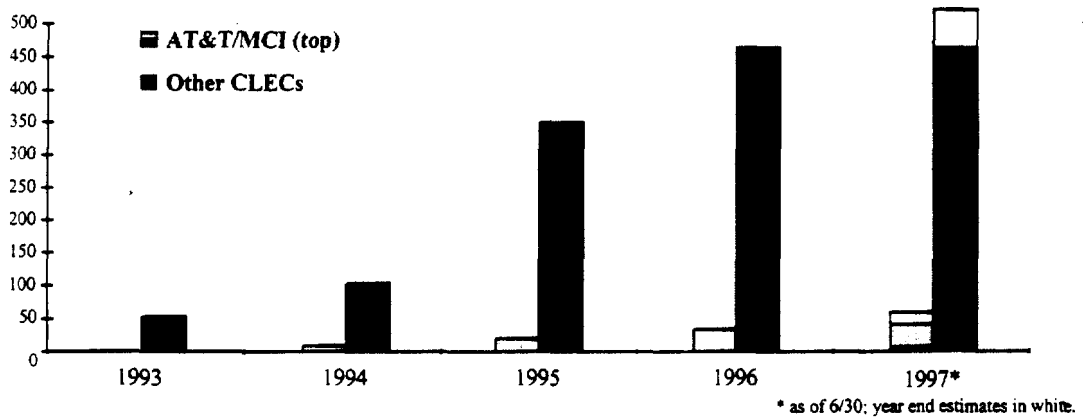
[1]Joint Explanatory Statement of the Committee of Conference, H.R. Rep. No. 438, S. Rep. No. 230, 104th Cong., 2d Sess., at 1 (1996) ("*Conference Report*"). The Act was designed to foster facilities-based competition in local telephone service. *See, e.g.*, First Report and Order, Implementation of the Local Competition Provisions of the Telecommunications Act of 1996, 11 FCC Rcd 15499, 15588 (1996) ("*Local Competition Order*") ("pave the way for the introduction of facilities-based competition with incumbent LECs").

[2]47 U.S.C. § 253. The House Commerce Committee summarized the bill's purpose as the elimination of "statutory and regulatory barriers that have impeded the development of competition." H.R. Rep. No. 104-204, 104th Cong., 2d Sess. at 202 (1996) ("*House Report*").

[3]*House Report* at 72.

[4]141 Cong. Rec. S8188, S8195 (daily ed. June 13, 1995) (Statement of Sen. Pressler).

Figure 1. Cities Served by CLECs



Source: New Paradigm Resources Group, Inc. and Connecticut Research, Inc. 1997 Annual Report on Local Telecommunications Competition (8th ed. 1997).

Table 1. Selected Profiles

WorldCom: 15,000 fiber route miles, 50 digital switching centers, 100 POPs, and 1 million customer lines.[1] In addition, MFS has 85 switches,[2] 11,000 buildings-on-net,[3] and 3,677 route miles in 57 cities.[4]

Time Warner: CLEC network has 15 switches,[5] 300 buildings-on-net,[6] and 700 fiber route miles[7] in 18 cities.[8] Shared tenant service offered in 5,000 buildings.[9]

TCG: 155 switches,[10] 9,571 buildings-on-net, and 7,400 route miles in 57 major markets[11] with 8 new networks planned for completion this year.[12]

Brooks Fiber: 44 switches,[13] 2,810 buildings-on-net, 36,000 access lines, and 1,200 route miles in 44 metropolitan areas.[14]

ICG: 52 switches,[15] 545 buildings-on-net,[16] 17,000 access lines,[17] and 2,483 fiber route miles[18] in 19 metropolitan areas.[19]

Frontier: Customers in 32 markets outside of its local telephone operations, and adding over 2,000 access lines per month.[20]

Sources: [1]H.E. Blount, et al., Rauscher Pierce Refsnes, Inc., Co. Rpt. No.1847580, WorldCom Inc., at 2, 11 (Jan. 17, 1997). [2]Bellcore, TR-EOP-000315, Local Exchange Routing Guide, Aug. 1, 1997 ("*Bellcore LERG Database*"). [3]PR Newswire, Oct. 31, 1996. [4]H.E. Blount, et al., Rauscher Pierce Refsnes, Inc., Co. Rpt. No.1847580, WorldCom Inc., at 8 (Jan. 17, 1997). [5]*Bellcore LERG Database.* [6]1997 Annual Report on Local Telecommunications Competition, 8th Ed., New Paradigm Resources Group and Connecticut Research, 1996, at 521. [7]Http://www.pathfinder.com/@@ZnSaFgcATvzGWDqU/corp/twcable/index.html. [8]*Ibid.* [9]Multichannel News, March 17, 1997, at 8. [10]*Bellcore LERG Database.* [11]K.M. Leon, et al., Abn Amro Chicago Corporation, Co. Rpt. No. 1916888, Teleport Communications Group, Inc., at 11 (May 6, 1997). [12]Http://www.tcg.com/tcg/areas/index.html. [13]*Bellcore LERG Database.* [14]K.M. Leon, et al., Abn Amro Chicago Corporation, Co. Rpt. No. 1902096, Brooks Fiber Properties, at 1 (Apr. 29, 1997) (includes networks acquired from Metro Access Networks during second quarter, 1997). [15]*Bellcore LERG Database.* [16]S.P. Conrad, Deutsche Morgan Grenfell Inc., Co. Rpt. No. 2550652, ICG Communications, Inc., at 3 (May 5, 1997). [17]*Id.*, at 1. [18]*Id.*, at 2. [19]1997 Annual Report on Local Telecommunications Competition. [20]PR Newswire, May 2, 1997.

Interconnection Agreements. While the 1996 Congress saw open entry as the most essential change in the regulatory environment, it recognized that "it is extremely unlikely that competitors will have a fully redundant network in place when they initially offer local service."[5] Precisely because ubiquitous facilities-based competition might prove uneconomic, Congress directed all incumbent local carriers to interconnect their networks with competitors upon request.[6] Interconnection regulation, Congress recognized, can greatly accelerate the development of competition and efficient collaboration in networked industries; this regulatory lesson had already been learned in markets for customer premises equipment,[7] long-distance service,[8] cellular service,[9] and Internet services.[10]

Under the 1996 Act, competitors may lease unbundled, separately priced network elements for resale to end users.[11] Competitors may alternatively resell the incumbent's local service, buying that service at a discount from the price charged to retail customers and bundling it with the reseller's own long-distance, wireless, or other services.[12] In August 1996, the FCC promulgated rules purporting to implement these requirements;[13] those rules are currently under review in the courts.[14] The FCC set the discount range for the resale of local loops at 17 to 25 percent of the existing retail rates.

Interconnection negotiations began well before the FCC acted and have progressed rapidly, even as major parts of the FCC rules have (to this point) been rejected by the courts.[15] Some 200 interconnection agreements had been reached by February 1997, the first anniversary

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[5]*Conference Report* at 148.

[6]47 U.S.C. § 251(c)(1), (2).

[7]*See, e.g.*, Use of the Carterfone Device in Message Toll Telephone Service, 13 FCC 2d 420 (1968).

[8]*See, e.g.*, MCI Telecommunications Corp. v. FCC, 580 F.2d 590 (D.C. Cir. 1978); MTS and WATS Market Structure, Phase III, 100 FCC 2d 860 (1985).

[9]*See, e.g.*, An Inquiry Into the Use of the Bands 825-845 MHz and 870-890 MHz for Cellular Communications Systems, FCC 2d 469 (1981); The Need to Promote Competition and Efficient Use of Spectrum for Radio Common Carrier Services, 2 FCC Rcd 2910 (1987).

[10]*See, e.g.*, Report and Order, Amendment of § 64.702 of the Commission's Rules and Regulations (Third Computer Inquiry), 104 FCC 2d 958 (1986).

[11]47 U.S.C. § 251(c)(3).

[12]47 U.S.C. § 251(c)(4).

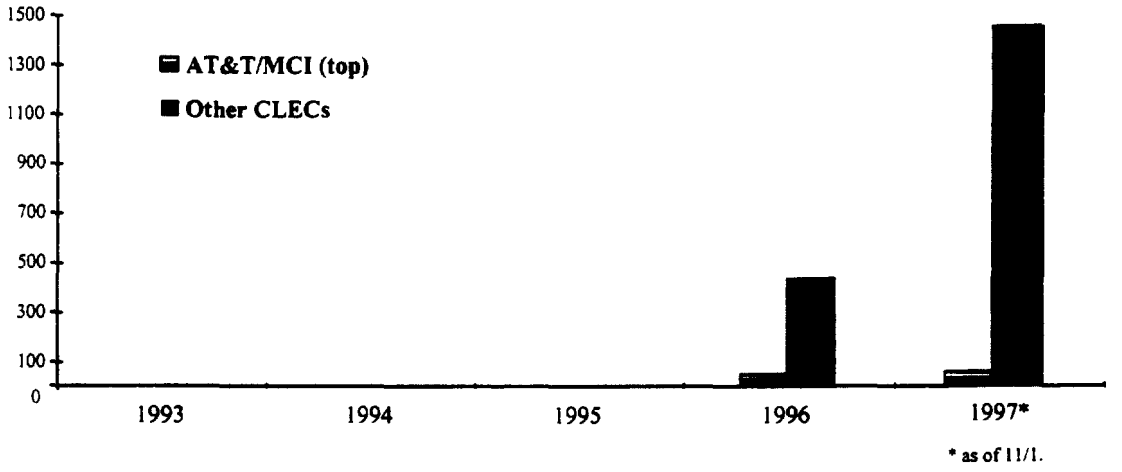
[13]*Local Competition Order*, 11 FCC Rcd 15499, 15616 (unbundling), 15812 (pricing of interconnection and unbundled elements), 15930 (resale).

[14]Order on Petitions for Rehearing, Iowa Utils. Bd. v. FCC, No. 96-3321 (8th Cir. filed Oct. 14, 1997).

[15]Iowa Utils. Bd. v. FCC, 1997 U.S. App. LEXIS 18183; (8th Cir. June 27, 1997) *vacating in part, Local Competition Order* ("*8th Circuit Decision*").

of the Act. As of November 1997, the number of agreements signed exceeded 1,500.[16] **Figure 2.** SBC alone has signed over 200 interconnection agreements in its seven-state region, 150 of which have been approved by state commissioners. Twenty months after the Act was signed, these dramatic numbers provide irrefutable evidence that the Act is rapidly accomplishing its first and most central purpose. Legal barriers to entry are gone. Interconnection agreements are being signed at a rapid and accelerating pace. **Table 2.** Companies do not negotiate and sign over 1,500 interconnection agreements for the fun of it. They sign them to compete.

Figure 2. Interconnection Agreements



Source: USTA, Draft Competition Report, Nov. 1, 1997.

[16]United States Telephone Association (USTA), Draft Competition Report, Nov. 1, 1997 (excludes agreements between LECs and cellular carriers, but includes PCS providers). The USTA data on interconnection agreements is preliminary; a final release of the updated Competition Report is expected in the first week of November 1997.

Table 2. Competitive Carriers with Interconnection Agreements

Access Network Services	Continental Telecom	Hart Comm.	Network Access Solutions	Southern Phon-Reconnek
ACM	Covad Comm.	Havre Answering	Multi-Family Comm.	Spectranet International
ACN	Crescent City Networks	Innovative Access	Multi Technologies Services	STL Partner
ACSI	CRG International	Interlink	National Tel	Strategic Technologies
Advanced Telecom	Cybernet	International Telecom	National Telecom of FL	Supra Telecom
AL 1-Franklin	Cytel	Interstate Tel	N.A. Telephone & Telecom	Talk One America
ALEC	Data & Electronic Services	Intertech	Network Multi-Family	TCG
America's Tel	DeltaCom	Inter-World	Nielsen Comm.	Telecarrier Services
American MetroComm	Dial & Save	IRSA Rockford	Northeast Telephone	Telecom Service Center
Annox	Dial Tone/Move	Jerry Laquiere	NOW Comm.	Tel-Link
Arch Comm.	Dial USA	Jetcom	NTS Comm.	Telephone Co. of Central FL
Arkansas Comm.	Don-Mar	KADCOM	OCI	Tele Sys
Atlantic Connections	East Florida Comm.	Kansas Comm.	OmniCall	Texas CommSouth
AXCES	Eatel	Kentucky RSA	OnePoint Comm.	Texas Teleconnect
AXSYS	ELI	Kingsgate Midsouth Telecom	Orlando Business Telephone Services	Tie Comm.
Birdsong Leasing	ENTERGY	KMC	PacWest	Tortoise Comm. & Paging
Business Telecom	ETC	Lambada Comm.	Pam Oil	Tricomm
California RSA	EZ Phone	LDM Systems	Payphone Consultants	TTE
Call-For-Less	Fast Connections	Leslie County Telephone Co.	Phone Michigan	Unicom Comm.
Capital Telecom	FI Comm. South	Levee Comm.	Phoenix Fiberlink	Unidial
CFW	Fiber South	Local Line America	Posner Telecom	Unique
Chickasaw Telecom	FI RSA	Local Telephone Service Co.	Preferred Carrier Services	US LEC
Chocktaw Comm.	First Line	Lone Star-Net	Preferred Network	US Network
Choicetel	First Tel	Louisville Lightwave	Q-Tel	US One
CMT Partners	Freedom Ring	Max-Tel	R&B	US WATS
Climax Telephone	Fresno MSA	Metracom	Reconex	Value-Line
Coast to Coast	Gasden	Metro Access Network	RGW Comm.	Vital Comm.
COI	Georgia Comm.	Metro Connection	Sagir	VITTS
COMAV	GCI	Metrolink Telecom	Salem Telephone	World Access
Com Brokerage	GST	MGC Comm.	Shared Comm. Services	WorldLink Comm.
Comm Buying Group	Global Tel Link	Micro-Com	Sharon Telephone	Wright
Comm Depot	G Net	M-Tel	Shell Offshore	
Consolidated	GTEC	Montana Comm.	SouthEast Telephone	

Long-distance Providers

AT&T	Excel Comm.	LCI	MFS/WorldCom	US Long Distance
ATT Alascom	Feist Long Distance	MCI	Preferred Long Distance	Western OK Long Distance

Cable Companies

Comcast	C-TEC	Jones Intercable	Rainier Cable	Time Warner
Cox	Hyperion	MediaOne	TCI (TCI Telephony)	

Wireless (Non-cellular)

ALLTEL Mobile	Centennial Cellular	NEXTEL	PageNet of Atlanta	Western Wireless
American PCS	Cook Telecom	PCS PrimeCo	Sprint Spectrum	WinStar Wireless
AT&T Wireless	Cox PCS	Powertel	Sprint PCS	
BellSouth PCS	GET Mobilenet	Page Kit Comm.	Triad Cellular	

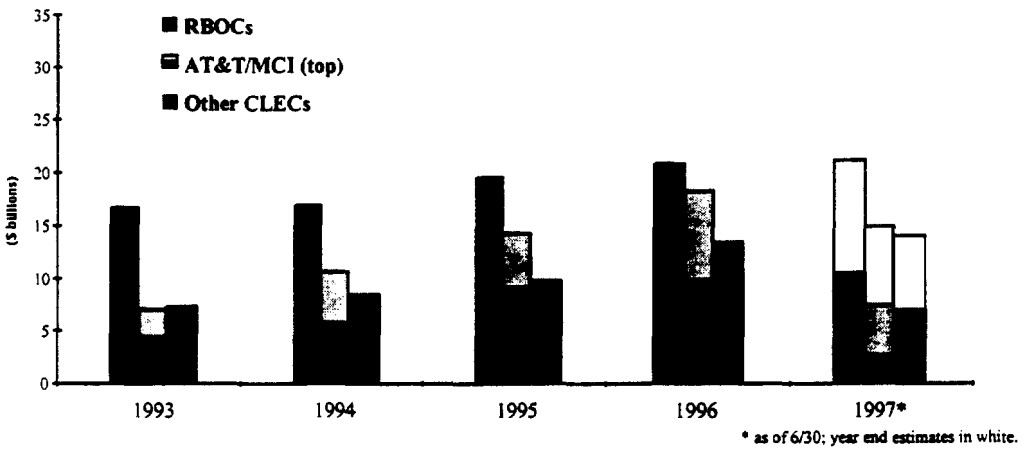
Incumbent LECs (Out of Region)

Ameritech	Frontier	SBC	SNET	GTE
Citizens	Sprint	BellSouth		

Source: United States Telephone Association, Interconnection Agreements by State.

Capital Investment. While precise figures are elusive, capital investment in competitive local exchange facilities is rising fast.[17] In 1993, the Bell Companies spent over $9 billion more on capital investment than cable operators, wireless companies, and four of the largest competitive access providers combined.[18] There is almost no remaining gap between the capital investments of those two groups today.[19] Counting AT&T, MCI, and Sprint among them, the companies currently competing in local exchange markets invested $2 billion less than the Bell Companies in 1993.[20] By 1997, capital investment by that same group had surpassed Bell Company investment by about $4 billion.[21] **Figure 3.**

Figure 3. Capital Expenditures



Sources: 1995 and 1996 Annual Reports; 2nd Quarter 1997 Quarterly Reports, NCTA, Cable Television Developments, at 2, 10 (Fall 1996); CTIA, Semi-Annual Data Survey Results (Dec. 1995-1996), http://www.wowcom.com/professional/reference/graphs/gdtable.cfm. 1997 wireless expenditures were conservatively estimated from the 1993-1996 trendline.

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[17]Few CLECs provide breakdowns of their investments between local exchange and other types of facilities, so there is no way to ascertain precisely how much CLECs – particularly those who also provide facilities-based long-distance service – are spending on facilities to provide purely local services.

[18]In 1993, total capital expenditures of all wireless companies, cable operators (excluding Time Warner), and the four largest CAPs (MFS (combined with WorldCom), Brooks Fiber, TCG, and ICG) were $7.4 billion, compared with Bell Company capital expenditures of $16.7 billion.

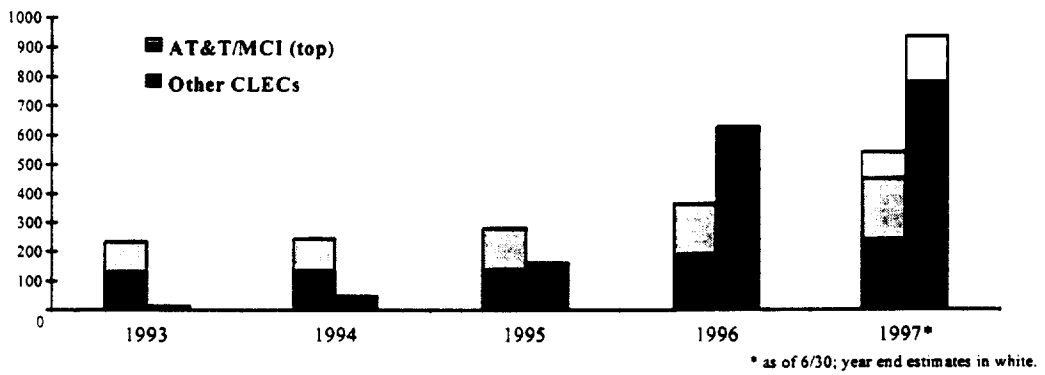
[19]Since the Act was passed, the Bell Companies have spent $32 billion, whereas cable companies have invested $13 billion, wireless companies have spent $13 billion, and the four largest CAPs have spent $3 billion. Due to conservative methodology, actual CLEC spending may be significantly higher than reported, and may have actually surpassed Bell Company spending since the Act.

[20]1995 Annual Reports of AT&T, MCI, and Sprint.

[21]Second Quarter 1997 Quarterly Reports of AT&T, MCI, and Sprint. The Bell Companies have invested a great deal of capital to meet their obligations under the 1996 Act. For example, SBC estimates that by the end of the year it will have spent $1.1 billion to upgrade its networks. About $450 million of this was spent on long-term number portability alone.

New Switches. Competitive local exchange carriers installed over 500 new switches in 1996, and another 270 in the first half of 1997. Bell Companies have deployed far fewer new switches in that same period.[22] The difference is partly attributable to the fact that Bell networks are mature, so capacity increases can often be accommodated within existing Bell facilities.[23] Nevertheless, since passage of the Act, competitive carriers in Arizona have deployed almost twice as many new switches as U S West;[24] competitors in Florida have deployed four times as many new switches as BellSouth;[25] competitors in Texas have deployed more than six times as many new switches as SBC.[26] **Figure 4.**

Figure 4. Competitive Switches



* as of 6/30; year end estimates in white.

Source: *Bellcore LERG Database* (versions: 7/93, 12/94, 7/95, 4/96, 10/96, 4/97 and 8/97); Northern Business Information, U.S. Central Office Equipment Market: 1996 Database 64-65 (1997).

Fiber Deployment. Until recently, Bell Companies were by far the largest buyers of fiber-optic cable nationwide. But the gap has been closing steadily during the last twenty months. In 1995, CLECs (including AT&T and MCI) deployed less than a quarter of the fiber the Bell Companies deployed. Since passage of the Act, competitive companies, excluding

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[22]Although the number of switches deployed by Bell Companies has remained flat (and actually fallen in some regions), Bell Companies have been replacing many older switches with a fewer number of new, higher capacity switches.

[23]Up to a point, it is possible to accommodate increases in capacity by adding modules to existing switches, rather than purchasing entire new switches; however, the LERG database only reports additions of entire switching entities, not the addition of modules.

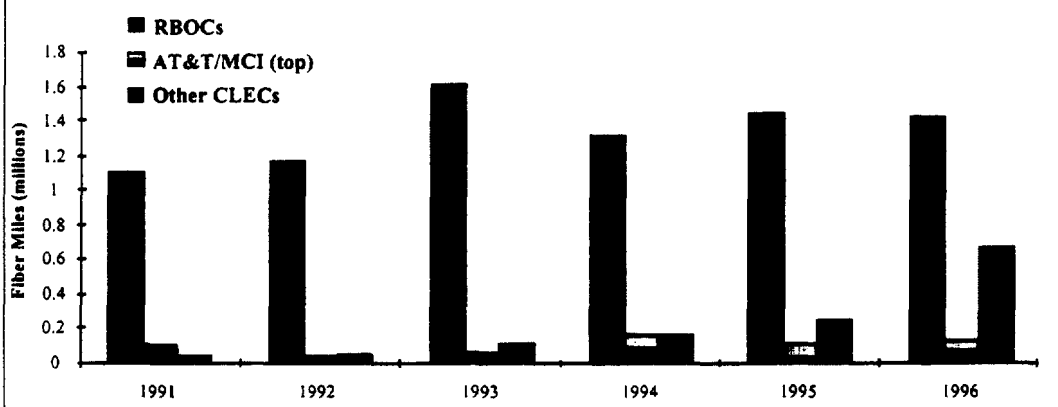
[24]TCG added 3 switches; GST added 2; and MCI, Brooks Fiber, Cox, and ACSI each added one in the state.

[25]WorldCom and MediaOne each deployed 5 additional switches, while Intermedia Communications (ICI) deployed 3.

[26]TCG added 9 in the state; AT&T added 11; MCI added 6; and ICG and WinStar each added 4.

AT&T and MCI, doubled their installed base of fiber, deploying more than half the fiber of the Bell Companies. **Figure 5.** In 1996, non-Bell Companies purchased two-thirds of all fiber sold.[27] Current indications are that other buyers of fiber will outstrip the Bell Companies within the next decade.

Figure 5. Incremental Fiber Deployment



Source: J. Kraushaar, Ind. Anal. Div., FCC, End-of-Year 1996 Fiber Deployment Update at Tables 2, 6 and 14 (Aug. 1997).

Facilities Interconnection and Resale. CLECs are interconnecting their networks at a rapid pace as well. Over 100,000 interconnection trunks – used to connect a CLEC's network and switches to the Bell Companies' – are operational in SBC's seven-state region. BellSouth has installed 30,000 in its nine-state region. Over 300 physical or virtual collocation arrangements are operational in SBC's region, though nearly all of these are in California, with another 140 pending. There are 14 physical collocation arrangements in place in BellSouth's region and another 86 in progress,[28] and 133 virtual collocation arrangements with an additional 45 in progress.[29] CLECs are also beginning to resell Bell Company services. In SBC's region alone, competitors are reselling more than 330,000 lines (180,000 in California and over 115,000 in Texas). Nearly 40,000 were converted to resale in September alone. Similarly, in BellSouth's region, competitors are serving 130,000 resold lines.

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[27] *Telcos Lead New Fiber Deployment, Corning Expands To Meet Demand,* Fiber Optics News, Feb. 24, 1997 (quoting Corning executive Clifford Hund: "'The CLECs were where the action was in 1996. They put fiber in 47 states in 200 cities.").

[28] Brief in Support of Application at 35, Application by BellSouth Corporation, BellSouth Telecommunications, Inc., and BellSouth Long Distance, Inc., For Provision of In-Region, InterLATA Services in South Carolina, CC Dkt. No. 97-208 (F.C.C. Sept. 30, 1997).

[29] Order Addressing Statement and Compliance with Section 271 of the Telecommunications Act of 1996 at 32, Entry of BellSouth Telecommunications, Inc., Into InterLATA Toll Market, Dkt. No. 97-101-C, Order No. 97-640 (SCPSC July 31, 1997).

Data Services. Because voice telephone service is ubiquitous and familiar, many observers assess the state of local competition in terms of voice alone. But data traffic is growing much faster than voice[30] and will soon surpass it, if it has not already done so.[31] Much of the current growth in lines supplied by incumbent local phone companies is attributable to second phone lines, which are used mainly for fax and Internet services.[32]

Since passage of the 1996 Act, cable operators have begun offering data services to a rapidly growing number of customers in this high-growth segment of the market. By early 1997, 1.5 million homes could reach the Internet via high-speed cable modems.[33] By mid-1997, Time Warner alone was offering cable data links to over 800,000 homes;[34] TCI claims to reach nearly three million homes.[35] Cable operators continue to invest ambitiously in fiber optics,[36] signal compression, and high-speed cable-modem technology.[37] Microsoft has invested $1 billion in Comcast,[38] and is reportedly considering a similar investment in TCI.[39] A projected 80 percent of homes passed by cable lines will be able to access the Internet over cable by 2002, and a quarter

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[30]J.L. Barlage, et al., Smith Barney, Ind. Rpt. No. 1761069, Technology Topics, at 6 (Jul. 9, 1996) (voice traffic will grow 4 percent a year, while data traffic will grow by more than 40 percent annually).

[31]*More Traffic on The I'way*, Industries in Transition (Jan. 1997) (Data traffic constituted approximately one half of all user traffic in 1996 and is expected to reach 60 percent by 2001).

[32]L. Selwyn and J. Laszlo, ETI, The Effect of Internet Use on the Nation's Telephone Network at Table 3 (Jan. 22, 1997) (prepared for the Internet Access Coalition) (the demand for 6 million "second" residential subscriber lines in 1995 – almost half of all "second" residential lines – can be attributed principally to on-line access).

[33]D.H. Leibowitz, et al., Donaldson, Lufkin & Jenrette Securities, Ind. Rpt. No. 2546034, Cable Industry Outlook '97, at 16 (Apr. 17, 1997) ("*DLJ Cable Outlook*").

[34]Time Warner, Road Runner High-Speed Online Service, http://www.pathfinder.com/@@e*ceAAcAUP48ELee/rdrun/.

[35]TCI Press Release, *@Home Network Announces First Public Quarter Results; Subscriber Base Grows To 26,000, Marketable Homes Passed Increases To 2.7 Million*, Oct. 16, 1997.

[36]The U.S. cable industry accounted for 32 percent of the fiber-optic cable deployed in 1996. *Telcos Lead New Fiber Deployment,* Fiber Optics News, Feb. 24, 1997.

[37]24 cable operators have deployed commercial cable modem services in over 40 cities. Cable Datacom News, Commercial Cable Modem Launches in North America, Sept. 12, 1997, http://cabledatacomnews.com/cmic7.htm.

[38]A. Gould, et al., Oppenheimer & Co. Inc., Ind. Rpt. No. 2562652, Media Stocks: Cable Stocks Reconsidered, at 2 (Jul. 3, 1997) ("[T]he $1 billion Microsoft investment clearly points to the cable infrastructure as the preferred provider of high-speed data.").

[39]E. Shapiro, *TCI May Get Investment By Microsoft*, Wall St. J., Oct. 15, 1997, at A3.

are expected to subscribe; by that estimate, one third of all Internet users will be accessing the Internet over cable networks.[40]

Wireless Services. The FCC completed the largest of its auctions of PCS spectrum in 1995, before the 1996 Act was signed into law.[41] By November 1997, PCS providers had signed 157 interconnection agreements with incumbent wireline carriers.[42] By all accounts, PCS providers are deploying their new networks much faster than anticipated only a year or two ago.[43] Since passage of the 1996 Act, they have launched commercial service in markets that serve half of the U.S. population.[44] Wireless prices are falling. And because wireless offers the great convenience of mobility, many analysts believe wireless will compete with wireline even at premium prices, in much the same way subscription cable competes with free broadcast television.[45] **Table 3**. AT&T has also announced ambitious plans to compete in local markets using some of its PCS spectrum for the provision of fixed-wireless loops.[46]

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[40]*DLJ Cable Outlook* at 13, 18.

[41]The A and B Block auctions, for 30 MHz MTA licenses, were completed in March 1995. The 30 MHz C Block auction was completed in May 1996, and the D, E, and F blocks were completed in January 1997. FCC, Wireless Bureau, http://www.fcc.gov/wtb/auctions.

[42]USTA, Draft Competition Report, Nov. 1, 1997.

[43]P. Millard, *PCS Networks Being Installed Faster than Expected*, Bus. Journal., Feb. 21, 1997, at 16.

[44]L.J. Runyon, et al., Merrill Lynch Capital Markets, Ind. Rpt. No. 1938067, Telecommunications/Wireless, at Table 4 (Jul. 28, 1997) (showing that PCS service is available in 67 of the top 100 MSAs in the United States, accounting for 131,609,000 people).

[45]Report and Order at ¶ 98, Amendment of Parts 1, 63, and 76 of the Commission's Rules to Implement the Provisions of The Cable Act of 1984, 1985 FCC Lexis 3475; Fitch Investors Service, Ind. Rpt. No. 1702551, Telecom's Wireless Battlefield, at 6 (Jan. 29, 1996) ("In their competition against landline operators, wireless operators will be aided in part by consumers' desire for the convenience of mobility and their current willingness to pay a premium for it."); J.L. Hines, et al., NatWest Securities Corporation, Ind. Rpt. No. 1824099, Year In Review & Thoughts For '97/Wireless, at 2 (Jan. 1, 1997) ("[W]ireless will replace wire").

[46]J. Keller, *AT&T Unveils New Wireless System Linking Home Phone To Network*, Wall St. J., Feb. 26, 1997, at B2 (quoting AT&T Wireless Vice Chairman, Wayne Perry: "While everyone thought we were going to use these licenses for mobile phone services, we were getting them for the fixed wireless local phone system as well.").

Table 3. Wireless/PCS Competition: Predicted Growth
"There are predictions that 40 percent of the population will be wireless users in ten years and that wireless will challenge the traditional wired network for basic phone service."[1] *(FCC Chairman Reed Hundt, 1995).*
"A small but growing number of consumers are . . . embracing an exclusively wireless telephonic experience."[2] *(Wall Street Journal, 1997)*
"By the year 2006, the number of wireless phone users is expected to grow from one in ten Americans to five in ten."[3] *(Kansas City Star, 1997)*
"Eventually, the companies [PCS providers] expect, customers will start canceling their local telephone service and using wireless phones exclusively."[4] *(Kansas City Star, 1997)*
"According to Yankee Group, 14 percent of the U.S. population used a PCS or cellular phone last year, but that is expected to swell to a quarter of the population, or 67 million subscribers, by 2000."[5] *(Mark Lowenstein, Wireless Analyst, 1997)*
"Our analysis projects that over the next 5 to 8 years wireless prices will drop from the current 60¢ - 70¢/ minute to 10¢ - 20¢/minute, and penetration will rise to the 30 percent - 40 percent range. Hence, wireless will become a very competitive domestic telephone service supplier."[6] *(P. William Bane, Stephen Bradley and David Collis, 1995)*
Sources: [1]Statement of Reed E. Hundt, Chairman, Federal Communications Commission, before the Telecommunications and Finance Subcommittee, June 19, 1995. [2]S. Mehta, *Unfettered But In Touch*, Wall St. J., Aug. 20, 1997, at B1. [3]T. Sickinger, *Familiar Sight?...Wait Till You See What These Guys Are Planning*, Kansas City Star, June 5, 1997, at A1. [4] *Ibid.* [5] D. Zeiger, *U S West Turns Attention to Wireless Launch*, Denver Business Journal, May 23, 1997 at 11A. [6] P. Bane, S. Bradley and D. Collis, Winners And Losers: Industry Structure In The Converging World Of Telecommunications, Computing And Entertainment, http://www.hbs.edu/units/gm/mis/multimedia/link/p_winners_losers.html.

A Fast Transition. A study commissioned by AT&T and MCI before passage of the 1996 Act concluded that natural economic forces would prevent cable and wireless operators from having any significant competitive impact on local markets in the foreseeable future.[47] Competition, the study asserted, had taken 30 years to develop in long-distance markets, 16 years for customer premises equipment, 9 years and counting in markets for enhanced services, 6 years for competitive access services, and 4 years for 800 numbers.[48] Competitors in local markets would require "anywhere from 5 to 8 years to generate a positive cash flow," and their new businesses might never prove profitable at all.[49] Anyone who believed "entry will be quick and

[47]Economics and Technology, Inc./Hatfield Associates, Inc., The Enduring Local Bottleneck: Monopoly Power and the Local Exchange Carriers 151 (1994) ("[I]t will be a long hard climb for cable and wireless providers who plan to provide local telephone service in competition with the LECs").

[48]*Id.* at 6-7.

[49]*Id.* at 151.

easy" would face a "big surprise when they meet the hard, cold facts of the income statement and they must incur the costs of being in the local telephone business."[50] Both the FCC and the Department of Justice were presenting comparably downbeat projections about the prospects for local competition.[51]

At the very least, then, it should come as no surprise that competition in local exchange markets is not fully mature 20 months after passage of the 1996 Act. Indeed, what is remarkable is how far local competition has advanced in such a short time. Judged against the historical record in other markets, the competitive record in local markets since 1996 is excellent. Twenty months after terminal equipment manufacturers and long-distance carriers were first offered interconnection, almost nothing at all had happened. By contrast, incumbent local carriers and new competitors launched interconnection negotiations within weeks after the 1996 Act was signed into law. Far more has happened in local markets, during twenty months of private interconnection negotiation, than happened in other markets during years of interconnection regulation minutely orchestrated by federal regulators.

But will competitors ever arrive to challenge local incumbents in the market for basic, residential, voice service? Few casual observers are prepared to believe that local markets are competitive when the populist consumer – the residential subscriber – can still buy the populist service – basic, local, voice – from only a single provider. When will there be a second?

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[50] *Ibid.*

[51] Reed Hundt, Chairman, FCC, Statement on S. 1822, the Communications Act of 1994 and Telecommunications Equipment Research and Manufacturing Competition Act of 1994, Before the Committee on Commerce, Science, and Transportation, United States Senate, Feb. 23, 1994 ("Of course, telecommunications markets that have been dominated by a single firm for many years do not mature into competitive markets overnight simply by the removal of entry barriers."); Anne Bingaman, Assistant Attorney General, Antitrust Division, U.S. Department of Justice, Promoting Competition in Telecommunications, address before the National Press Club, Washington, D.C., Feb. 28, 1995 ("[I]mplementation issues mean that the growth of local competition may take time, even under the best of circumstances").

2. COMPETITION AT THE HIGH END OF THE MARKET

That hundreds of competitors are signing local interconnection agreements and offering service is beyond dispute. Equally clear is that they are carefully picking where they compete, for which customers and which services, and on what timetable. As AT&T puts it, the company will build competitive local facilities only "where and when it makes economic sense."[52]

But where does local competition make "economic sense"? The answer turns on both economic and regulatory factors.

Costs and Prices of Local Exchange Service. Local phone companies currently spend an average of between $27 and $37 per month to provide a local phone line and dial tone for normal levels of local calling. This is a national average for all lines, urban and rural, residential and business, and includes the average cost of supplying "interexchange access."[53]

The average business subscriber pays a monthly fee for a basic line, dial tone, and subscriber line charge (SLC) that aligns fairly closely to that average cost – about $27 per month, plus an average of about 1.7 cents per minute for local calls.[54] The average residential subscriber, by contrast, pays a basic fee of about $17.[55] In addition, every major incumbent local

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[52]AT&T, 1996 Annual Report 3 (1997).

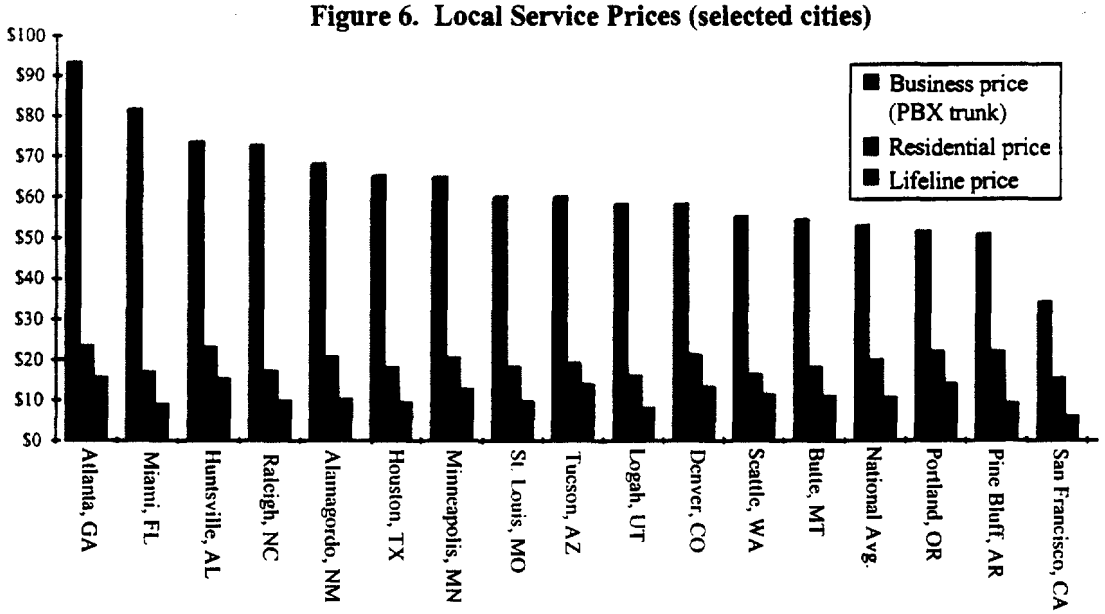
[53]This assumes that the cost of providing local service is about $27 per month, the median of estimates provided by the FTC and Hatfield Associates. The FTC has calculated that between 1983 and 1987 the average cost per line of providing basic local service (excluding interexchange access) fell from $35.51 to $33.15 per month. Comments of the Staff of the Bureau of Economics of the Federal Trade Commission at Table 2, Expanded Interconnection with Local Telephone Company Facilities, CC Dkt No. 91-141 (F.C.C. filed Mar. 5, 1993) ("*FTC Comments*"). Assuming costs have continued to decline at that rate and adjusting for inflation, local service would cost around $31 per month per line. Hatfield Associates' Hatfield Model version 3.1 (endorsed by AT&T and MCI) estimates the cost of providing local service by state and by carrier within each state. Weighting these costs by the number of lines for each carrier in each state yields a national average cost of around $21 per line per month. Hatfield Associates, Hatfield Model Release 3.1 Model Description, CC Dkt. No. 96-45 (F.C.C. filed Feb. 28, 1997) ("*Hatfield Model Release 3.1*"). An additional $6 of cost per line per month should be added to account for the non-traffic-sensitive costs of providing interexchange access. Third Report and Order, MTS and WATS Market Structure Phase I, 93 FCC 2d 241, 281-82 (1983) (indicating FCC desire to set SLC at $6 per month to cover NTS costs).

[54]FCC, Reference Book of Rates, Price Indices, and Household Expenditures for Telephone Service, at 24 (Mar. 1997) ("*FCC Reference Book*"). The $27 per month includes measured service, SLC, and touch-tone. The business SLC is roughly $6 per month per line, closely aligning with actual costs of NTS access.

[55]*Id.* at 17. This rate is for unlimited local calls, SLC, and touch-tone service. The residential SLC was set at $3.50 (under pressure from consumer advocacy groups, state regulators, Congress, and Judge Greene) to keep local telephone service affordable, but the FCC has noted that $3.50 is not sufficient to cover the NTS costs of

carrier offers "lifeline" service of some sort, averaging around 50 percent lower than the basic rate, to subscribers who cannot afford more.[56] **Figure 6.**

Figure 6. Local Service Prices (selected cities)



Source: *FCC Reference Book*, at Apps. 2, 3.

Incumbent local phone companies make up a net of $4 to $5 of the residential revenue shortfall on fees charged to provide interexchange access.[57] **Figure 7.** These are average numbers. For subscribers that make few if any interexchange calls, the cost of providing basic

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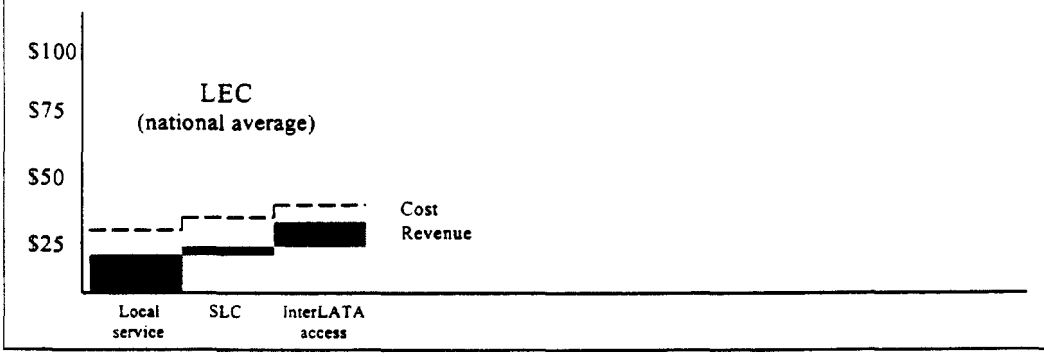
interexchange access. *See, e.g.*, First Report and Order at ¶ 24 , Access Charge Reform, CC Dkt. No. 96-262 (F.C.C. May 16, 1997) ("*Access Charge Reform Order*") (noting that some of the "cost of the loop [is] not recovered from end users through the [SLC] flat charge").

[56]*Id.* at ¶ 27.

[57]This is derived by multiplying the average number of interLATA minutes generated by a residential line by the average amount per minute that the LEC charges IXCs for interstate access and subtracting the cost of that access. According to FCC phone bill surveys, the average residential line made and received 249 minutes per month of interLATA calling. FCC, Long Distance Market Shares, First Quarter 1997 at Table 11 (July 1997) ("*FCC Long Distance Market Shares*") (reporting 1996 surveys of 6,700 residential lines which generated 835,000 interLATA minutes of use). LECs charge IXCs an average of 3.5 cents a minute to deliver those calls. FCC, Statistics of Communications Common Carriers at Tables 2.6, 6.2 (1995/1996 ed. 1996) ("*FCC Statistics of Common Carriers*") (in 1995, total access revenues, excluding SLCs and private line access were $19.5 billion; total originating and terminating interLATA minutes were 548 billion). The average residential line therefore generated nearly $9 per month in access revenue. Assuming that access costs are half of its price, interLATA access generates $4 to $5 profit per residential line per month. *FTC Comments* at Table 2.

loop and dial tone remains well above the price charged. Only the very heaviest interexchange callers pay off the whole subsidy through interexchange access charges alone.[58]

Figure 7. Residential Monthly Revenue and Cost (per line)



The average residential customer generates, in addition, about $6 per month in local toll charges;[59] that is, on average, probably about twice the incremental cost of providing the service.[60] **Figure 8**. It is here that the revenue earned by the incumbent local phone company on the average residential line begins to catch up with cost.

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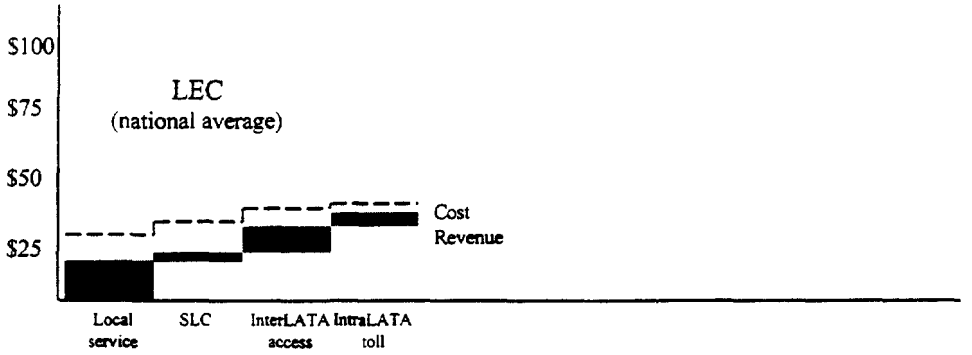
[58]And only the largest business customers generate enough access revenue to make competition profitable.

[59]This was calculated by multiplying the quotient of total LEC intraLATA toll revenue divided by the total number of intraLATA toll minutes by the average number of intraLATA toll minutes per month generated by each residential line; this yielded a result of $5.80 per month in local toll revenue. *FCC Long Distance Market Shares* (LECs generated $14 billion in local toll revenue in 1996); *FCC Statistics of Common Carriers* at Table 2.6 (22.8 billion total local toll calls in 1995). To derive the total average number of intraLATA toll minutes per month generated by each residential line, we assumed the following: (1) the average intraLATA toll call is the same length (3.5 minutes) as the average intrastate interLATA toll call, *ibid.* (20.1 billion intrastate interLATA calls made in 1995; 77 billion originating minutes – assuming that originating minutes are half of total); (2) that 52 percent of intraLATA toll minutes generated per month are from residential lines, *ibid.* (52 percent of all interLATA minutes per month are generated by residential lines), which means that there were 43 billion residential interLATA toll minutes in 1995, or 400 minutes per year (34 per month) per line.

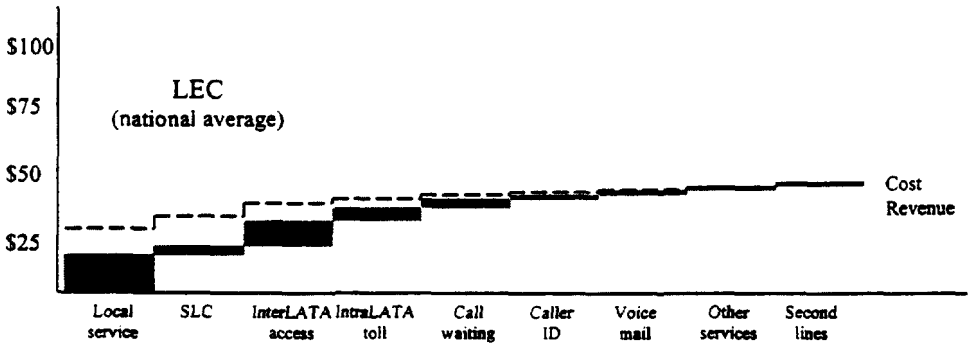
[60]This is a conservative estimate: MCI has estimated its own local toll margins at 66 percent. K.M. Leon, Lehman Brothers, Inc., Co. Rpt. No. 1567651, MCI Communications, at 6 (Mar. 7, 1995); *see also* R. Klugman, PaineWebber Inc., Ind. Rpt. No. 1537197, RBOCs and GTE, at 33 (Dec. 13, 1994) ("*RBOCs and GTE Industry Report*") (margins for local toll calls are "typically an astronomical 80-90 percent").

Figure 8. Residential Monthly Revenue and Cost (per line)



Finally, local phone companies make up another part of the shortfall from basic services – another $4 per average residential line per month – on vertical services like call waiting and Caller ID.[61] **Figure 9**.

Figure 9. Residential Monthly Revenue and Cost: Vertical Services (per line)



[61]This was calculated by weighting the prices of various vertical services with the penetration of such services and adjusting for costs. Adjusted for penetration, call waiting generates an average of $2.55 per residential line per month; voice mail, $0.83 per month; Caller ID, $1.17; additional lines, $1.50; and all other services combined, $0.50 per month. The following assumptions were made: (1) Call waiting penetration nationwide is 51 percent at a cost of $5 per month; voice mail penetration is 11 percent at a cost of $7.50 per month; Caller ID penetration is 18 percent at a cost of $6.50 per month; and second residential line penetration is 15 percent at a cost of $10 per month. D. Reingold, et al., Merrill Lynch Capital Markets, Ind. Rpt. No. 1864842, Telecom Services: RBOCs & GTE, at Table 10a (Feb. 19, 1997) (penetration rates); SWBT tariffed rates in Houston, Texas (proxy for service prices); (2) All other vertical services – including speed dialing, three-way calling, and many others – have a combined penetration of around 10 percent and a total cost of $5 per month; (3) vertical services are provided at 60 percent margins above cost. *See, e.g., RBOCs & GTE Industry Report* at Table 7.

In the aggregate, local phone service today is a solvent business. But only because some components are profitable enough to make up for others that are not. Overall, local phone companies lose a net of about $19 billion a year – about $15 per month, per line – providing basic local service to residential subscribers.[62] The losses are offset by above-cost prices charged for local business service, interLATA access charges, local toll, and vertical services. **Table 4.**

Table 4. Local Service: Revenues and Costs

Service	Revenue $ billions	Cost $ billions	Net profit/loss* $ billions	Profit/loss as a percentage of cost national average
Residential local service	17	33	-15	-47
Single line business local service	5	4	1	26
Multiple line business local service	17	11	6	57
Residential NTS access	4	7	-3	-41
Single line business NTS access	0.5	1	-0.5	-40
Multiple line business NTS access	2	2	0	0
Residential TS access	11	5	5	100
Business TS access	10	5	5	100
Residential intraLATA toll	7	4	4	100
Business intraLATA toll	7	3	3	100
Vertical services	8	3	5	166

*Note: Numbers may not add up due to rounding.

These numbers did not arise by accident; they reflect deliberate regulatory policy. The FCC and state utility commissions are charged with maintaining "affordable rates" for all subscribers.[63] To that end, regulators require incumbent phone companies to offer service at

[62]This assumes the median local service cost figure of $27 per line per month. Using the FTC-based cost estimate of $31 per line per month yields a deficit of over $24 billion per year; using the Hatfield data yields a deficit of over $12 billion per year.

[63]The Commission has recently held that the rates in effect before implementation of the Act were indeed "affordable." Report and Order at ¶ 2, Federal-State Joint Board on Universal Service, CC Dkt. No. 96-45 (F.C.C. May 8, 1997) ("*Universal Service Order*").

uniform rates to all residential subscribers in their service areas, however much it may actually cost to serve the most distant, difficult-to-reach customers, and however few additional, more profitable services beyond basic dial tone customers may use.[64] As the FCC itself has noted, low rates for basic residential service are maintained "through, among other things, a combination of: geographic rate averaging, high rates for business customers, high interstate access rates, high rates for intrastate toll service, and high rates for vertical features and services such as call waiting and call forwarding."[65]

In most markets, subsidies of any kind are inefficient. Whether they are in local telephony, however, is not entirely clear. The value of the telephone network is enhanced each time a customer is added to the network – every new connection creates what economists call a positive "network externality." As the FCC recently explained, "[a]t the simplest level, increasing the number of people connected to the telecommunications network makes the network more valuable to all of its users by increasing its usefulness to them."[66] And whether or not they promote global efficiency, subsidized rates for basic residential service do undoubtedly promote connection and social equity.

Equally clear is that they do profoundly affect the evolution of competition. Their initial impact, of course, is to divert all competitive effort toward the most profitable, subsidizing side of the market, and away from the least profitable, subsidized side. This is precisely what has happened so far, in the twenty months since the 1996 Telecom Act fully opened all local markets to competition.

Business Services. The most effective way for a competitive local carrier to red-line unprofitable customers out of its service territory is to shun residential customers completely, and serve only businesses. In serving business customers, competitors don't need to undercut below-cost service; business service rates are already close to cost. Additional revenues from

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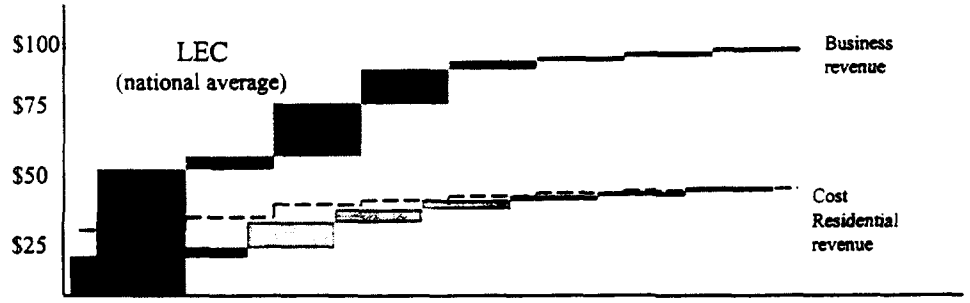
[64]As the California Public Utilities Commission has noted, this requires each local phone company "to set a rate which reflect[s] an average of the higher cost exchanges with the more profitable exchanges." Decision No. 96-10-066 at 24, Rulemaking on the Commission's Own Motion into Universal Service and to Comply with the Mandates of Assembly Bill 3643, Rulemaking No. 95-01-20 (Cal. PUC Oct. 25, 1996).

[65]*Access Charge Reform Order* at ¶ 11. *See also* California Decision No. 96-10-066 at 24, Rulemaking on the Commission's Own Motion into Universal Service and to Comply with the Mandates of Assembly Bill 3643, Rulemaking No. 95-01-20 (Cal. PUC Oct. 25, 1996) ("The LECs were also able to price certain services above costs so as to subsidize basic local exchange service, which was generally priced below cost.").

[66]*Universal Service Order* at ¶ 8 ("Increasing subscribership also benefits society in ways unrelated to the value of the network per se. For example, all of us benefit from the widespread availability of basic public safety services, such as 911."). *See also* Reed Hundt, Chairman, FCC, remarks before the Institute for International Economics, Washington, D.C. (Oct. 23, 1996) ("Economists teach us that the more people who use the network, the more valuable it becomes to each user. Within countries this provides a strong reason for promoting universal service.").

measured local service,[67] interexchange access,[68] local toll,[69] and other vertical services add significantly to the overall profitability of providing business service. **Figure 10**.

Figure 10. Business Monthly Revenue and Cost (per line)



Because they are also much heavier users of long-distance services, business customers tend to be more attractive to carriers than residential customers.[70] Competitors target their competition accordingly.[71] As with residential local toll service, interexchange carriers are able to carry business local toll minutes economically, and are moving to provide business local toll service, often in combination with their local or long distance offerings.[72] "Competitive Access

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[67]The average business line adds an additional $17 in local charges per month, under the assumption that the average business line makes 200 five-minute business-day calls per month, at 1.7 cents per minute. This is the same assumption made by the FCC in preparing its national averages for business calls. *FCC Reference Book* at 24.

[68]The average business line generates approximately $9 per month in access revenue above cost, under the following assumptions: (1) there are 45 million business lines that account for 48 percent of total interLATA minutes, or 288 billion minutes total, *see* note 59 (residential lines account for 52 percent of the total); (2) the LECs charge roughly 3.5 cents per minute for access, *see* note 57; and (3) the cost of providing access is roughly half of revenue, *see* note 57.

[69]The average business line generates approximately $12 per month in local toll profits, under the following assumptions: (1) the 45 million total business lines generate 39 billion minutes of intraLATA toll traffic per month, *see* note 59 (residential lines generate 43 billion of 72 billion total); and (2) the average charge for an intraLATA toll call is 17 cents per minute, *see* note 59.

[70]California Decision No. 96-10-066, Rulemaking on the Commission's Own Motion into Universal Service and to Comply with the Mandates of Assembly Bill 3643; California Investigation on the Commission's Own Motion into Universal Service and to Comply with the Mandates of Assembly Bill 3643, Rulemaking No. 95-01-020 at 145 (Cal. PUC Oct. 25, 1996) ("[B]usiness customers tend to be more attractive to carriers than residential customers because businesses tend to make more toll and long-distance calls.").

[71]Correspondingly, the FCC has recognized that "[b]usiness customers who spend more on telephone service will generally get the first benefit as new entrants market services for them. Residential customers . . . may wait longer to see results." FCC, Common Carrier Competition Report 1 (Fall 1995).

[72]For example, "MCI One" is MCI's bundled offering of toll (long distance, local toll, and toll-free), local, Internet access, and cellular services. MCI, MCI One for Your Business, http://www.mci.com/aboutus/products/

Providers" go directly after the profitable business of providing interstate access for larger business users.

Businesses typically cluster in downtown areas and business parks – the areas of highest daytime population. Accordingly, competitors have deployed their fiber networks to areas of high daytime population, while bypassing areas with low daytime population. **Maps 1-6**. In Atlanta, for example, MFS (WorldCom), TCG, and Intermedia Communications have meticulously threaded their networks through the business areas down Peachtree Street and Edgewood Avenue, past government buildings, banking headquarters, investment firms, law firms, and newspaper offices like the Atlanta Journal and Constitution.[73] In Denver, MCI's, MFS's, and TCG's fiber networks run through the dense clusters of business high-rises in the heart of the downtown area, past First Interstate Bank and Arthur Andersen, then north and east to the industrial areas along the train tracks, and along the perimeter of, but not into, the low-income areas north and east of City Park.[74] In the San Francisco Bay area, the competitive fiber networks of TCG, MFS, and ICG run through the downtown business, financial, and shopping districts, then south to the hundreds of high-tech firms in Silicon Valley; they never touch the low-income Tenderloin district, nor even the high-income residential areas around Golden Gate Park.[75]

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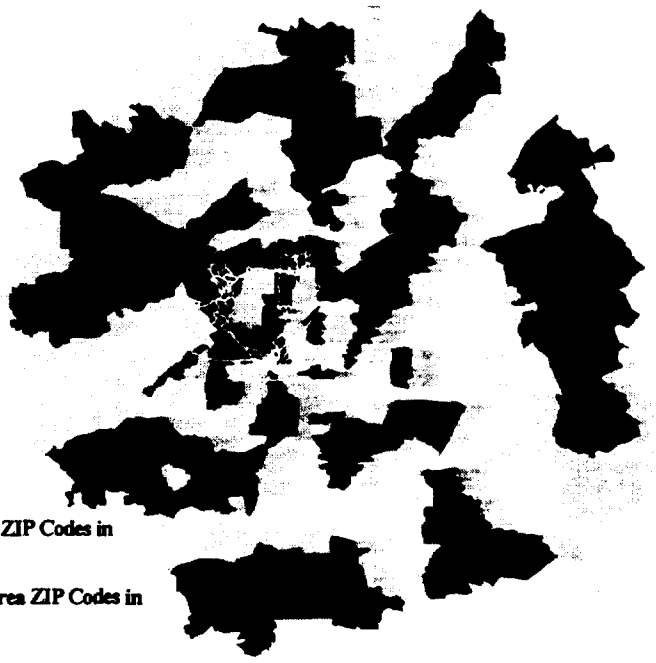
mcione/textbus2.shtml. "ATT.ALL" is AT&T's bundled offering of toll (long distance, local and 800 services), international, local, calling card, and cellular services. AT&T, AT&T.ALL, http://www.att.com/attall/.

[73]The fiber then runs up Piedmont Avenue, passing upscale high-rise apartment buildings and shops, but avoids the low income areas south of I-20 and east of Moreland Avenue. Leaving downtown, the networks continue up Piedmont and Peachtree to another cluster of stores, high-rises, and financial offices, including Merrill Lynch, Prudential, and Alex Brown. In the suburban areas, the fiber runs to and through the business parks surrounding Perimeter Mall directly north of the city.

[74]South of City Park, the fiber runs east through a high income residential area, passing, among other things, three hospitals, and out to the Colfax Corridor, a stretch of small businesses along Colfax Street heading to Aurora. The networks head south to the Denver Technology Center – a collection of high-technology office buildings, including Lucent and TCI – passing business parks, small businesses, clusters of apartment complexes, Denver University, and South High School along the way. The fiber continues south to pass companies in the electronics industry, but does not enter any of the residential areas west and north of the city.

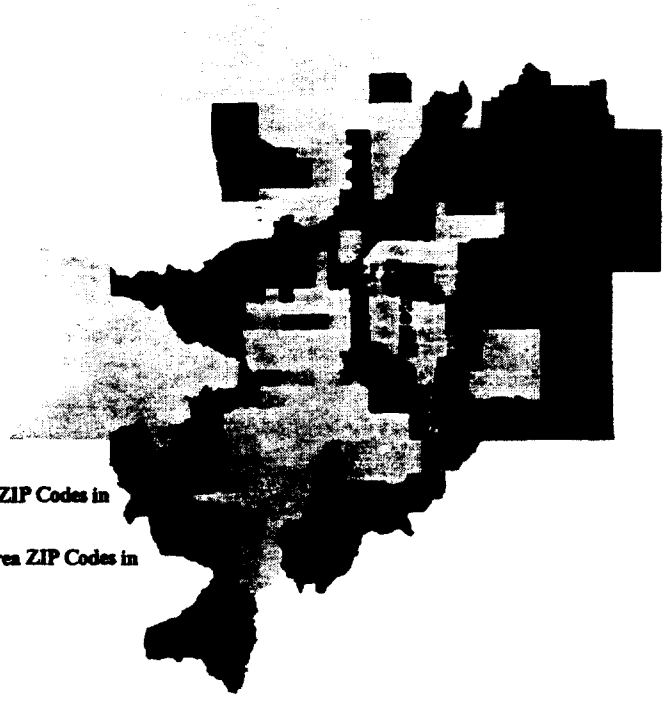
[75]The fiber passes the Bank of America headquarters, the Transamerica tower, and the Hyatt and St. Francis hotels around Union Square. It then heads south of the city, through industrial South San Francisco, to Silicon Valley, home to such firms as Intel, Apple Computer, Motorola, and Sun Microsystems. The fiber then runs north along the highways of the East Bay suburbs, but does not incorporate residential areas, ending up in downtown Oakland to meet, among other professional and industrial office buildings, Aetna, Pacific Gas & Electric, and Kaiser Permanente hospital.

Map 1. Competitive Networks In Atlanta



- Top 25 Percent of Area ZIP Codes in Daytime Population
- Bottom 25 Percent of Area ZIP Codes in Daytime Population
- CLEC Fiber

Map 2. Competitive Networks In Denver



- Top 25 Percent of Area ZIP Codes in Daytime Population
- Bottom 25 Percent of Area ZIP Codes in Daytime Population
- CLEC Fiber

Map 3. Competitive Networks In Dallas

Top 25 Percent of Area ZIP Codes in Daytime Population

Bottom 25 Percent of Area ZIP Codes in Daytime Population

CLEC Fiber

Map 4. Competitive Networks In Miami

Top 25 Percent of Area ZIP Codes in Daytime Population

Bottom 25 Percent of Area ZIP Codes in Daytime Population

CLEC Fiber