IV. OPERATOR SERVICES AND DIRECTORY ASSISTANCE

The FCC defines directory assistance as a service that "allows subscribers to retrieve telephone numbers of other subscribers,"[1] and operator services as "any automatic or live assistance to a consumer to arrange for billing or completion, or both, of a telephone call."[2]

Competition in the provision of OS and DA began soon after divestiture. Both the FCC and state regulators have recognized this fact.[3]

Today, numerous CLECs – including AT&T and MCI WorldCom – provide their own competitive OS and DA services. And CLECs readily may establish their own OS and DA services without the OS/DA UNE. The Communications Act and FCC rules guarantee CLECs non-discriminatory access to all LECs' OS and DA databases and services, and directory listings.[4] CLECs also may obtain OS and DA databases and services, and directory listings from numerous wholesale providers.

A. Competitive OS and DA Providers

Numerous companies provide competitive OS and DA throughout the BOCs' and GTE's regions. The largest CLECs – AT&T and MCI WorldCom – offer nationwide directory assistance service, which provides "telephone listings anywhere in the United States."[5] AT&T markets "00 INFO" nationally to its presubscribed customers.[6] Both AT&T and MCI offer DA using 10-10-XXX dial-around patterns, which are accessible from any telephone in the nation.[7] MCI WorldCom launched its "10-10-9000" directory assistance service in October 1998.[8] AT&T has since introduced "10-10-ATT-00."

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[1] *Performance Measurements and Reporting Requirements for Operations Support Systems, Interconnection, and Operator Services and Directory Assistance*, Notice of Proposed Rulemaking, 12 FCC Rcd 12817, 12823 n.14 (1998).

[2] *Implementation of the Local Competition Provisions of the Telecommunications Act of 1996*, Second Report and Order and Memorandum Opinion and Order, 11 FCC Rcd 19392, 19448 ¶ 110 (1996).

[3] *See, e.g., Implementation of Sections 3(n) and 332 of the Communications Act Regulatory Treatment of Mobile Services*, Second Report and Order, 9 FCC Rcd 1411, 1489 (1994) ("Operator service providers (OSPs) compete with local exchange and long distance carriers."). Numerous states have removed OS or DA, or both, from price-cap regulation, or have otherwise proclaimed these services competitive. *See, e.g.*, Order Granting Petition, Petition of U S West Communications for Competitive Classification of its Directory Assistance Services, Docket UT-990259 (WUTC Apr. 28, 1999).

[4] *See* 47 U.S.C. § 251(b)(3); 47 C.F.R. § 51.217; 47 U.S.C. § 222(e).

[5] AT&T News Release, *AT&T Tests New '00' INFO Directory Assistance Service*, Sept. 22, 1997. *See also* MCI Press Release, *10-10-9000 - Directory Assistance Made Simple; MCI WorldCom Delivers One Number for National Long-Distance Directory Assistance*, Oct. 12, 1998 ("10-10-9000 is a national long distance directory that provides consumers with one number for all their directory assistance needs.").

[6] *See* D. Willis, *Numbers in U.S.?; Dial 411*, Asbury Park Press (Neptune, NJ.), Feb. 3, 1999, at B3.

[7] *See* J. Knapp, *National Directory Assistance Battle Heats Up*, Phone+ Magazine, Dec. 1998.

[8] *See* MCI Press Release, *10-10-9000 - Directory Assistance Made Simple; MCI WorldCom Delivers One Number for National Long-Distance Directory Assistance*, Oct. 12, 1998.

AT&T, MCI WorldCom, and Sprint also provide OS nationwide via toll-free 800 numbers. AT&T markets its service as "1-800 CALL ATT," MCI as "1-800 COLLECT," and Sprint as "1-800 ONE DIME." Using any of these services, customers may place calling card, collect, bill-to-third number, and person-to-person services.

Many other CLECs provide their own OS and DA services or resell the services of someone other than the in-region ILEC. *See* Table 1. McLeod USA, GST Telecom, Cox, and Winstar all provide such services.[9] Numerous wireless carriers also provide DA services that compete with ILEC services.[10]

Table 1. Major CLEC Providers of OS and DA

AT&T	Nationwide directory assistance: ATT-00-INFO: 10-10-ATT-00 OS: 1-800 CALL ATT
MCI WorldCom	Nationwide directory assistance: 10-10-9000 OS: 1-800 COLLECT
Sprint	OS: 1-800 ONE DIME
McLeod	Nationwide directory assistance
ALLTEL Communications	OS and DA (obtained from Metro One)
GST	OS and DA (obtained from Metro One)
Cox	OS and DA (obtained from Teltrust)
Omnipoint	OS and DA (obtained from Teltrust)
WinStar	OS and DA (obtained from Frontier)

Sources: See Appendix C

Various Internet sites – many of which provide DA services at no charge[11] – are also a major source of competition. *See* Table 2. One consumer group – the Telecommunications Research and Action Center (TRAC) – recommends that customers "[u]se the Internet to search for numbers whenever possible and avoid all charges."[12] Switchboard.com is the most widely used directory service on the Internet, and was ranked as one of the top ten most used web sites by one study.[13] It has signed agreements with several Internet portals and search engines to be their exclusive source for yellow

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[9] *See e.g.*, The Insight Research Corporation, *Enhanced Directory and Operator Services 1998-2003* (July 1998)("*Insight*"); Metro One Press Release, *Metro One Telecommunications Signs Agreement with GST Telecom*, Oct. 2, 1997; Teltrust Press Release, *Teltrust To Provide Telecommunications Services to Cox Communications*, July 9, 1997; *Frontier Partners with WinStar Communications for Operator Services*, PR Newswire, Oct. 17, 1996.

[10] One analyst notes that, "[I]n 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." Fitch Investors Service, Ind. Rpt. No. 1702551, *Telecom's Wireless Battlefield*, Jan. 29, 1996, at *6.

[11] InfoNOW is an exception; it offers 22 searches covering residential, business and government listings for a monthly fee of $9.90. G.R. Notess, *Duplicative Databases: Yellow Pages from infoUSA*, Database, Feb. 1999.

[12] B. Mohl and P. Wen, *Directory Assistance Confusion May Have You Dialing Up Dollars*, Boston Globe, Jan. 10, 1999, at B2.

[13] Switchboard.com Press Release, *Switchboard Audience Figures Skyrocket*, Feb. 25, 1998. Switchboard.com was "ranked as the number 10 web site as measured by Media Metrix, The PC Meter Company, during the month of January 1998. Switchboard's total audience was 4,184,000, representing a reach of 11.1% of all users of the World Wide Web in that month." *Id.*

and white page listings.[14] Other major DA websites include InfoSpace, InfoNow, Zip2.com, WhoWhere?, and DirectoryNet.[15] AT&T operates www.anywho.com, which contains extensive residential and business listings.[16]

Table 2. Major Internet Providers of OS and DA	
AT&T's Anywho Directories	Searchable national White and Yellow Page listings, toll free listings and reverse lookups. Call connection using AT&T Click2Dial. Available at <http://www.anywho.com>.
Alta Vista People Search	Searchable national White and Yellow Page listings. Available at <http://www.altavista.com>.
At Hand	Searchable national Yellow Page listings with links to webpages with White Page listings. Available at <www.athand.com>.
Big Yellow	Searchable national White and Yellow Page listings, including business searches by distance and address. Available at <http://www.bigyellow.com>.
Bigbook	Searchable national Yellow Page listings, including searches by distance and address. Available at <http://www.bigbook.com>.
Bigfoot	Searchable national White and Yellow page listings. Call connection using Net2Phone. Available at <http://www.bigfoot.com>.
555-1212.com	Searchable national White and Yellow Page listings, toll free listings and reverse lookups. Available at <http://www.555-1212.com>.
InfoNOW	22 searches of national White and Yellow Page listings for $9.90. Available at <http://www.directorynet.com/infonow>.
InfoSpace	Searchable national White and Yellow Page listings, toll free listings and reverse lookups. Available at <http://www.infospace.com>.
InfoUSA	Searchable national White and Yellow Page listings and reverse lookups. Available at <http://www.infousa.com>.
Switchboard.com	Searchable national White and Yellow Page listings. Available at <http://www.switchboard.com/>.
Smartpages	Searchable national White and Yellow Page listings, searches by distance and reverse lookups. Call connection using AT&T Click2Dial. Available at <http://www.infospace.com>.
WhoWhere People Finder	Searchable national White and Yellow Page listings. Call connection using AT&T Click2Dial. Available at <http://www.whowhere.lycos.com/Phone>.
Worldpages	Searchable White and Yellow Page listings, keyword searches, toll free listings and international listings. Available at <http://www.worldpages.com>.
Yahoo! People Finder	Searchable national White and Yellow Page listings. Available at <http://people.yahoo.com/> and <http://www.yp.yahoo.com>.
Zip2	Searchable national Yellow Page listings. Links to local content providers providing information on local events, restaurants and businesses. Available at <http://www.zip2.com>.

In addition to simple directory assistance, several Internet sites provide call completion options that compete with ILECs' OS. AT&T's Anywho offers a Click2Dial

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[14] These include America Online, AltaVista, At Hand, Comcast, Cox, and GeoCities. *See* Switchboard.com Press Release, *Switchboard to be Exclusive Provider of White Pages and Maps on GeoCities Community Site*, Nov. 12, 1998.

[15] *See* Frost & Sullivan, *U.S. Directory Assistance Market*, Feb. 1999, at 7-23 ("*Frost & Sullivan*").

[16] H. Wessel, *Here's the 411 on Directory Assistance*, Orlando Sentinel, Apr. 21, 1999. Anywho "features over 90 million consumer and over 10 million business listings." Anywho Website, http://www.anywho.com/aboutus.html.

feature, which enables users to complete calls to requested listings with software that AT&T provides for free at its site.[17] In March 1999, Qwest and Switchboard.com announced plans to offer customers the ability "to automatically place calls from the Internet," using "web-based click-to-conference technology as well as other Internet-based communications services."[18]

There are a large number of wholesale providers of OS and DA. *See* Table 3. These companies operate one or more call centers, and provide branded service to other carriers including many CLECs. The largest provides of such services include Excell, Teltrust, InfoNXX, Metro One, and HebCom.[19]

Excell is the outsourcing agent for AT&T's new nationwide directory information service, AT&T-00-Info.[20] Teltrust can "supply nationwide origination and termination services with a variety of live agent and automated network platform services, configured to each client's needs."[21] Teltrust provides services to numerous IXCs (*e.g.*, US Long Distance, and Qwest Communications) and CLECs.[22] InfoNXX markets its service as being "a true alternative to telephone company directory assistance."[23] Metro One describes itself as "a leading provider of EDA [enhanced directory assistance] for the telecommunications industry" and as having "thirteen significant EDA contracts with six different carriers to provide EDA in numerous U.S. metropolitan markets."[24] Metro One customers include AT&T, AirTouch, and Sprint.[25] Quest411 offers other carriers the ability to "[a]ccess high quality national listings without the need to develop and maintain your own national database."[26]

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[17] *See* AT&T Website, http://www.click2dial.att.com/.

[18] *See* Switchboard.com Press Release, *Qwest Communications and Switchboard to Offer Web-Based Calling Services*, Mar. 29, 1999.

[19] *See Insight* at 3.

[20] Excell Agent Services Press Release, *Excell Agent Services Announces Aggressive Hiring Campaign*, Mar.12, 1999.

[21] Teltrust Website, http://www.teltrust.com/network/index.html.

[22] Teltrust, Inc., SEC Form S-1 A, July 8, 1998.

[23] InfoNXX Website, http://www.infonxx.com/national.html.

[24] Metro One Telecommunications, Inc., SEC Form 10-Q, Nov. 16, 1998.

[25] *Insight* at 56.

[26] Company promotional material.

Table 3. Major Wholesale Providers of OS and DA	
Century Telecommunications	Provides Directory Assistance, call branding, call completion, collect calling, third party billing and busy verify/interrupt services.
Excell Agent Services	Provides Enhanced Directory Services including extended searches, call branding, call completion, driving directions and yellow pages DA.
Frontier Communications	Provides OS/DA from its Rochester, N.Y. call center for more than 100 other telecommunications companies.
HebCom	Provides enhanced directory services including extended and reverse searches, call branding, call completion, movie listings, local event information, directions, road assistance, weather reports, yellow pages DA, preferred vendor and concierge capabilities.
InfoNXX	Provides enhanced directory services including extended and reverse searches, call branding, call completion, restaurant guides, movie listings, local event information, emergency road service, weather reports and yellow-page searches.
Metro One	"Enhanced Directory Assistance" providing extended and reverse searches, call branding, call completion, driving directions, information on local events, movie listings, road assistance, weather reports and yellow pages DA capabilities.
Quest411	"Quest411 Nortel's national DA service . . . provides ready access to more than 120 million listings."
Teltrust	"FYI National Directory Assistance" provides extended and reverse searches, call branding, call completion, driving directions and yellow pages DA capabilities.
Sources: See Appendix C.	

Numerous CLECs provide competitive DA to their end user customers through arrangements with wholesale providers. GST Telecom provides directory assistance using services obtained from Metro One Telecommunications.[27] Cox provides directory assistance using services obtained from Teltrust.[28] Winstar provides directory assistance services obtained from Frontier.[29]

CLECs do not need large call volumes to obtain OS and DA from wholesalers. As one industry study notes, wholesalers "will quote prices for data listings or records. Quotes are usually based on a cost per 1000 records, and prices are fully negotiable. Typical quotes for raw data may range from $0.25 per record to fractions of a cent per record."[30] When CLEC GST hired Metro One, Metro One stated, "[w]e expect initial EDA call volumes to be relatively small, but we look forward to growing as it expands business."[31]

As a result of this diverse competition, ILECs have lost significant volumes of OS and DA traffic. For example, in SBC's region, directory assistance call volumes have

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[27] *See* Metro One Press Release, *Metro One Telecommunications Signs Agreement with GST Telecom*, Oct. 2, 1997.

[28] *See* Teltrust Press Release, *Teltrust to Provide Telecommunications Services to Cox Communications*, July 9, 1997.

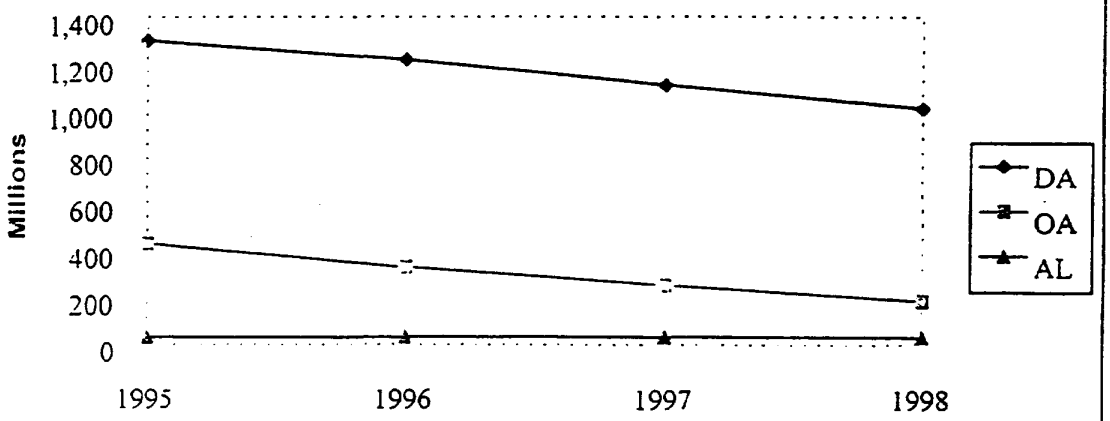
[29] *See Frontier Partners with WinStar Communications for Operator Services*, PR Newswire, Oct. 17, 1996.

[30] *Insight* at 41.

[31] Metro One Press Release, *Metro One Telecommunications Signs Agreement with GST Telecom*, Oct. 2, 1997.

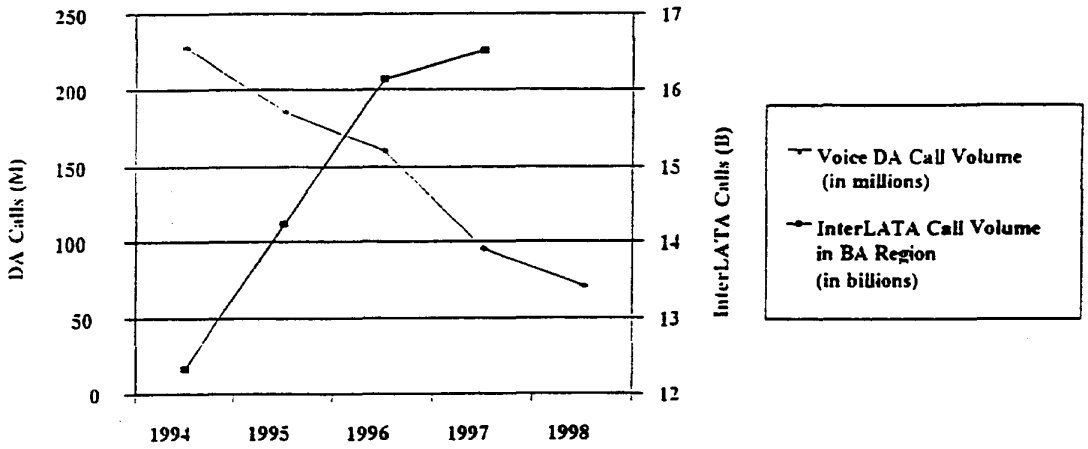
decreased nearly 30 percent since 1995, and operator assistance calls have dropped by over 50 percent, even though access lines have grown during this time. *See* Figure 1. In BellSouth's territory, in-region call volumes for operator assistance have declined over 60 percent in the past eight years, even though access lines have grown in this time. BellSouth estimates that it carries only 30 percent of total in-region operator assistance calls. Bell Atlantic lost approximately 60 percent of its wholesale DA calls between 1994 and 1997. *See* Figure 2. This occurred even though the number of interLATA calls in Bell Atlantic's region increased during this time, as did the entire market for wholesale DA services.[32] These trends clearly indicate that consumers are using alternative OS and DA providers instead of the ILECs.

Figure 1. SBC Call Volumes vs. Access Line Growth



[32] *See Frost & Sullivan* at 4-13.

Figure 2. Bell Atlantic Wholesale DA Call Volumes vs. InterLATA Call Volumes



B. CLECs' Ability To Provide OS and DA Services

1. Access to OS and DA Databases and Services and Directory Listings. ILECs provide OS and DA using databases derived from customer records. Directory assistance databases contain customer names, numbers, and addresses; operator services databases contain customer billing information (*e.g.*, whether a customer will accept collect calls or third party billing).[33]

Section 251(b)(3) of the Communications Act requires all LECs to provide CLECs with "nondiscriminatory access to . . . operator services, directory assistance, and directory listings." Pursuant to this section, the FCC adopted Rule 217, which requires all LECs to "permit competing providers to have access to and read the information in the LEC's directory assistance databases."[34] This guarantees CLECs non-discriminatory access to the OS and DA databases of all local exchange carriers. With assured access to these databases, CLECs may establish their own OS and DA call centers, using their own operators, computers, and equipment. AT&T has indeed conceded that "[c]ompared with other ILEC network elements, CLECs have greater opportunity to establish, themselves or by contract, work centers for providing operator and/or directory assistance services."[35]

Even if CLECs choose not to establish their own call centers, Rule 217 requires LECs to provide CLECs access to "operator services and directory assistance services . . . in their entirety, including access to any adjunct features (*e.g.*, rating tables or customer

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[33] *See Implementation of the Local Competition Provisions of the Telecommunications Act of 1996*, Second Report and Order and Memorandum Opinion and Order, 11 FCC Rcd 19392, 19446 n.252 (1996).

[34] 47 CFR §51.217(c)(ii).

[35] AT&T, *Remand Proceeding on Rule 319* at 50 (FCC filed Feb. 1999).

information databases) necessary to allow competing providers full use of these services."[36] LECs are required to provide these services on a branded or unbranded basis so that CLECs may substitute their own brand-name announcements for those of the LEC.[37] In light of these provisions, the only ostensible purpose of the OS/DA UNE is to enable CLECs to obtain what Rule 217 already grants them, but at a far lower, TELRIC-based price, and under the FCC's rate structure rules for UNEs.

Yet CLECs clearly do not need the OS/DA UNE to provide these services. As described above, there are numerous competitive suppliers of OS and DA databases and services, and directory listings. The rise of these competitors has been facilitated by the Supreme Court's decision to permit the wholesale copying of LEC white pages listings.[38] The largest suppliers of directory listings today include Metromail, VoltDelta, InfoUSA (formerly American Business Information), Dun & Bradstreet, R.R. Donnelley, Axicom Corporation, and The Berry Company.[39] AT&T has for years obtained directory listings from such sources.[40]

These companies supply name, number, and address information on a local and nationwide basis.[41] They make considerable efforts to provide up-to-date and accurate listing information.[42] InfoUSA invests $30 million per year to compile its yellow and white page listings database, which are updated daily,[43] and the company "will soon be

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[36] 47 CFR §51.217(c)(iv).

[37] *See id.* § 51.217(d)

[38] *See Feist Publications, Inc. v. Rural Telephone Service Co., Inc.*, 499 U.S. 340 (1991). Moreover, Section 222(e) of the Communications Act requires all telecommunications carriers to provide their subscriber list information "to any person upon request for the purpose of publishing directories in any format."

[39] *See Insight* at 3, Axicom Website, http://www.acxiom.com/infobase/ ("Acxiom InfoBase is the most comprehensive collection of US consumer, business, property and telephone data available.").

[40] AT&T spokesman Michael Keady has stated that the company has "gotten better about" finding listings from non-ILEC sources in the past few years. L. Gornstein, *New Competition, Services Coming to Telephone Directory Assistance*, The Orange County Register, Feb. 16, 1998.

[41] MetroMail's database contains 90 million listings; VoltDelta's database contains 120 million residential, business and government listings; InfoUSA's database contains 115 million households and 11 million business listings with 120,000 new business listings added every month; Dun & Bradstreet's database contains 11 million business listings; Axicom's database contains over 140 million listings including over 13 million business listings. *See Insight* at 43, 47; Experian Website, http://www.experian.com/catalog_us/info_consumer/idprofile.html; VoltDelta, *Directory Express*, http://www.voltdelta.com/; InfoUSA Website, http://kickapoo.infousa.com/ab_iusa/; Acxiom Websites, http://www.acxiom.com/infobase/business/.

[42] *See, e.g.*, G.R. Notess, *Duplicative Databases: Yellow Pages from infoUSA*, Database, Feb. 1999 (DirectNET's InfoNOW provides "access to the same database used by [ILEC] directory assistance, this live access connects to a database that is updated daily."); InfoUSA Website, http://kickapoo.infousa.com/ab_iusa/item/ (InfoUSA makes "16 million phone calls to verify the information."); *Insight* at 42 ("[MetroMail's] database receives continuous updating through electronic gateway access to the ILEC's independent telephone companies data.").

[43] InfoUSA Press Release, *infoUSA INC. Reports First Quarter 1999 Financial Results*, Apr. 19, 1999.

able to update [its] customers daily, weekly, or monthly via e-mail."[44] Many of these companies provide information on a per listing basis, or supply entire databases on magnetic tapes or CDs.[45]

Finally, the underlying components of the OS and DA databases – customer records – increasingly are supplied by competitors themselves. CLECs are adding new business customers at an even faster rate than ILECs,[46] and are capturing many residential customers as well. CLECs already control well over 1.5 million White Pages directory listings nationwide.[47] As CLECs' share of local customers increases, they will increasingly become a critical source of data for all carriers. As one analyst notes, "[a]s local competition continues to increase, the question becomes which LEC maintains the listings for a geographic area?"[48] Moreover, ILECs have strong incentives to share databases with CLECs, to obtain reciprocal access to CLECs' databases in order to publish complete white pages and provide more useful DA service.

2. Other Facilities Used to Provide OS and DA. Apart from databases, the key ingredients of OS and DA services are employees (operators), real estate, and computers. These are not intrinsic parts of ILECs' telecommunications networks, and ILECs have no particular advantage in obtaining them. Teltrust, "a leading independent outsource provider of a broad range of enhanced call processing and calling card services to the domestic telecommunications industry," states that there is an "absence of substantial barriers to entry in the call completion, national directory assistance, third-party verification and calling card services markets."[49]

OS and DA can be provided on a nationwide basis through a single call center, or with a handful of regional centers. Teltrust operates "four state-of-the-art megacenters"[50] that serve the entire country. HebCom operates five regional call centers that serve the U.S.[51] Excell operates six call centers, each serving the entire US.[52] McLeod USA operates one national call center.[53] InfoNXX provides nationwide service using four call

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[44] InfoUSA Website, http://kickapoo.infousa.com/ab_iusa/item/1,1051,3,00.html.

[45] *See Insight* at 41.

[46] *See, e.g.*, J. Grubman, Salomon Smith Barney, *Review of First Quarter CLEC and RBOC Line Growth*, May 6, 1998.

[47] *See* United States Telephone Association, *Competition in the Local Loop*, Dec. 9, 1998 (Does not include totals for GTE and US West).

[48] *Insight* at 35.

[49] Teltrust, Inc., SEC Form S-1 A, Jul. 8, 1998.

[50] *Insight* at 54. Teltrust operates three call centers in the Salt Lake City area and one in Clearfield, UT. Teltrust Press Release, *Teltrust Announces Relocation of Corporate Headquarters*, Jun. 29, 1998.

[51] *Insight* at 59.

[52] *Id.* at 52. Excell operates call centers in Mesa, Peoria, Phoenix and Tempe, AZ; Las Cruces, NM; and Rockledge, FL. Excell Agent Services Website, *Employment Opportunities. Current Openings*, http://www.excellagent.com/.

[53] *Insight* at 70.

centers.[54] Call centers can be established in relatively short periods of time. In June 1994, CFW contracted with AT&T to provide DA even though it had "no directory service, no land and no employees" at the time; by December of that year it had built a building and hired employees, and began providing service in February 1995.[55] As discussed above, nationwide OS and DA can also be provided with a single web site. CLECs such as AT&T and Qwest are already providing, or have plans to provide, web-based OS and DA services.

Service centers must be staffed with operators. ILECs obviously exercise no control over this labor market. Both "AT&T and MCI employ their own operators."[56] Teltrust employs over 900 operators.[57] In March 1999, Excell announced an "aggressive hiring campaign," to hire 2,000 new operators in order to meet the demands associated with being named the outsourcing agent for AT&T's new nationwide directory information service, AT&T-00-Info.[58]

The major hardware and software components of OS and DA are operator platforms, database applications, and search engines. The market for such equipment is undeniably competitive. There are at least three vendors that make all three components: Nortel, Volt Delta, and PC Plus.[59] In addition, IBM produces operator platforms and search engines, and Metromail makes database applications.[60] Alcatel and Lucent also make one or more of these components.[61]

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[54] InfoNXX has call centers in Bethlehem, PA; Oakville, CT; Riverside, CA; and Tuscon, AZ; InfoNXX Website, http://www.infonxx.com/overview.html.

[55] M. Martinek, *Rural Regional & Remunerative*, Wireless Review, Feb. 1, 1999.

[56] B. Wolfe, *Directory-Assistance Options Have Your Number / Here's How to Get It*, The Courier-Journal (Louisville, KY.), Feb. 15, 1999, at 1C.

[57] *Id.*

[58] Excell Agent Services, Press Release, *Excell Agent Services Announces Aggressive Hiring Campaign*, Mar. 12, 1999.

[59] *Insight* at 76.

[60] *Id.*

[61] *Id*; Alcatel Website, http://www.alcatel.com/telecom/nid/netsol/operator/voiceser/infoserv.htm#dir.

V. SIGNALING NETWORKS AND CALL-RELATED DATABASES

The FCC has defined incumbent LECs' signaling networks to include signaling links and signal transfer points (STPs);[1] it has defined call-related databases as those used "for billing and collection or the transmission, routing, or other provision of a telecommunications service."[2]

Carriers' signaling networks are, of course, interconnected, but current technology requires each local switch to link to one – and only one – signaling network. The RBOCs and GTE connect their switches to their own signaling networks. To the extent that a CLEC purchases unbundled switching from an RBOC or GTE, it must necessarily connect to that same ILEC's signaling network.

A CLEC that deploys its own switches, however, is free to link them to any signaling network it chooses. CLECs may deploy their own signaling networks, or link instead to the signaling network of a third party. Many CLECs already use one or the other of these two options. There are no significant barriers to deploying additional signaling networks and databases. A single STP pair or database can serve customers region-wide or nationwide. The equipment itself is readily available, from a number of highly competitive suppliers.

The market for the provision of signaling and databases is a national one. Efficient SS7 networks use a relatively small number of STPs to serve many switches nationwide. Additional STP pairs and databases are added only as needed to meet capacity requirements, and for network redundancy. Long-haul transport of signaling traffic to distant STP pairs is the industry norm. Two major signaling wholesalers (Illuminet and Transaction Network Services (TNS)) provide national service with only 11 and 2 STP pairs each, respectively. AT&T has a national signaling footprint with 22 STPs (11 pairs). MCI WorldCom uses 12 STPs (6 pairs).

That the BOCs have deployed STPs in every LATA reflects nothing but misguided regulatory history. They were forced to do so by the Bell Divestiture decree – notwithstanding the Department of Justice's strong support for a waiver that would have permitted them not to do so.[3] In 1996, Congress finally eliminated that unfortunate vestige of antitrust history.[4]

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[1] 47 C.F.R. §51.319(e)(1).

[2] *Id.* § 51.319(e)(2). Such databases include the LIDB, the Toll Free Calling database, number portability databases, and AIN databases.

[3] *See* Memorandum *United States v. Western Elec. Co.*, No. 82-0192 (D.D.C. July 13, 1990). The Department of Justice concluded that deployment of STPs in every LATA "would impose substantial inefficiencies and unnecessary costs on interexchange carriers – especially smaller carriers – as well as the BOCs, thereby hampering the implementation of SS7-CCS and its attendant public benefits." Department Memorandum at 2, *United States v. Western Elec. Co.*, No. 82-0192 (May 12, 1989).

[4] 47 U.S.C. § 271(g).

A. CLEC Signaling Networks and Databases

AT&T and MCI WorldCom deployed SS7 networks nearly a decade ago.[5] According to the March 1999 *Local Exchange Routing Guide* (LERG) database, AT&T has deployed STPs in 22 locations, and MCI WorldCom in 12. Both companies can and do use these networks to signal the switches these companies use to provide competitive local exchange service.[6]

According to the LERG, four other CLECs have deployed STPs as well.[7] Other sources indicate that several additional CLECs have done so, too. *See* Table 1.

A number of providers, including Illuminet, Transaction Network Services (TNS), GTE Internetworking Services, and SNET, now serve as competitive wholesalers of signaling services. Any CLEC may link its switches to one of those networks, rather than to one of the ILECs'. Though neither Illuminet or TNS reveal who their specific CLEC customers are, Illuminet states that "CLECs are the most likely candidates for wholesale LNP services."[8] The FCC has found that competitors can rely on such wholesalers instead of incumbents to obtain SS7 capabilities.[9]

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[5] *See AT&T to deploy SS7 by year-end*, Data Communications, Aug 1, 1989; R.N. Lane, Arthur D. Little Decision Resources, Ind. Rpt. No. 1023667, *Carrier Provisions of SS7 Services - Industry Report*, at 2 (Sept. 1, 1989).

[6] The LERG lists these AT&T and MCI STPs as "CLEC" switching entities.

[7] These are GST, Intermedia, ICG, and Universalcom.

[8] *Illuminet Provides Wholesale Number Portability Services*, Advanced Intelligent Network News, Oct. 29, 1997 (*quoting* Illuminet's Senior Product Manager, WIN Services, G. Christensen).

[9] *See, e.g., Application of WorldCom, Inc. and MCI Communications Corp. for Transfer of Control of MCI Communications Corp. to WorldCom Inc.*, Memorandum Opinion and Order, 13 FCC Rcd 18025, 18061 ¶ 60 ("We disagree with GTE's claim that the new firms [e.g., Qwest, IXC Williams, Level 3] will be unable to deploy signaling equipment for years. Applicants identify several companies, including Transaction Network Services, Inc., GTE Intelligent Network Services, and SNET, that provide wholesale signaling services.").

Table 1: Competitive Signaling and Database Providers	
AT&T	22 STPs located in: Birmingham, AL; Phoenix, AZ; Sacramento, CA; Anaheim, CA; Denver, CO; Jacksonville, FL; Atlanta, GA; Chicago, IL; Louisville, KY; St Louis, MO; Kansas City, MO; Jackson, MS; Greensboro, NC; Freehold, NJ; Manhattan, NY; White Plains, NY; Cleveland, OH; Oklahoma City, OK; Philadelphia, PA; Pittsburgh, PA; Dallas, TX; Arlington, VA
CenturyTel	CenturyTel recently purchased two pairs of STPs that is using to "to provide connectivity between all its SS7 transfer points and to provide gateways to other networks."
GLOBAL NAPs	"Global NAPs also maintains its own SS-7 network."
GST	GST has deployed STPs in "three western U.S. cities," and has stated that "[w]ith our own SS7 network, we are reducing our reliance on third parties..." It expects "to have the remainder of its 15 major markets on-line by the end of June 1999."
GTE INS	GTE-INS is "a leading supplier of SS7 hubbing and transport services to competitive local exchange carriers, inter-exchange carriers, RBOCs and wireless providers."
ICG	4 STPs located in: Cleveland, OH; Columbus, OH; Denver, CO; Englewood, CO
Intermedia	4 STPs located in: Chicago, IL; Dallas, TX; Orlando, FL; Tampa, FL
MCI Worldcom	12 STPs located in: Fort Lauderdale, FL; Jersey City, NJ; New York, NY; San Francisco, CA; Los Angeles, CA; Chicago, IL; Atlanta, GA; Reston, VA; Southfield, MI; Maryland Heights, MO; Newark, NJ; Dallas, TX
SBC/SNET	SBC/SNET's Network Services division "helps growing providers expand into new markets. . . . We can even help turn a company with no network and no experience into a viable, profitable telecommunications provider."
UniversalCom, Inc.	STP located in: Destin, FL
US LEC	STPs in Charlotte and Virginia Beach US LEC Executive Vice President of Engineering David Conner: "US LEC will no longer depend on other SS7 vendors to connect to the National SS7 network."
Sources: See Appendix C.	

Illuminet claims to operate "the largest independently-owned [SS7] network in the United States."[10] It provides "connectivity to all RBOC LATAs, GTE, Sprint LTD and other carriers."[11] It offers "advanced signaling network technology and enhanced applications, including local number portability, wireless fraud management, SS7 network usage measurement and billing services,"[12] as well as access to LIDBs "throughout the United States."[13] CLECs may access Illuminet's network through a single connection: "One connection to Illuminet does it all; you won't have to negotiate separate connectivity arrangements."[14] It advertises that carriers may "[c]hoose an access

[10] Illuminet web site, http://www.illuminetss7.com/wireless/wi-ISUP.htm.

[11] *Id.*

[12] Cisco, *Cisco and Illuminet Team to Deliver SS7 Solution for Advanced IP Network Access*, Feb. 22, 1999, http://www.cisco.com/warp/public/146/february99/20.html.

[13] Illuminet, *LIDB Access and Transport*, http://www. Illuminetss7.com/eedc

[14] Illuminet, *Illuminet Products and Services, Network Connectivity*, http://www.illuminetss7.com/textonly/prod_txt/loc_txt/_lonetco.htm.

point closest to your switch(es); we offer access via 11 STP pairs located throughout the country."[15]

TNS likewise operates a "national SS7 network" that enables carriers "to complete calls and retrieve accurate information for billing and back office support."[16] It operates STPs in Washington, D.C., and Kansas City, MO that are "interconnected to the SS7 networks provided by the Regional Bell Operating Companies (RBOCs), SNET, ITN, GTE, and United Telephone."[17] TNS advertises itself as a "single gateway to all available LEC data centers, so you only have to manage one connection to TNS instead of custom connections to each LEC."[18] TNS provides "comprehensive SS7 network transport services," access to LIDBs, customized database products, and Local Number Portability.[19]

TNS and Illuminet both serve the CLEC market. Equally significantly, Illuminet's origins illustrate how easily small LECs can provide their own signaling, rather than rely on signaling provided by larger incumbents. The company was actually formed by the merger of two other – US Intelco and ITN – that were themselves established to deploy nationwide SS7 networks for independent telcos, to free those independent ILECs from having to rely on the signaling networks of adjacent BOCs and GTE.[20]

Two other independent ILECs have already made the same transition: first they built up SS7 networks to serve their own needs, then they began selling signaling services to other LECs that lacked signaling networks of their own. Under its own 1984 consent decree, GTE initially faced the prospect of having to deploy 101 STP pairs, one in every LATA GTE serves. But the company persuaded Judge Greene in 1992 that it should be permitted to deploy just 9, instead.[21] GTE then immediately formed a new subsidiary,

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[15] Illuminet, *Illuminet Products and Services, LIDB Access and Transport*, http://www.illuminetss7.com/textonly/prod_txt/loc_txt/_lolidb.htm. "Illuminet operates Gateway Signal Transfer Points (STPs) in Mattoon, IL; Rock Hill, SC; Las Vegas, NV; and Olympia, WA. In addition, eight Regional STP pairs and numerous Signaling Points of Interconnection, geographically dispersed throughout the United States, provide additional access points." Illuminet, Illuminet Products and Services, Network Connectivity, http://www.illuminetss7.com/textonly/prod_txt/loc_txt/_lonetco.htm.

[16] *SS7 Vendor Gears Up For Illinois Number Pooling Trial*, Communications Today, Jan. 12, 1999.

[17] Transaction Network Services, *Products and Services, SS7 Network Services*, http://www.tnsi.com/.

[18] Transaction Network Services, *Products and Services, LEConnect Data Services*, http://www.tnsi.com/. "This makes the entire process easier and much more cost effective for you. Plus, you won't need the extra resources necessary to manage your own links to the LECs. TNS does it all for you. Our nationwide facilities have connections into each of the LEC data centers established specifically for these applications." *Id.*

[19] Transaction Network Services, *Products and Services, Local Number Portability Services*, http://www.tnsi.com/.

[20] *See* Illuminet, *Corporate History*, http://www. Illuminetss7.com/about/history.htm.

[21] *United States v. GTE Corp.*, No. 83-1298 (D.D.C. March 26, 1992).

Intelligent Network Services (INS), to provide nationwide SS7 and database services to other carriers. Today, GTE-INS is "a leading supplier of SS7 hubbing and transport services to competitive local exchange carriers, inter-exchange carriers, RBOCs and wireless providers."[22]

SNET, which became a subsidiary of SBC in 1998, was never subject to the Bell divestiture decree. SNET built up its own nationwide SS7 and database network beginning in 1991.[23] Today SBC/SNET offers signaling services on a wholesale basis to "interexchange carriers (IXC's), incumbent local exchange carriers (ILEC's), competitive local exchange carriers (CLEC's) and switch-less resellers."[24] SBC/SNET's Network Services division "helps growing providers expand into new markets. . . . We can even help turn a company with no network and no experience into a viable, profitable telecommunications provider."[25]

In sum, there are at least six major facilities-based SS7 network providers (AT&T, MCI WorldCom, Illuminet, TNS, GTE-INS, and SBC/SNET) that operate nationwide networks, plus at least four other mid-sized CLECs (GST, ICG, Intermedia, and US LEC) that operate regional SS7 networks. Two of the national competitors are backed by AT&T and MCI WorldCom; two more are backed by GTE and SBC/SNET; a fifth (Illuminet) is supported by a consortium of smaller, independent ILECs.

Finally, there are no significant entry barriers to additional entry in the national signaling market. As noted above, STPs and databases have very large geographic footprints. No CLEC needs to replicate the ILEC architecture to provide ubiquitous signaling and database services. Signaling equipment is readily available from a variety of competitive suppliers, including Nortel, Lucent, Alcatel, Tekelec, and ADC. Tekelec has designed an STP – the Eagle – with CLECs' needs in mind – it is "smaller, less costly, and arguably . . . more flexible," than other leading STPs.[26] CLECs US LEC, and CenturyTel have purchased the Eagle.[27] As one industry observer noted in 1997, "[t]he SS7 market has shifted from traditional LECs that built out large SS7 networks exclusively for basic call signaling functions to facilities-based CLECs that are building out highly advanced networks from scratch."[28]

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[22] GTE Intelligent Network Services, *SS7 Overview*, http://www.gteins.net/overview.htm.

[23] *See* B. Massick et al., *Company Report-Southern New England Telecommunications*, Report No. 1124711 at *8, Jun. 14, 1991.

[24] SNET, *About SNET: Wholesale Network Services*, http://204.60.166.5/snetcom/about/corp/cowhol.htm.

[25] *Id.*

[26] The Robinson-Humphrey Company, Inc., Investext Rpt. No. 1891928, *Network Equipment Portfolio - Industry Report*, at *3 (May 29, 1997).

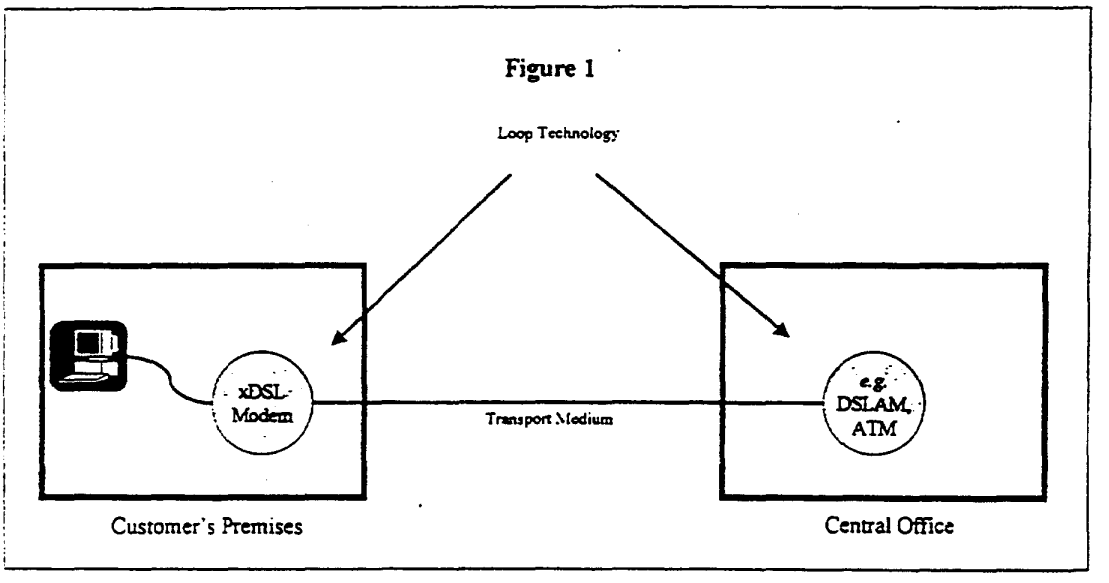
[27] *See* Tekelec Press Release, *US LEC Purchases STP from Tekelec*, Apr. 26, 1999; Tekelec Press Release, *Century Tel Selects Eagle STP*, Feb. 22, 1999.

[28] D. O'Shea, *The Network That's Never Done: SS7 Networks Have Become Pervasive Enough That Some Carriers No Longer View Them As An Investment Priority. But A New Wave of Applications and Competitors will Challenge This Notion; Transmission Special*, Telephony, Sept. 15, 1997.

VI. ADVANCED SERVICES INFRASTRUCTURE

The FCC has designated 200 kbps as the threshold of "advanced" or "broadband" services. This speed "is enough to provide the most popular forms of broadband – to change web pages as fast as one can flip through the pages of a book and to transmit full-motion video."[1] "Advanced" digital services are thus 10 to 100 times faster than those available in the past over dial-up telephone lines. Traditional telephone plant is "not ideally suited for broadband."[2] Existing copper loops are "not broad or fast enough to be called 'advanced.'"[3]

As with all other telecommunications services, the provision of high-speed services requires both equipment – modems, routers, and radios – and a transport medium – a phone line, a cable, or a spectrum band in the airwaves. The equipment is often referred to as "loop technology," a somewhat confusing term in that it appears to refer to the copper wire itself, but in fact refers to the electronics (the "technology") plugged in at either end. *See* Figure 1.



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[1] *Inquiry Concerning the Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion, and Possible Steps to Accelerate Such Deployment Pursuant to Section 706 of the Telecommunications Act of 1996*, Report, CC Docket No. 98-146, ¶ 20 (rel. Feb. 2, 1999) ("*Advanced Services Report*").

[2] *Id.* ¶ 46.

[3] *Inquiry Concerning the Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion, and Possible Steps to Accelerate Such Deployment Pursuant to Section 706 of the Telecommunications Act of 1996*, Notice of Inquiry ¶ 3, CC Docket No. 98-146 (rel. Aug. 7, 1998) ("*Advanced Services NOI*").

The Commission has indicated its intention to craft new UNEs out of both the equipment[4] and the transport medium that ILECs use to provide high-speed services.[5] In addition, the Commission has declared its intent to require "spectrum unbundling" or "line sharing."[6] In effect, the plan is to carve out a new UNE not in the physical space defined by the loop, but out of the bandwidth that the loop is able to deliver. A CLEC would thus be able to sell to customers high-speed data service over the same wire that the ILEC used to provide voice service, or vice versa. Two (or more) independent, competing providers could end up delivering distinct and possibly competing services over a single wire to a single home.[7]

High-speed services use the old transport media – wires, cables, and the airwaves – though with landline media, significant upgrading is often required. For both landline and wireless services, virtually all the equipment is new. None of it is required for ordinary voice, cable, or radio services. The technology in question was only very recently developed. Industry standards for the equipment – the catalyst for widespread consumer acceptance and deployment – have emerged only recently, and some are still under negotiation. *See* Table 1. Moreover, the technology has evolved on about the same timetable for phone lines, cable, and wireless media. As the FCC has acknowledged, no single medium starts with a history as the incumbent or monopoly provider.[8] Incumbent LECs are new entrants, like every other provider in the market. *Compare* Map 1 *with* Map 2.

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[4] The Commission declares that "the facilities and equipment used to provide advanced services are network elements subject to the obligations in section 251(c)." *First Advanced Services Order* ¶ 57. The Commission has sought further comment on the specific unbundling obligations that should apply. *See id.* ¶¶ 58, 167-184.

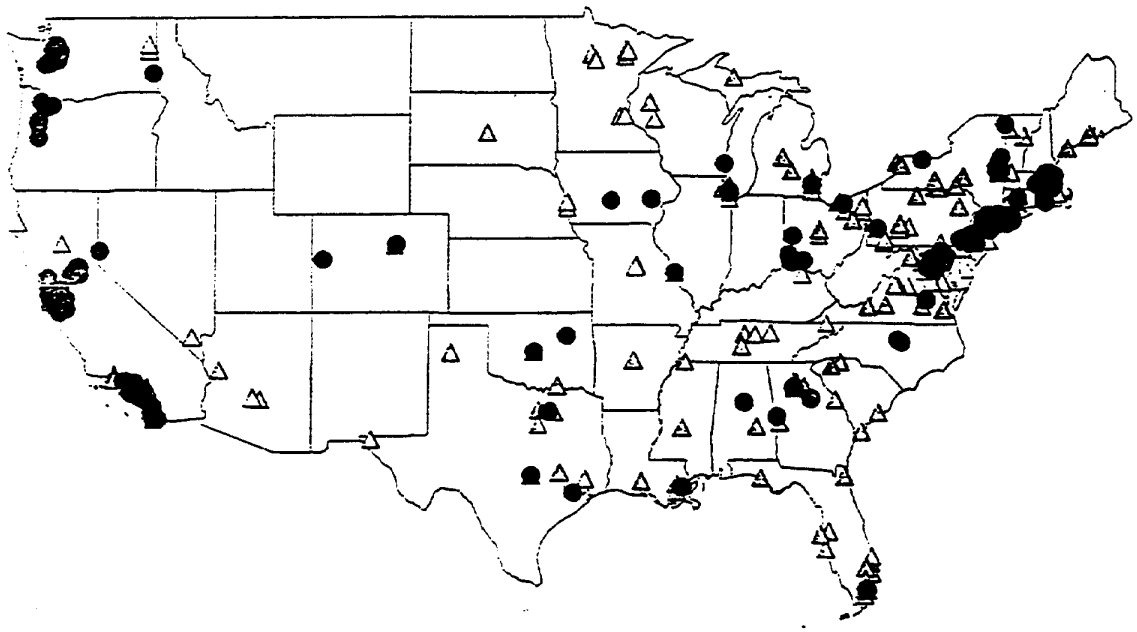
[5] The Commission has concluded that ILECs must "provide unbundled loops capable of transporting high speed digital signals." *Id.* ¶ 52. The Commission has further directed that, "[t]o the extent technically feasible, incumbent LECs must 'take affirmative steps to condition existing loop facilities to enable requesting carriers to provide services not currently provided over such facilities.'" *Id.* ¶ 53.

[6] *See Deployment of Wireline Services Offering Advanced Telecommunications Capability*, First Report and Order and Further Notice of Proposed Rulemaking, ¶¶ 8, 78-107, CC Docket No. 98-147 (rel. Mar. 31, 1999) ("*Second Advanced Services Order*").

[7] The Commission "tentatively concluded that [it has] authority to require line sharing." *Id.* ¶ 98. It also sought comment "on operational, pricing, and policy ramifications to determine whether or not to mandate line sharing nationally." *Id.* ¶ 8.

[8] *See, e.g.*, *Advanced Services Report* ¶ 48 ("The preconditions for monopoly appear absent" in the "last mile" of the advanced services market); *id.* ("[N]o competitor has a large embedded base of paying residential consumers" and there is no "indicat[ion] that the consumer market is inherently a natural monopoly.").

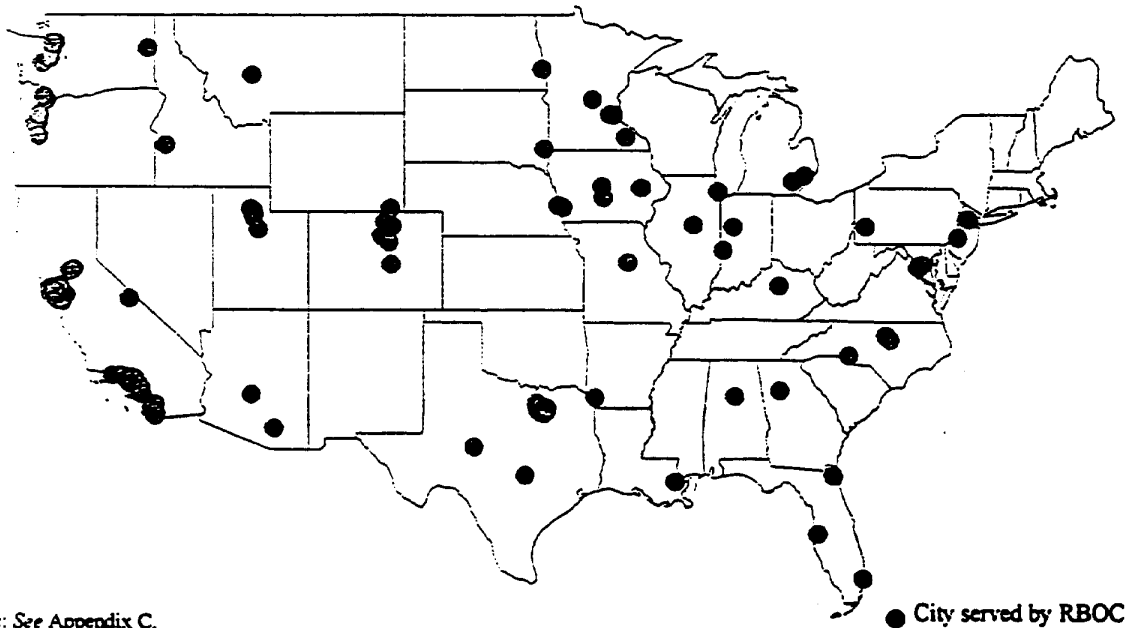
Map 1. CLEC xDSL and Cable Modem Deployment



Sources: *See* Tables 2, 6 & 7, *infra*.

● City served by CLEC xDSL △ City served by cable modem

Map 2. RBOC and GTE xDSL Deployment



Sources: *See* Appendix C.

● City served by RBOC or GTE xDSL

Table 1. Introduction Dates for Advanced Service Alternatives				
Technology		Date First Trials Began	Date of Commercial Availability	Date Standard Set
Cable Modem		Dec. 1993 (Cox) Dec. 1993 (Continental)	June 1996 (TCI) Sept. 1996 (Time Warner)	Mar. 1998 (DOCSIS 1.1)
XDSL		Jan. 1996 (Pacific Bell) Feb. 1996 (GTE) Oct. 1996 (Ameritech)	June 1997 (ioCom) Oct. 1997 (U S WEST) Nov. 1997 (Concentric)	Oct. 1998 (preliminary ITU approval of G-Lite) June 1999 (formal approval scheduled)
Satellite		Nov. 1994 (DirecPC)	Apr. 1995 (DirecPC)	N/A
Fixed Terrestrial Wireless	38 GHz	Sept. 1994 (WinStar) June 1998 (ART)	Mar. 1995 (WinStar) Sept. 1998 (ART)	N/A
	28 GHz	Apr. 1998 (WinStar)	Dec. 1998 (WinStar)	N/A
	24 GHz	Oct. 1997 (Teligent)	Sept. 1998 (Teligent)	N/A
	LMDS	June 1996 (est.) (CellularVision)	Apr. 1997 (CellularVision)	N/A
Sources: See Appendix C.				

In traditional areas of service, ILECs begin with commanding market positions created, in large part, by past regulatory policies that favored a single monopoly provider. But the opposite holds for advanced services – here, regulatory policy has favored competitors for as long as such services have been offered. CLECs may form alliances with long-distance carriers and Internet backbone providers – an essential edge in the business – while the Bell Company ILECs remain subject to the strictures of section 271. Cable operators may enter similar relationships, and have already done so. Broadband wireless carriers and satellite operators have likewise entered into strategic partnerships. Generally free of significant regulatory restraint, these competitors have all been able to secure ample financing for their endeavors.

A. Alternative Media

The Commission has already concluded that the advanced services market is technologically heterogeneous, it "accommodate[s] different technologies such as DSL, cable modems, utility fiber to the home, satellite, and terrestrial radio."[9] "Numerous companies in virtually all segments of the communications industry are starting to deploy, or plan to deploy in the near future, broadband to the consumer market."[10] Other providers, using other media, have already invested tens of billions of dollars in broadband facilities,[11] including enormous investment in the deployment of facilities that serve the "last mile" to the home.[12] Non-phone-

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[9] *Advanced Services Report* ¶ 48.

[10] *Id.* ¶ 12.

[11] *See id.* ¶ 35 (". . . publicly available data show that many companies in virtually all segments of the communications industry have made tens of billions of dollars of investment in broadband facilities.").

[12] *See id.* ¶¶ 34.

company providers, including cable companies, electric utilities, and wireless cable companies are further along in last-mile deployment of broadband than ILECs.[13]

> The fact[] that different companies are using different technologies to bring broadband to residential customers and that each existing broadband technology has advantages and disadvantages as a means of delivery to millions of customers opens the possibility of intermodal competition, like that between trucks, trains, and planes in transportation. By the standards of traditional residential telecommunications, there are, or likely will soon be, a large number of actual participants and potential entrants in this market.[14]

1. Cable. The FCC recognizes that "[t]he most popular offering of broadband to residential customers is via 'cable modems' offered by cable television companies within their cable service territories."[15] "The cable industry's broadband platform makes cable an optimal medium for transmitting large amounts of digital information – data, graphics, and video – at high speeds."[16] Thus, "[f]or many, perhaps most, American citizens, their first opportunity to obtain high bandwidth Internet access will be through cable systems."[17] "[C]able modems have clearly taken the early lead in the race to become the residential broadband modem technology of choice in the United States."[18]

One-third to one-half of all cable networks already support two-way service, or will very soon.[19] High-speed Internet access is available from cable operators to more than 20 million homes, or roughly 20 percent of the U.S. market.[20] More than 50 companies have deployed commercial cable modem services; cable modems are available in more than 100 local markets,

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[13] *See id.* ¶¶ 53-58.

[14] *Id.* ¶ 48 (footnotes omitted); *see also id.* ¶ 48 n.46 ("[O]ne of the most attractive prospects that broadband creates is the blurring of previously distinct regulatory categories and the blending of old monopolies and oligopolies into a competitive 'broadband market'").

[15] *Id.* ¶ 54.

[16] B. Esbin, Office of Plans and Policy, FCC, *Internet Over Cable: Defining the Future in Terms of the Past* at 76, OPP Working Paper No. 30 (Aug. 1998).

[17] Petition to Deny of Consumers Union, Consumer Federation of America, and Office of Communication, Inc. of the United Church of Christ at 11, *Joint Application of AT&T Corp. and Tele-Communications, Inc. for Approval of Transfer of Control of Commission Licenses and Authorizations*, CS Docket No. 98-178 (FCC filed Oct. 29, 1998).

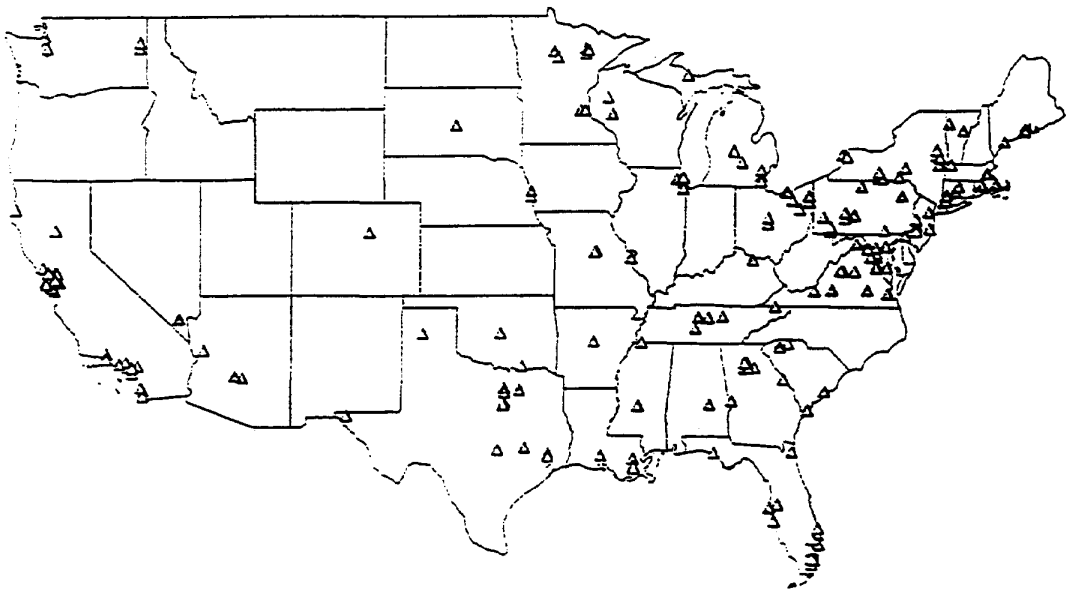
[18] Statement of Henry Samueli, Broadcom Corporation, in K. Fong, et al., *Hambrecht & Quist, Inc. Communications Symposium/Data Processing/Telecom. (Transcript) Industry Report*, Rpt. No. 2658327, April 16, 1998, at *11.

[19] *See Annual Assessment of the Status of Competition in the Market for the Deliver of Video Programming*, Third Annual Report, 12 FCC Rcd 4358, 4442 ¶ 172 (1997) (*citing* The Yankee Group).

[20] *See* Cable Datacom News, *Cable Modem Market Stats and Projections*, http://cabledatacomnews.com/cmic16.htm.

including 25 of the top 30 MSAs.[21] TCI, Comcast, and Cox – the largest, third largest, and sixth largest MSOs, respectively, have partnered to create @Home, which offers cable modem service to over 13 million homes.[22] Road Runner, a partnership between Time Warner (the second largest MSO) and MediaOne (fourth largest), offers cable modem service to 8 million homes.[23] *See* Map 3 & Table 2.

Map 3. Cable Modem Deployment



Source: *See* Table 2, *infra*.

△ City served by cable modem

[21] *See* Cable Datacom News, *Commercial Cable Modem Launches in North America*, http://cabledatacomnews.com/cmic/cmic7.html.

[22] *See* @Home Press Release, *@Home Network Reports Fourth Quarter and 1998 Results*, Jan. 20, 1999; @Home Press Release, *@Home Network Reports Subscriber Base Grows to 50,000, Upgraded Homes Passed Increases to 4.5 Million*, Jan. 20, 1998.

[23] *See* Road Runner Press Release, *Road Runner Races Past 250,000 Customer Milestone*, Apr. 6, 1999.

Table 2. Cable Modem Deployment	
Cable MSO	**Franchise Area Served**
21st Century	Chicago IL
Adelphia Cable	Coudersport PA, Plymouth MA, North Adams MA, Toms River NJ, Pittsburgh PA, Philadelphia PA, Buffalo NY, Niagara NY, Western Reserve OH, Dade County FL, Boca Raton FL, Delray Beach FL, Wellington FL, Palm Beach Gardens FL, West Palm Beach FL, Stuart FL, Burlington VT, Charlottesville VA, Waynesboro VA, Staunton VA, Winchester VA, Blacksburg VA, Hilton Head SC
Advanced Cable Communications	Coral Springs FL
Armstrong Cable Services	Connellsville PA
Avenue Cable TV	Ventura CA
Bresnan Communications	Marquette MI, Northwoods MI, Lake Superior MI, Dickinson MI, Escanaba MI, Manistique MI, Bay City MI, Midland MI, Duluth MN, Mankato MN, Marshall MN, Madison WI
CableAmerica	Mesa AR
Cable Communications Co-op	Palo Alto CA
Cable TV Arlington	Arlington VA
Cable TV Montgomery	Montgomery County MD
Cable York	York PA
Cablecomm	Johnstown PA
Cablevision of Lake Havasu	Lake Havasu City AZ
Cablevision of Lake Travis	Lake Travis TX
Cablevision of Loudoun	Loudoun County VA
Cablevision Systems	Oyster Bay NY, Westport CT
Capitol Cable	Columbia County MO, Boone County MO
Century Communications	Norwich NY
Chambers Cable	Chico CA
Charter Communications	St. Louis MO, Riverside CA, Pasadena CA, Newtown CT, Henry Co. GA, LaGrange GA, Newnan GA, Lanett AL
Coast Cablevision	San Mateo CA
Coaxial Communications	Columbus OH
Comcast	Baltimore MD, Sarasota FL, Union County NJ, Detroit MI, Philadelphia PA, Orange County CA, Chesterfield VA, Atlanta GA
CommuniComm Services	Durant OK
Conway Corp.	Conway AR
Cox Communications	Orange County CA, Omaha NE, Newport News VA, Oklahoma City OK, Providence RI, San Diego CA, Phoenix AZ, Meriden CT, Kenner LA, Algiers LA, Las Vegas NV, Eureka CA
Daniels Cablevision	Encinitas CA
FrontierVision	Camden ME, Rockland ME
GCI	Anchorage AK
Genesis Cable	Winder GA
Helicon Corp.	Uniontown PA, Barre VT
Hibbing Cable TV	Hibbing MN
Horizon Cable	Central Mohican MI, Point Reyes CA
InterMedia Partners	Nashville TN, Greenville SC, Spartanburg SC, Kingsport TN
Jones Intercable	Alexandria VA, Prince William County VA
Kingwood Cable	Kingwood TX
Knology Holdings	Augusta GA, Columbus GA, Charleston SC, Montgomery AL, Panama City FL
Limestone Cable	Maysville KY
Marcus Cable	Highland Park TX, University Park TX, Eau Claire, WI, Rice Lake WI
Marix Cable	Los Gatos CA
Media General Cable	Falls Church VA, Vienna VA, Merrifield VA, Fairfax VA
MediaOne	Boston MA, Detroit MI, Los Angeles CA, Atlanta GA, Chicago IL, Chestnut Hill MA, Jacksonville FL, Broward County FL, Dade County FL, Minneapolis MN, St. Paul MN, Avon Lake OH, Bay Village OH
Metro Cable	Philadelphia PA
Midcontinent Cable	South Dakota SD
Midwest Communications	Bemidji MN, Cass Lake MN
Palo Alto Cable Co-op	Palo Alto CA
Ponderosa Cable	Danville CA
Prestige Cable	Forsyth County GA
Prime Cable	Chicago IL
Range TV Cable	Hibbing MN, Chisholm MN
Rankin Cable	Rankin County MS
Rifkin & Associates	Miami Beach FL, Gwinnett County GA, Bedford VA, Cookville TN, Columbia TN, Lebanon TN
San Bruno Municipal Cable	San Bruno CA
Service Electric and Blue Ridge Cable	Eastern Pennsylvania PA
Suburban Cable	New Castle DE
Sun Country Cable	Los Altos CA, Spokane WA
TCA	Amarillo TX, Bryant TX, College Station TX, Lafayette LA
TCI	Alameda CA, Antioch CA, Castro Valley CA, Dublin CA, Fremont CA, Hercules CA, Livermore CA, Petaluma CA, Pinole CA, Pittsburg CA, Pleasanton CA, San Ramon CA, Hartford CT, Aurora CO, McKeesport PA, Garland TX, McKinney TX, Stonebridge TX, Arlington Heights IL, Seattle WA, Spokane WA, East Lansing MI
Time Warner Cable	Akron OH, Columbus OH, Youngstown OH, Binghamton NY, Corning NY, Elmira NY, San Diego CA, Tampa Bay FL, Oahu HI, Memphis TN, Austin TX, Portland ME, El Paso TX, Albany NY, Troy NY, Saratoga NY
TW Fanch	Altoona PA, Johnstown PA
Verto Communications	Dickson City PA, Scranton PA, Taylor PA, Old Forge PA, Throop PA
Western Shore Cable	St Mary's County MD, King George's County MD
WestStar	Half Moon Bay CA, Monterey CA
Sources: See Appendix C.	

Cable operators are rapidly expanding their cable modem deployment. High-speed Internet access will be available to 30 million homes by the end of 1999.[24] According to one estimate cited by the FCC, 63 percent of all cable systems will be broadband-ready by 2001.[25] An estimated 13 million cable modems will be deployed in the next three years.[26] @Home is projected to reach 60 million homes within the next 5 years.[27] Road Runner plans to reach 20-30 million homes nationwide by year-end 1999.[28] Cable already accounts for fully 80 percent of the over 900,000 U.S. high-speed internet users.[29]

Cable operators are well financed and enjoy economies of scope and scale fully comparable to the ILECs.[30] Before AT&T's recent acquisitions of TCI and MediaOne, the seven largest cable MSOs[31] served over 60 percent of all U.S. households.[32] Now AT&T alone controls cable facilities that pass some 28 million or roughly 27 percent of all U.S. homes, and it has significant ownership interests in cable systems (Time Warner Cable 25%; Cablevision 33%; Bresnan Cable 49%; Falcon Cable 46%; Kansas City Cable 50%; Susquehanna Cable 30%) that pass an additional 29 million homes or roughly 29 percent of all U.S. homes. In 1997, the cable industry spent $6 billion on the deployment of two-way broadband via high-speed cable modems.[33] The pace of new investment in the industry has since accelerated. The investments are backed by very large and wealthy companies, including AT&T, Comcast, Microsoft, and

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[24] *See* J.J. Bellace, et al., Merrill Lynch Capital Markets, Investext Rpt. No. 2706388, Wireline Communications Equipment – Industry Report at *1 (June 22, 1998). DSL, by comparison, is estimated to serve 750,000 to 1 million lines by this time. *Id. See also* A. Breznik, *High-Speed Data Player Set to Compete: Suburban Market Become a New Focus For Data Service Providers*, Cable World, Dec. 7, 1998.

[25] *See Advanced Services Report* ¶ 37 (*citing* Allied Business Intelligence Press Release, www.alliedworld.com at CATV98.pdf release).

[26] *See High Speed Internet Access to Reach 16 Million U.S. Households by 2002, According to Forrester*, Business Wire, Sept. 1, 1998 (predicting cable modems will capture 80 percent of the high-speed market). *But see Study Sees Cable Modem Deployments Surpassing ADSL Installations by 2003*, Broadband Networking News, Aug. 4, 1998 (estimating 10 million cable modem users by 2003).

[27] *See* A. Harmon, *Excite and At Home Confirm $6.7 Billion Merger*, New York Times, Jan. 20, 1999, at C-1; M. Clothier, *Internet Marriage: Connection and Content*, Atlanta Journal and Constitution, Jan. 20, 1999, at 4D.

[28] *See* Road Runner Press Release, *Road Runner Races Past 250,000 Customer Milestone*, Apr. 6, 1999.

[29] *See The Battle for the Last Mile*, The Economist, May 1-7, 1999, p. 59.

[30] After announcing a proposed $60 billion merger with MediaOne, Comcast president Brian Roberts stated "The new company will have the size and scope to lead the evolving broadband environment." Comcast Press Release, *Comcast and MediaOne Announce $60 Billion Merger*, Mar. 22, 1999.

[31] TCI, Time Warner, MediaOne, Comcast, Cablevision Systems, Cox, and Adelphia.

[32] *See NCTA Cable Television Developments* at 13 (*citing* Kagan Associates).

[33] *See* S. Shapiro, et al., Deutsche Morgan Grenfell Inc., Investext Rpt. No. 1964154, *Modems – Industry Report* at *3 (Aug. 27, 1997) ("[W]hat is often overlooked is that several operators have been upgrading their networks diligently for the past three, four, and five years, and a great deal of this money has already been spent.").

Compaq.[34] Microsoft has invested $1 billion in Comcast, and is reportedly considering similar investments in other cable companies.[35] *See* Table 3.

Cable operators are free to ally with the major equipment vendors, long-distance carriers, and Internet backbone providers, and have done so aggressively. They have forged broad alliances with three main equipment vendors – General Instruments, Scientific-Atlanta, and Motorola.[36] @Home has signed exclusive distribution contracts with TCI, Comcast, Cox, and 16 other cable companies.[37] Together, @Home's current owners and affiliates pass 50 million U.S. homes, or just under half of all homes passed by cable in the country. AT&T, which has purchased TCI, and with it, TCI's 71 percent voting interest in @Home, brings a major Internet backbone network and additional local conduit to the venture.[38] AT&T's purchase of MediaOne gives it co-control of Road Runner.[39] AT&T expects to conclude negotiations with both Comcast and Time Warner next year to provide cable telephony over their systems.

Cable is thus positioned to emerge as a fully independent, facilities-based provider of high-speed Internet access services. A significant number of observers predict that cable will be dominant – that it will stay out ahead of broadband alternatives offered over wireless media or copper loop.[40] One study projects that deployment of high-speed cable modems will substantially outpace deployment of DSL over the next four years.[41]

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[34] *See Advanced Services Report* ¶ 37.

[35] *See* A. Gould, et al., Oppenheimer & Co., Inc., Report No. 2562652, *Media Stocks: Cable Stocks Reconsidered – Industry Report*, at 2 (Jul. 3, 1997).

[36] *See* Cable Datacom News, *Commercial Cable Modem Launches in North America*, Apr. 6, 1999, http://www.cabledatacomnews.com/cmic/cmic7.html.

[37] *See* @Home Network, *Partnerships*, http://www.home.net/about/partnerships.html.

[38] Some small technical changes are occurring related to the management practices of @Home's board, however, AT&T remains the largest stakeholder with 71% of the company and 3 board seats. *See* L. Cauley & S. Swisher, *AT&T May Give Up Some Control Of At Home Due to Missed Targets*, The Wall Street Journal Interactive Edition, Apr. 8, 1999.

[39] P. Farhi, *AT&T Poised to Regain Long Reach, Via Cable*, Washington Post, May 6, 1999, at A1.

[40] *See, e.g.*, D.H. Leibowitz, Donaldson, Lufkin & Jenrette Securities, Investext Report No. 2815791, *Media and Communications Statistics/November Review: Global – Industry Report* at *52 (Dec. 17, 1998) (cable has the "first mover advantage"); D.H. Leibowitz, Donaldson, Lufkin & Jenrette Securities, Investext Report No. 2771430, *Media and Entertainment – Industry Report* at *19 (Sept. 23, 1998) (cable is in a "superior near-term and long-term position" . . . "cable overwhelmingly wins out technologically because of the inherent bandwidth advantages of its broadband pipe under the HFC (hybrid fiber/coax) architecture versus the RBOCs' narrowband copper wiring."); C.P. Dixon, et al., PaineWebber, Inc., @ Home/Transcript, Company Report, Rpt. No. 3330831, Feb. 26, 1998, at *8-9 ("[I]f you just look at the inherent physics of the cable versus the telephone, the cable is anywhere from five to 50 times faster.").

[41] *See Study Sees Cable Modem Deployments Surpassing ADSL Installations by 2003*, Broadband Networking News, Aug. 4, 1998 (citing study by Forward Concepts).

Table 3. Cable: Strategic Partners and Resources			
Company	**Equipment Partners**	**Other Strategic Partners**	**Access to Capital**
Adelphia Communications	Scientific-Atlanta: advanced digital set-top terminals General Instrument: cable modems	@Home affiliate 69% ownership of Hyperion IXC Corp.: 3-year agreement to resell long-distance service	Scripps has invested about $60 million to upgrade systems. Scheduled sale of $750 million in stock.
CableVision	Oracle Corp: $23 million, 4-year deal for software Bay Networks, 3Com: cable modems	@Home affiliate	Subsidiary of Cablevision Systems Corp., with $3.3 billion in 1998 revenues
Century Communications	General Instrument Corp: digital set-tops CSG Systems Inc: billing graphics and messaging management services Digital Equipment: cable modems	@Home affiliate TCI: partnership to consolidate Southern California cable systems	Pending acquisition by Adelphia Comm. for $5.2 billion
Comcast	Scientific-Atlanta: digital set-tops Comcast Cable will be the first cable operator to use SURFboard cable modems to provide @Home service to subscribers.	@Home partner AT&T: Negotiations underway for AT&T to offer telephony services over Comcast's cable network	Microsoft has taken a $1 billion stake in the cable company.
Cox Communications	Ericsson: developing a device to control a consumer's high-speed data, telephony, and cable television service Nortel: $65 million agreement for switches and other equipment Bay Networks: cable modems	@Home partner Frontier: long-distance service to be offered through a 5-year, co-marketing deal CyberSmart and AMP Inc.: partnership to offer data, video and voice services R&B Comm.: formation of FiberTel to offer voice, video and high-speed data comm.	$1.8 billion in 1998 revenues
Fanch Cable	Com21: cable modems Zenith, 3Com: cable modems	Road Runner affiliate Time Warner: joint venture to expand cable systems	
Jones Intercable	Hybrid Networks: advanced headend systems and cable modems	@Home affiliate AT&T: agreement to install nearly 50 route miles of fiber optic cable in several Chicago suburbs that AT&T will lease and use to provide local and long-distance service to customers	Equity investment by Bell Canada. Controlling interest recently acquired by Comcast.
Suburban Cable	Bay Networks, 3Com: cable modems	@Home affiliate	Subsidiary of Lenfest Comm., with $459 million in 1998 revenues
Marcus Cable	Com21, Nortel: cable modems	@Home affiliate	Purchased by Microsoft's Paul Allen for $2.8 billion. Soon to be integrated with Charter Comm., purchased by Mr. Allen for $4.4 billion.
Media General Cable	Toshiba, Motorola: cable modems	Road Runner affiliate	Subsidiary of Media General Comm., with $974 million in 1998 revenues.
MediaOne	Philips Electronics: digital set-top boxes Cisco Systems: internetworking solutions Bay Networks, NextLevel: cable modems	Road Runner partner Time Warner: joint venture for digital services. @home partner through acquisition by AT&T.	AT&T acquiring MediaOne for $58 billion. Microsoft $5 billion investment in AT&T.
Midcontinent Cable	Nortel: cable modems	@Home affiliate	
Multimedia Cablevision	Toshiba, Motorola: cable modems	Road Runner affiliate	Subsidiary of Gannett Co., with over $5 billion in 1998 revenues
TCI	Sony: advanced digital set-top devices General Instrument: digital cable set-top boxes Motorola, 3Com, Nortel: cable modems	@Home affiliate AT&T: merger enables AT&T to provide digital telephony and data services with digital video services	Acquired by AT&T for $48 billion Microsoft $5 billion in vestment in AT&T
Time Warner Cable	Toshiba: cable modems Motorola: CyberSURFR cable modems	Road Runner partner AT&T: Pending 20-year cable telephony deal	Subsidiary of Time Warner, with $27 billion in 1998 revenues
Sources: See Appendix C.			

2. Fixed Terrestrial Wireless. As of February 1999, the FCC ranked wireless cable companies ahead of incumbent LECs in the current deployment of broadband facilities that serve the last mile.[42] Fixed wireless providers include providers of LMDS (which operates in the 28/31 GHz band), MMDS (2.1 to 2.7 GHz band), and operators in the 24GHz and 38GHz bands.[43] Fixed wireless can transmit the equivalent of several hundred T-1 lines to a fixed antenna with an unobstructed path.[44]

The three major operational fixed wireless carriers providing advanced services are WinStar, Teligent, and Advanced Radio Telecom. WinStar has an average 750 MHz of spectrum in the 38-GHz band in 60 U.S. markets.[45] It provides wireless broadband service in 30 cities with access rights to 4200 buildings.[46] Teligent has between 320 and 400 MHz of spectrum in the 24-GHz band in 27 of the 35 most populous market areas in the United States.[47] It has networks in service in 26 markets,[48] and has agreements with 2400 buildings.[49] Advanced Radio Telecom provides service in three existing markets – Phoenix AZ, Bellevue, WA, and Portland, OR.[50] The FCC found that "fixed wireless providers such as WinStar and Teligent are also possible providers of broadband in rural areas."[51]

These fixed wireless providers are expanding rapidly, and new providers are quickly emerging. WinStar plans to be fully operational in 60 markets by the end of 2000.[52] It plans to have access to 8000 buildings by the end of 1999.[53] By year end, Teligent expects to offer service in 40 markets across the country.[54] NEXTLINK, started by Craig McCaw, recently purchased 40 LMDS licenses from WNP Communications, covering 105 million points of

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[42] *See Advanced Services Report* ¶¶ 53, 57, 58.

[43] *See id.* at App. A, ¶ 8.

[44] *See* C. Nerney, *Whither the Wireless Dream*, Network World, Mar. 15, 1999, at 41; *see also Advanced Services Report* at App. A, ¶ 7.

[45] *See* WinStar Communications, Inc., Form 10-K, filed Mar. 31, 1999 (Average spectrum in each of the 60 markets in the United States in which WinStar operates or in which it intends to operate by the end of 2000).

[46] *See id.*

[47] *See* Teligent, Inc., Form 10-K, filed Mar. 29, 1999.

[48] *See* Teligent Press Release, *Teligent Debuts Lower-Cost Communications Services for Small and Mid-Sized Businesses in San Diego and Sacramento*, Mar. 30, 1999.

[49] *See* Teligent Press Release, *Teligent Reports 1998 Financial Results, Sets Operating Benchmarks for 1999*, Mar. 1, 1999.

[50] *See* Advanced Radio Telecom, *Service Locations*, http://www.artelecom.com/services/areas/index.html.

[51] *See Advanced Services Report* ¶ 71.

[52] *See* WinStar Communications, Inc., Form 10-K, filed Mar. 31, 1999.

[53] *See* J. Oldham, *The Cutting Edge/Personal Technology; Telecom Talk; Bundle of Discounts for Small Businesses*, Los Angeles Times, Dec. 14, 1998, p. C3.

[54] *See* Teligent Inc., *What's New*, http://www.teligent.com/whatsnew.html.

presence.[55] NEXTLINK plans to develop networks covering a majority of the nation's top 30 markets by the end of 2000.[56]

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[55] *See* M. Mills, *Auctioned Licenses to be Resold for Big Gain*, Washington Post, Jan. 15, 1999.

[56] *See* Nextink Press Release, *NEXTLINK Communications Reports 1998 Financial Results*, Feb. 23, 1999.

Table 4. Wireless Cable: Strategic Partners and Resources			
Company	Equipment Partners	Other Strategic Partners	Access to Capital
LMDS/24GHz/38GHz			
WinStar	Lucent, Nortel, Innova, Hughes Network Systems	Williams Comm.: lease for long-haul services Spieker, Equity, and Cigna: non-exclusive agreements for access to buildings Metromedia Fiber Network: 25-year, $40 million deal for access to fiber network Recently purchased Midcom and PacNet, providers of long-distance and frame relay services, respectively Purchased Internet backbone provider GoodNet AOL: agreement to provide Dun and Bradstreet Reports over the Internet ISP AboveNet: $40 million contract to deliver Internet backbone access GRIC Communications, Inc: provides WinStar's dial-up customers with access to GRIC's Alliance Network POPs Billing Concepts: contract for operations support systems	$2 billion line of credit from Lucent over five years for equipment.
Teligent	Nortel, Hughes	Arden Realty, Spieker Properties, CarrAmerica, U.S. RealTel: agreements for access to nationwide properties PSInet: partnership for Internet access Purchased a $640 million stake in Williams Communications Concentric Networks: partnership for nationwide backbone access International Billing Services: partnership for operations support systems	$100 million invested by Nippon Telegraph and Telephone Corp. $300 million bank credit facility from Chase Manhattan and Goldman Sachs, for a total of $1.7 billion available for growth through 2000. $780 million in financing from Nortel. The Associated Group of Philadelphia has a 40% stake in Teligent.
Advanced Radio Telecom	Lucent	Snap.com: agreement to act as a portal Spieker: non-exclusive agreement for access to properties ICG, ChoiceCom: 3-year agreements to provide broadband service Electric Lightwave: agreement to provide broadband access InterNAP Network Services: agreement for backbone provider .comfax: marketing agreement	$200 million in financing from Lucent. WinStar has a 15% stake.
NEXTLINK	PulsePoint	Acquired WNP Communications, Inc. for approximately $695 million in cash and stock, adding 114 POPs to Nextlink's LMDS coverage area Level 3: 3-year, $700 million agreement for long-distance data transport and fiber network construction Covad, AT&T: strategic relationships to provide and transport DSL services PSINet: agreement to provide Internet services Metromedia Fiber Network: $92 million contract for access to fiber Founder Craig McCaw operates four other telecom companies: Nextel, Nextband, Internext, and Teledesic	Over $1.7 billion in cash assets available. Recently raised $835 million in the sale of senior notes.
MMDS			
American Telecasting (ATI)	Hybrid Networks, EMCEE Broadcast Products	Internet Ventures, Rocky Mountain Internet: agreements to provide Internet access Provides DirecTV over its network IBM: agreement for connection to Internet backbone Online Systems Services: agreement for turnkey Internet products and service packages	Sprint purchased ATI for $168 million in stock plus $281 million assumed ATI debt.
CAI Wireless	General Instrument, Hybrid Cable	94% stake in CS Wireless National Science Foundation: alliance to provide high-speed Internet connections to upstate New York schools Provides DirecTV over its network.	MCI WorldCom purchased CAI for approximately $476 million. $80 million senior credit facility from Merrill Lynch Global Allocation Fund.
CS Wireless	General Instrument, Hybrid Cable, NextLevel Systems	Stratton Voice and Data: strategic relationship to provide video conferencing, live video broadcasting, and stored video on demand to the desktop Provides DirecTV over its network TelQuest Satellite Services: agreement to provide digital video	Portion of $200 million MCI WorldCom investment. MCI has obtained 94% stake through purchase of CAI Wireless
Nucentrix (formerly Heartland Wireless)		Ownership of 20% stake in Wireless One Provides DirecTV over its network	Senior credit facility secured from Merrill Lynch Global Allocation Fund.
People's Choice TV	Hybrid Networks	Provides DirecTV over its network Fully owned subsidiary, Speed Choice, provides Internet access	Sprint purchased People's Choice TV for approximately $126.3 million. Portion of $200 million MCI WorldCom investment. The Blackstone Group also has a significant stake in the company.
Wireless One		Provides DirecTV over its network ALLTEL: long-term outsourcing contract	Portion of $200 million MCI WorldCom investment.

Sources: See Appendix C.

These fixed wireless carriers are well financed and have formed numerous strategic alliances. Teligent has $1.2 billion available to fund its growth through 2000.[57] In addition, Teligent has tapped Nortel to build part of its network and to supply $780 million in financing.[58] WinStar leases its long-haul services from Williams Communications.[59] Lucent Technologies has provided WinStar with a $2 billion line of credit for equipment.[60] NextLink, which is backed by billionaire Craig McCaw, has an alliance with ISP InterNext, and leases long-distance data transport through an agreement with Level 3.[61] ART has received over $200 million in financing from Lucent,[62] and is also backed by WinStar.[63] *See* Table 4.

MMDS operators include CAI Wireless systems, CS Wireless Systems, Wireless One, Nucentrix (formerly Heartland Wireless), ATI Telecasting, and People's Choice TV. The Commission found that "[i]n a significant number of cities," MMDS companies are "offer[ing] broadband services to residential consumers."[64] And it cited estimates that "several million residential consumers could now obtain broadband from such companies.[65]

In March 1999, MCI WorldCom invested $200 million in four MMDS providers – CAI, CS Wireless, Wireless One, and People's Choice.[66] MCI WorldCom subsequently acquired CAI Wireless, and with it a 94 percent stake in CS Wireless.[67] The company has also entered into a five-year national agreement to resell WinStar's "Wireless Fiber," and is also reselling fixed wireless access from Teligent.[68] MCI WorldCom CEO Bernard Ebbers has stated that, while his company has already purchased enough cable to cover half the country, his goal is to eventually cover 70 percent, and to use this fiber to serve as a local loop to small and mid-sized

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[57] *See* Teligent Press Release, *Teligent Reports 1998 Financial Results, Sets Operating Benchmarks for 1999*, Mar. 1, 1999.

[58] *See* S. Mehta, *Teligent Taps Northern Telecom for Financing, Role in Network*, The Wall Street Journal, Nov. 5, 1997 (Teligent also received a $100 million investment from Nippon Telephone & Telegraph).

[59] *See* Winstar Press Release, *WinStar Reports Fourth Quarter and Year-End Results*, Mar. 4, 1999.

[60] *See id.*

[61] *See NEXTLINK Communications Reports Record Revenue Growth; Continues Nationwide Expansion*, Business Wire, Oct. 27, 1998.

[62] *See* ART Press Release, *Advanced Radio Telecom Reports Fourth Quarter, Year End Results*, Mar. 2, 1999.

[63] *See* E. Mooney, *WinStar Says It Wants ART's Spectrum*, Radio Comm. Report, Nov. 9, 1998, at 6.

[64] *Advanced Services Report* ¶ 57.

[65] *Id.* (*citing* Comments of AT&T Corp. at 16; Comments of BellSouth Corp., Exhibit E at 2).

[66] *MCI WorldCom's Wireless Cable Plans Seen Widening Broadband Options*, Communications Daily, Mar. 31, 1999, at 5.

[67] B. Menezes, *MCI WorldCom Discovers Fixed Wireless*, Wireless Week, Feb. 8, 1999.

[68] *Id.* ("By deploying its own solution, WorldCom might have more leverage to exploit the benefits of broadband wireless local access – such as speed of deployment and relatively low infrastructure costs – instead of having to negotiate with the incumbent wireline local exchange carrier" for local access.").

businesses.[69] In April 1999, Sprint announced an agreement to merge with People's Choice TV, and said it would use PCTV's MMDS licenses to provide wireless broadband services as a part of its Sprint ION offering.[70] Sprint subsequently acquired ATI, Videotron USA, and Transworld, and plans to use these companies' facilities to provide high-speed Internet access.

3. Satellite. A new, more intelligent breed of satellites is rapidly being deployed as an additional competitor in the high-speed market. The nation's largest DBS operator, DirectTV (owned by Hughes), already provides nationwide Internet access at speeds of up to 400 kbps.[71] The Commission has granted fourteen Ka-band licenses, including thirteen geostationary systems and one non-geostationary system, Teledesic, which will deploy a low-earth orbiting system.[72] According to the Commission, several of these licensees – including Loral's CyberStar, Hughes' Spaceway, Lockheed Martin's Astrolink, SkyBridge, and Teledesic, among others – "are planning to enter the residential broadband market in the next decade."[73] The operators themselves have announced much more rapid deployment schedules.[74]

In the *Advanced Services Report*, the Commission noted that "[s]ince 1993, over $20 billion has been invested in the space industry, of which much has gone into the broadband satellite telecommunications sector."[75] Teledesic's $9 billion venture is backed by Craig McCaw, Microsoft Chairman Bill Gates, Motorola (with a 26 percent stake),[76] Saudi Prince

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[69] *See* CIBC World Markets, Daily Teletimes, May 21, 1999 (summarizing comments of Bernard Ebbers at MCI WorldCom's Annual Meeting on May 20, 1999).

[70] *See MDS Provider People's Choice TV Merging Into Sprint*, Telecommunications Report Daily, Apr. 12, 1999. Sprint stated that: "Along with recently announced plans to build asymmetrical digital subscriber lines (ADSL) in 35 major markets by the end of the year, the purchase offers Sprint another way to deliver Sprint ION broadband services to business and residential customers." *Id.*

[71] *See Applications for Consent to the Transfer of Control of Licenses and Section 214 Authorizations from Tele-Communications, Inc. to AT&T Corp.*, Memorandum Opinion and Order ¶ 74, CS Docket No. 98-178 (rel. Feb. 18, 1999).

[72] *See Advanced Services Report* ¶ 39 (These geostationary Ka-band licensees include systems owned by Comm Inc., EchoStar Satellite Corp., GE American, Hughes Space & Communications, KaStar Satellite Communications, Loral Aerospace Holdings, Inc., Lockheed Martin Corp., MorningStar Satellite Co., NetSat 28, Orion Atlantic, Orion Network Systems, PanAmSat Corp., and VisionStar, Inc.).

[73] *Id.* ¶ 60.

[74] Teledesic plans to begin its broadband satellite service in 2003. *See* Teledesic, *Fast Facts*, http://www.teledesic.com/overview/fastfact.html. Spaceway plans to begin operations in North America in 2002. *See* Company Press Release, *Hughes to Invest $1.4 Billion in Broadband Satellite System*, Mar. 17, 1999, http://www.hns.com/news/pressrel/corporat/p031799.htm. SkyBridge will begin operations in 2001. *See* Company Press Release, *SkyBridge Will Expand Its Satellite Constellation from 64 to 80 Satellites to Meet Market Demand*, June 1, 1998, http://www.skybridgesatellite.com/news/cont_81.htm. Astrolink plans to begin its operations in 2001. *See* Astrolink: System Concept, http://www.astrolink.com/concept.html.

[75] *See Advanced Services Report* ¶ 39.

[76] Motorola initially planned to build its own broadband satellite network (Celestri), but then pooled its resources with Teledesic and will now lead the industrial team that will develop and deploy the satellite system, along with Boeing and the Italian company Matra Marconi Space. *See* Teledesic, *Fast Facts*, http://www.teledesic.com/overview/fastfact.html.

Alwaleed Bin Talal,[77] and Boeing. SkyBridge's $3.5 billion development costs are being footed by Alcatel, Loral Space & Communications, Toshiba, Mitsubishi Electric, Sharp, and others.[78] CyberStar's $1.6 billion system is also backed by Loral and Alcatel.[79] Astrolink's $3 billion project is backed by Lockheed Martin,[80] and there are plans to bring other investors and partners on board.[81] Finally, the $3.5 billion Spaceway project is financed by Hughes Electronics Corporation (a subsidiary of General Motors).[82] *See* Table 5.

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[77] The Prince invested $200 million. *See* C. Bulloch, *Coming Soon: Multimedia Satellites*, Interavia Business & Technology, Feb. 1, 1999, at 45.

[78] Alcatel, *SkyBridge*, http://www.alcatel.com/telecom/space/Systems/SkyBridge/index.htm.

[79] Cyberstar, *Common Questions*, http://www.cyberstar.com/abo0301.html.

[80] *See* C. Bulloch, *Coming Soon: Multimedia Satellites*, Interavia Business & Technology, Feb. 1, 1999, at 45.

[81] Astrolink, *About Us*, http://www.astrolink.com/about_us.html. Plans call for a team consisting of "country service providers, terminal and network manufacturers, content providers, application software developers and other value-added providers." *Id.*

[82] Hughes Press Release, *Hughes to Invest $1.4 Billion in Broadband Satellite System*, Mar. 17, 1999.

Table 5. Satellite: Strategic Partners and Resources			
Satellite Provider	**Equipment Partners**	**Other Strategic Partners**	**Access to Capital**
Teledesic	Motorola: prime contractor Boeing: assistance in building the satellite system Matra Marconi Space: likely to build platform structures for satellites	Craig McCaw: 21% stake; Co-CEO AT&T Wireless: 12% stake	Motorola: 26% stake valued at $750 million Boeing: 5% stake Bill Gates: 21% stake Saudi Prince Alwaleed Bin Talal: 11% stake ($200 million investment).
SkyBridge	Alcatel: design and development of satellite system Loral Space & Comm.: manufactures satellites and provides satellite-based communications services, but manufacturer for SkyBridge satellites has not been announced	CNES (National Center for Space Studies – France) SRIW (Societe Regionale d'Investissements de Wallonie – Belgium) Mitsubishi Sharp SPAR Aerospace (Canada) Aerospatiale (France) Toshiba COM DEV Satellite Comm. SkyBridge partners will receive licenses to offer its services in return for investing a combined $2 billion to build satellite dishes on the ground.	Alcatel and Loral have an agreement to allow for "cross-investment" between Alcatel's SkyBridge and Loral's CyberStar. The agreement stipulates that each company will invest an initial $30 million in the other's satellite venture.
CyberStar	Loral Space & Comm. (Managing Partner): use of existing satellites	Alcatel (Equity Partner): 14% stake	As of November 1998, Alcatel and Loral had spent $69 million on the CyberStar system.
Astrolink	Lockheed Martin	Astrolink will announce its international partners and service providers "very soon."	Astrolink is wholly-owned by Lockheed Martin, however plans call for the company to become a separate entity.
Spaceway	Hughes Network Services: manufacture of DirecTV receivers; provision of "key end-user marketing and distribution elements" Hughes Space & Comm.: manufacture of all satellites PanAmSat (81% owned by Hughes Electronics): control of satellite operations DirecTV (wholly-owned by Hughes Electronics): provision of satellite television service	"Hughes plans to work with global strategic partners to roll out additional systems."	Spaceway is a Hughes-controlled project.

Sources: See Appendix C.

4. Utilities. The FCC has noted that "[a] growing number of public utilities are offering broadband within their utility service territories."[83] According to the FCC, "as of 1997, utilities had installed 40,000 route miles of fiber optic cable representing over 750,000 fiber miles, and they intend to install another 36,000 route miles in the next few years."[84] Utility-based offerings have begun in numerous cities.[85]

Many utilities have formed partnerships with CLECs.[86] For example, Hyperion has partnered with PECO Energy to provide telecommunications services over PECO's 500-mile fiber optic network in southeastern Pennsylvania.[87] Boston Edison teamed up with RCN in the fall of 1996 to provide telephone, video, and Internet access over its 200-mile fiber optic backbone.[88] RCN has also joined forces with PEPCO to provide advanced services in the Washington, DC metro area.[89] MaineCom Services, a subsidiary of Central Maine Power, has a $20 million joint venture with Brooks Fiber to construct a fiber optic network to serve the Portland market.[90] According to the FCC, utilities have also entered into "joint ventures with software and content providers."[91]

Utilities clearly have deep financial pockets. The FCC notes that "[a]ctual and planned utility-affiliated ventures in Boston, New York, Philadelphia, Washington, and San Francisco areas have a capital budget for 1998 and 1999 that is estimated at $850 million."[92] Utilities

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[83] *Advanced Services Report* ¶ 60.

[84] *Id.*

[85] *E.g.*, VPS Communications, a subsidiary of Virginia Power, owns and operates a 270-mile fiber optic backbone. New Paradigm Resources Group and Connecticut Research, *1998 Annual Report on Local Telecommunications Competition*, at Ch. 6, p. 18 (9th ed. 1998) ("*1998 Annual Report on Local Competition*"). FTV, a joint venture between Montana Power, Enron, and the Williams Companies, is in the process of constructing a 1,620-mile fiber optic network between Portland and Los Angeles. *Id.* at 17 of 22. SCANA Communications, a subsidiary of the SCANA Corporation, owns and manages a 2,500-mile fiber optic network stretching from the Carolinas to east Texas. *Id.* at 18 of 22. C3 Communications, a subsidiary of Central and Southwest Energy, owns and operates a large fiber optic network that covers Texas, Arkansas, Oklahoma, and Louisiana. C3 Communications, *Our Network*, http://www.c3com.com/ C3Networks/network/network.htm. Montana Power also owns an 8,000 mile network called Touch America, which covers thirteen states. They are planning to expand to a national footprint. W. Carter, *Proceeding With Caution*, Internet Telephony, Nov. 2, 1998, http://www.internettelephony.com/archive/ 11.02.98/STnews.htm.

[86] *See* CLEC.Com, News Release, *C-LECs Team with Electric Utilities*, Feb. 3, 1999, http://www.Clec.com/latest/newsjump.cfm?NewsID=854984116 ("And many [utilities] are joining forces with existing C-LEC operators that have competitive savvy at their roots.").

[87] *1998 Annual Report on Local Competition* at Ch. 6, p. 16.

[88] *Boston Edison and CTEC's RCN Unit Form Partnership To Offer Local Phone, Long Distance, Video and Internet Access*, PR Newswire, Sept. 30, 1996.

[89] Pepco Press Release, *PEPCO Subsidiary Joins RCN Corporation to Bring Washington, DC Area a Single-Source Package of Telecommunications and Cable Services*, Aug. 6, 1997.

[90] *1998 Annual Report on Local Competition* at Ch. 6, p. 19.

[91] *Advanced Services Report* ¶ 55.

[92] *Id.* ¶ 40.

entering the telecommunications market place include giants such as Virginia Power[93] and Con Ed of New York.[94]

B. Current CLEC Provision of Advanced Services Over ILEC Loops

In addition to the many direct alternatives to ILECs' networks, many competitors are providing advanced services by attaching their own facilities to ILECs' copper loops. Providing high-speed service over an ILEC copper loop requires new equipment deployed at the two ends of the wire: on the customer's premises and in the ILEC's central office. ADSL service, for example, requires an ADSL modem at the customer's premises and in the central office: (1) a Digital Subscriber Line Multiplexer ("DSLAM"); and (2) a fast-packet or ATM switch to route high-speed data traffic from there on out (*e.g.*, to an ISP).

ILECs can of course deploy such equipment, and are doing so. But CLECs can too, if they have direct access to the ILEC's unbundled loop. Which they do. No new "advanced services" UNE is required to ensure such access.[95] ILEC loops are already unbundled to permit competitive provision of ordinary voice service. Apart from a modest amount of loop testing for quality, nothing more is required.

Market experience confirms that conclusion beyond any possible dispute. CLECs already provide xDSL service in each of the 10 largest MSAs, and 25 of the top 50. They are in 21 states and 273 cities. Most of these markets are served by multiple CLECs. By comparison, ILECs are offering xDSL service in only 7 of the 10 largest MSAs and only 22 of the top 50. *See* Map 4, Table 6. In filings with the Commission, a major CLEC trade association insists that CLECs – not ILECs – "were the *first*" to deploy high-speed data networks and "continue to deploy such advanced technologies at a dramatic pace."[96] The Commission itself acknowledges

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[93] *Another Power Utility Subsidiary Seeks Entry into Competitive Telecom*, clec.com, Aug. 12, 1997.

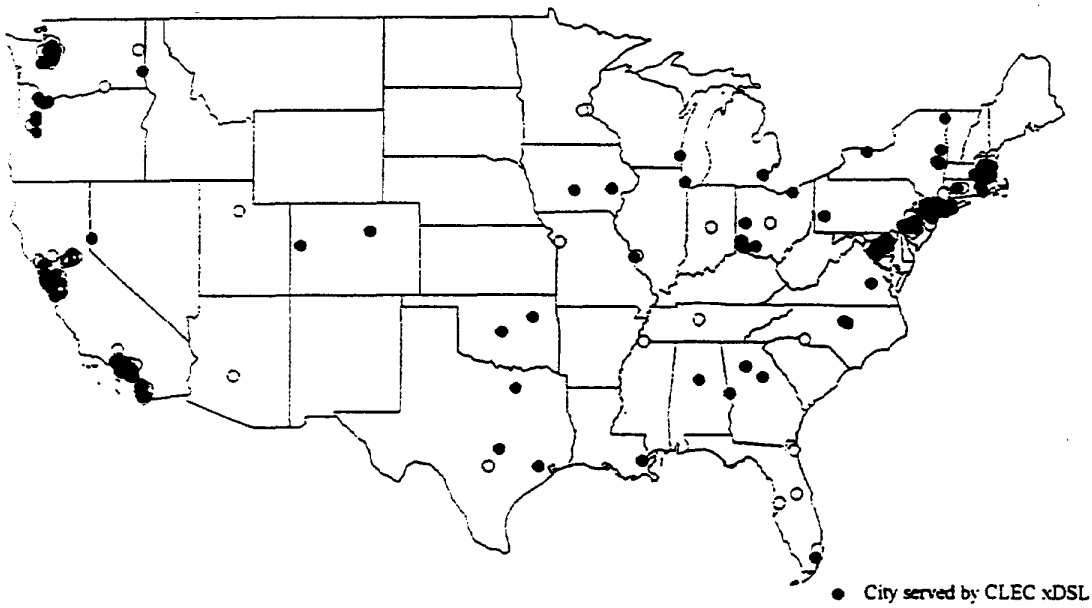
[94] Credit Suisse First Boston Corporation, *Global Telecommunications Weekly*, Feb. 22, 1999, at 5.

[95] The Commission's *Local Competition Order* created the only UNE CLECs need to provide competitive advanced services, and the Commission's several collocation orders ensure that CLECs can attach their own equipment to ILEC loops on the same physical premises as ILECs can. *See, e.g.*, *Second Advanced Services Order* ¶¶ 27-60; *Local Competition Order*, 11 FCC Rcd at 15782-807 ¶¶ 55-607; *Expanded Interconnection with Local Telephone Company Facilities*, Memorandum Opinion and Order, 9 FCC Rcd 5154 (1994) (Virtual Collocation Order); Second Report and Order and Third Notice of Proposed Rulemaking, 8 FCC Rcd 7374 (1993) (Switched Transport Expanded Interconnection Order); Report and Order and Notice of Proposed Rulemaking, 7 FCC Rcd 7369 (1992) (Special Access Expanded Interconnection Order). NorthPoint CEO, Michael Malaga, notes that collocation is his company's key asset: "'The asset is really in the co-location." S. Schiesel, *Start-Up Leads Phone Cause in Battle for Internet Access*, The New York Times, May 17, 1999.

[96] Petition of the Association for Local Telecommunications Services (ALTS) for a Declaratory Ruling Establishing Conditions Necessary to Promote Deployment of Advanced Telecommunications Capability Under Section 706 of the Telecommunications Act of 1996 at ii, CC Docket No. 98-78 (FCC filed May 27, 1998) (emphasis added).

that CLECs have already deployed more advanced-service equipment than ILECs over ILEC loops.[97]

Map 4. CLEC xDSL Deployment



Source: *See* Tables 1 & 7, *infra*.

[97] *See Advanced Services Report* ¶¶ 53, 56, 58 (outlining the current deployment of broadband facilities service the last mile, "begin[ning] with those that seem most advanced in deployment at this time," and listing CLECs ahead of ILECs).

Table 6. xDSL Deployment in Top 30 MSAs		
MSA	**ILEC**	**Other Providers**
1. Los Angeles	SBC, GTE	Concentric, Covad, DigitalSelect, Flashcom, InteleNet, ICG Netcom, NorthPoint, Orconet, Rhythms, UUNET, Verio, Zyan, and 34 ISP Partners
2. New York	Bell Atlantic (expected June 1999)	Concentric, Covad, DigitalSelect, Flashcom, NorthPoint, Red, Rhythms, UUNET, Verio, and 37 ISP Partners
3. Chicago	None	American Information Systems, @Work, Concentric, Covad, Flashcom, InterAccess, NorthPoint, Rhythms, UUNET, Verio, and 8 ISP Partners
4. Philadelphia	Bell Atlantic	Covad, Flashcom, NorthPoint, and 6 ISP Partners
5. Washington, D.C.	Bell Atlantic	Concentric, Covad, DigitalSelect, Flashcom, NorthPoint, UUNET, Verio, Rhythms and 16 ISP Partners
6. Detroit	None	Flashcom, NorthPoint, UUNET, and 2 ISP Partners
7. Houston	SBC	Concentric, DigitalSelect, Muse, ICG Netcom, NorthPoint, Verio, and 2 ISP Partners
8. Atlanta	BellSouth	Covad, DigitalSelect, Flashcom, ICG Netcom, NorthPoint, UUNET, Verio, and 7 ISP Partners
9. Boston	Bell Atlantic	Concentric, Covad, Digital Select, Flashcom, NorthPoint, Rhythms, Shore.Net, UUNET, Verio, WinStar iCi, and 19 ISP partners
10. Dallas	SBC, GTE	Concentric, DigitalSelect, Flashcom, Muse, ICG Netcom, NorthPoint, Telares, UUNET, Verio, and 2 ISP Partners
11. Riverside-San Bernardino	SBC (expected June 1999)	None
12. Phoenix	U S WEST	Covad (expected 1999), Flashcom (expected May 1999), NorthPoint (expected 1999), and Rhythms (expected 1999)
13. Minneapolis-St. Paul	U S WEST	Covad (expected 1999), Flashcom (expected May 1999), NorthPoint (expected 1999), and Rhythms (expected 1999)
14. San Diego	SBC	Concentric, Covad, Flashcom, NorthPoint, Rhythms, UUNET, Verio, Zyan, and 10 ISP Partners
15. Orange County	SBC	Concentric, Covad, Flashcom, NorthPoint, Rhythms, UUNET, Verio, and 35 ISP Partners
16. Nassau-Suffolk	None	CAIS Internet, Concentric, Covad, Flashcom, NorthPoint, Verio, and 36 ISP Partners
17. St. Louis	SBC (expected second quarter 1999)	NorthPoint, Flashcom (expected June 1999)
18. Baltimore	None	Concentric, Covad, Flashcom, Digital Select, NorthPoint, UUNET, Verio, and 5 ISP partners
19. Pittsburgh	Bell Atlantic	Flashcom, NorthPoint
20. Oakland	SBC	Concentric, Covad, Flashcom, Rhythms, NorthPoint, UUNET, Verio, and 40 ISP Partners
21. Seattle	U S WEST, GTE	Covad, Flashcom, Orconet, Telares, UUNET, Verio, and 13 ISP Partners
22. Tampa-St. Petersburg, FL	GTE	UUNET
23. Cleveland	None	NorthPoint, Flashcom, UUNET
24. Miami	BellSouth (expected 1999)	DigitalSelect, Flashcom, NorthPoint, UUNET, and 4 ISP Partners
25. Newark	Bell Atlantic	None
26. Denver	U S WEST	ICG Netcom, Telares, UUNET
27. Portland, OR	U S WEST, GTE	Telares, UUNET
28. San Francisco	SBC	Brainstorm Networks, Concentric, Covad, DigitalSelect, Flashcom, Ionix, Muse, ICG Netcom, NorthPoint, Orconet, Rhythms, UUNET, Verio, and 39 ISP Partners
29. Kansas City, MO	SBC (expected second quarter 1999)	Flashcom (expected August 1999)
30. San Jose, CA	SBC	Concentric, Covad, Flashcom, Ionix, Muse, ICG Netcom, Orconet, Rhythms, UUNET, Verio
Sources: See Appendix C.		

The CLECs' own trade association insists that CLECs already lead the ILECs in providing advanced services over ILEC loops.[98] CLECs offer advanced services to over five million homes, and ALTS predicts that number will quadruple in 1999.[99] "Data CLECs have invested heavily in facilities, pushed DSL prices down," and "[s]everal competitive DSL providers have entered multiple markets in which they compete against each other, the ILECs, and cable modem providers."[100] CLECs – not ILECs – are "driving the deployment of cutting-edge technology."[101] *See* Table 7. CLECs are among the leading providers of dedicated access facilities to Internet Service Providers (ISPs), and in many instances, CLECs own controlling interests in the nation's better-known ISPs.[102] Data will constitute 20 percent of CLEC revenue by the year 2000.[103]

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[98] *See* ALTS Press Release, *ALTS' Fall Education Seminar Proves Success of Telecom Act in Stimulating Broadband Data and Competitive Providers*, Sept. 18, 1998.

[99] *See* ALTS Press Release, *ALTS Faults Monopolies' Repeated Efforts to Bypass Competitive Requirements for Advanced Services*, Dec. 7, 1998, http://www.alts.org/tdbshowarticle.asp?AID=117&type=News.

[100] The Council of Economic Advisors, United States Department of Commerce, *Progress Report: Growth and Competition in U.S. Telecommunications 1993-1998* (Feb. 8, 1999), http://www.ntia.doc.gov/ntiahome/press/ceafinalrpt.htm.

[101] ALTS Press Release, *ALTS' Fall Education Seminar Proves Success of Telecom Act in Stimulating Broadband Data and Competitive Providers*, Sept. 18, 1998.

[102] *See* ALTS Press Release, *ALTS Proposes Advanced Communications Network Model to Propel Investment in Local Broadband Networks*, May 17, 1998.

[103] *See id.*

Table 7. CLECs Providing Advanced Services on ILEC Loops			
CLEC	Cities Presently Served	Expansion Plans	Collocation Nodes in ILEC Central Offices
Covad	Atlanta: Baltimore: Boston: Chicago: Los Angeles: New York: Philadelphia: Sacramento: San Diego: San Francisco: Seattle: Washington, D.C.	1999 expansion into Austin: Dallas: Denver: Detroit: Houston: Miami: Minneapolis: Phoenix: Portland, OR: Raleigh	168
NorthPoint	Austin: Atlanta: Baltimore: Boston: Chicago: Cleveland: Dallas: Detroit: Houston: Los Angeles: Miami: New York: Philadelphia: Pittsburgh: San Diego: San Francisco: St. Louis: Washington, D.C. "40 percent of all businesses and 20 percent of all residences"	1999 expansion into 25 metro areas, including Columbus: Denver: Minneapolis/St. Paul: Orlando: Phoenix: Portland, OR: Raleigh-Durham: Seattle: Tampa	500
Rhythms NetConnections	Boston: Chicago: Los Angeles: New York: Oakland/East Bay: Orange County: Sacramento: San Diego: San Francisco: San Jose, Washington, D.C.	1999 expansion into 23 metro areas: including Austin, Baltimore, Cincinnati, Cleveland, Columbus, Denver, Detroit, Hartford, Houston, Kansas City: Miami, Milwaukee, Minneapolis/St. Paul, Pittsburgh, Phoenix, Portland, OR, Raleigh-Durham, Seattle, St. Louis and Tampa	200
Allegiance Telecom	Introducing service in Atlanta, Chicago, Dallas, New York and San Francisco	DSL services will be "provisioned from 100 more central offices by the end of the year"	150
ICG Communications	Colorado: California: the Ohio Valley and various part of the Southeastern United States	". . . expand even further and gain access to more than two-thirds of the businesses and more than half of the residential customers in the top 25 markets in the United States"	100
UUNET	Atlanta: Baltimore: Boston: Chicago: Cleveland: Connecticut: Los Angeles: New York: Rochester: San Diego: San Francisco: Washington, D.C.	". . . expects to deliver enhanced DSL services to 70% of American businesses by 2000"	
e.spire	New York: Washington, D.C.	"signed an agreement with Covad Communications that it enables it to offer a new type of high speed connection to the Internet in major metropolitan markets"	
Intermedia Communications	222 multi-tenant buildings in 16 markets	Agreements with NorthPoint and Rhythms will expand DSL reach to an additional 17 markets, including San Francisco, Chicago, and Boston.	
Network Access Solutions	Baltimore: Boston: New York: Philadelphia: Richmond: Washington, D.C.	". . . will be operational in Wilmington(DE): Norfolk and Pittsburgh by June 1, 1999"	
MGC Communications	Atlanta: Southern California: Nevada "40,000 small business and residential lines installed throughout the US"		
JATO Communications	Seattle: Spokane: Portland: Salem: Eugene: Boise: Salt Lake City: Las Vegas: Phoenix: Tucson: Ft. Collins: Greeley: Denver: Colorado Springs: Albuquerque: Dallas: Austin: San Antonio: Houston: Oklahoma City: Omaha: Lincoln: Kansas City: St. Louis: Des Moines: Minneapolis "JATO's markets cover 800 thousand businesses and 8 million residences"		
Choice One	Rhode Island (approved to offer service in March 1999)		
Microsoft	Atlanta: Seattle	"will begin trials in Chicago and San Diego" "By the fall of this year, the company plans to offer DSL in 20 US cities"	
Dakota Services	32 cities in Minnesota, South Dakota and Wisconsin, including Chicago	Canton, SD: Lauren and Marshall, MN	
Flashcom	Atlanta: Austin: Baltimore: Cleveland: Connecticut: Dallas: Detroit: Houston: Illinois: Los Angeles: Maryland: Massachusetts: Miami: Michigan: New Hampshire: New Jersey: New Orleans: New York: Philadelphia: Pittsburgh: Seattle: San Diego: San Francisco, San Jose, Virginia: Washington, D.C.	Flashcom is currently providing service in 22 major metro markets with plans for 20 more by the end of this year.	
HarvardNet	New Hampshire: Massachusetts	CLEC applications pending to Rhode Island and Maine. HarvardNet "plans to expand its DSL offerings to 4.2 million lines in New England over the next 18 months."	
InterAccess	Chicago	Expansion in March to include Northbrook: Oakbrook: Naperville: Elk Grove Village: and Schaumburg.	
Interstate Telephone Co.	Westpoint, GA		
Supra Telecommunications & Information Systems	Florida		
Sprint	Charlottesville, VA (expected May 1999)	Second half of 1999 rollouts in Las Vegas, Kansas City and Orlando	
AT&T	Currently conducting trials in 5 markets.		
Sources: See Appendix C.			

CLECs have access to significant resources, and have formed numerous strategic alliances. For example, Covad has "strategic relationships" with AT&T, NEXTLINK, Qwest, and Concentric whereby each has agreed to market and resell Covad's DSL lines to their customers.[104] The companies have also committed capital resources: Qwest has invested $15 million in Covad,[105] AT&T made a $25 million equity investment in Covad, and NEXTLINK provided another $20 million.[106] Rhythms has entered into a strategic alliance with MCI WorldCom, which is expected to invest $30 million in Rhythms.[107] Under the terms of the agreement, "Rhythms will be MCI WorldCom's preferred supplier of DSL-based solutions," and MCI WorldCom will purchase 100,000 lines of DSL-based services from Rhythms.[108] "The companies will also pursue joint product development opportunities targeting the bundled voice and data needs of businesses."[109] Microsoft and Rhythms have also recently announced an alliance,[110] and Microsoft has already invested $30 million in Rhythms to "assist in Rhythms' nationwide deployment plan."[111] ICG recently designated NorthPoint as its preferred DSL provider[112] and Intel, @Home, and the Carlyle Group have provided NorthPoint with financial backing.[113] *See* Table 8.

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[104] *See* Covad Press Release, *Covad Communications Announces 1998 Results*, Mar. 2, 1999.

[105] *See* Covad Press Release, *Covad Communications Enters into Strategic Relationship with Qwest Communications*, Jan. 19, 1999.

[106] *See* Covad Press Release, *Covad Communications Enters Into Strategic Relationship with AT&T and NEXTLINK*, Jan. 4, 1999.

[107] *See* Rythms Press Release, *Rhythms, MCI WorldCom Strategic Alliance Offers High-Performance Data Networking for Businesses*, Jan. 26, 1999.

[108] *Id.*

[109] *Id.*

[110] *See* Rhythms Press Release, *Microsoft and Rhythms Alliance to Focus on New Services for Rhythms' Business Customers*, Mar. 17, 1999.

[111] *See id.*

[112] *See* ICG Press Release, *ICG Communications Expands National DSL Footprint in Strategic Relationship with NorthPoint Communications*, Feb. 18, 1999.

[113] *See* NorthPoint Press Release, *NorthPoint Communications Receives Intel Investment*, Oct. 26, 1998; Press Release, *@Work Expands Transport Portfolio To Include DSL*, Jun. 29, 1998.

Table 8. Facilities-Based Data CLECs: Strategic Partners and Resources			
Company	**Equipment Partners**	**Other Strategic Partners**	**Access to Capital**
NorthPoint Communications	Copper Mountain: central office equipment, DSL access concentrators and DSL modems	ICG Comm.: designated NorthPoint as its preferred DSL provider. ICG will purchase up to 75,000 DSL lines and sell its DSL assets to NorthPoint. Frontier Comm.: designated NorthPoint as its preferred DSL provider	Major Investors: @Work, Intel, Verio, The Carlyle Group, Vulcan Ventures, Accel Partners, Benchmark Capital and Greylock
Rhythms NetConnections	Xylan: high speed concentrators Compas: service support in the collocation process Genicom: service support, desktop integration, outside wiring and LAN/MAN/WAN maintenance Paradyne: integrated performance reports Copper Mountain: DSL equipment	Epoch: partnership to provide DSL services AboveNet Comm.: partnership to provide high speed Internet connectivity MCI WorldCom: designated Rhythms as its preferred supplier of DSL. WorldCom will purchase 100,000 lines of DSL from Rhythms. Microsoft: alliance to provide co-branded MSN portal	Major Investors: MCI WorldCom ($30 million); Microsoft ($30 million); Kleiner Perkins Caufield & Byers; Enterprise Partners; The Sprout Group; Brentwood Venture ($20 million); Enron Corp. $150 million in private placement of debt.
Covad Communications	Cisco Systems: routers, ATM equipment, ISDN line cards and CPE	AT&T, NEXTLINK, Qwest: agreements to market and resell Covad DSL lines to customers. Concentric: will use Covad to provide DSL in over 20 markets	Major Investors: Warburg, Pincus Ventures, L.P.; Crosspoint Venture Partners 1996; Intel; AT&T ($25 million); Qwest ($15 million); NEXTLINK ($20 million) $152 million from private placement of debt $435 million from private high yield debt offering, IPO
Jato Communications	Lucent: ADSL equipment Hewlett-Packard: partners in developing high-speed, two-way data, telephony and video service	Formus Comm., Stanford Telecom.: alliance to provide data, voice and Internet access to the metro Denver area	Major Investors: Lucent ($50 million credit), Chase Capital Partners, Centennial Funds, Spectrum Equity Investors, Telecom Partners
Network Access Solutions	Ascend: xDSL equipment Paradyne: Hotwire M-SDSL products	MCI WorldCom, Level 3 Comm.: fiber provisioning for long-distance network National Rural Telecom Coop: agreement to use NAS services to manage its frame relay DBS network	Major Investor: Zeneca
Sources: See Appendix C.			

1. Equipment and "Loop Technology". The major vendors of DSL equipment include Cisco Systems, Alcatel, Copper Mountain, Lucent, and Westell. CLECs buy exactly the same equipment as ILECs do to provide these services, and they buy it from exactly the same vendors. The only difference, to this point, is that the CLECs are the larger buyers – they have bought and deployed more of this equipment than ILECs have. *See* Table 9.

Table 9. Major xDSL Equipment Vendors and Purchasers		
Manufacturer	**ILEC Buyers**	**CLEC Buyers**
Alcatel	Ameritech, BellSouth, SBC, Bell Atlantic	Recent agreements aimed at selling ADSL central office equipment and modems to CLECs;[1] currently markets non-ADSL equipment to CLECs such as e.spire and MCI WorldCom.
Cisco Systems, Inc.	U S WEST, Cincinnati Bell	Covad; CAIS Internet; Conectiv
Copper Mountain Networks		ICG Netcom; InterAccess; NorthPoint Communications; Rhythms NetConnections; UUNET WorldCom
3Com	BellSouth	Flashcom; NorthPoint Communications
Futisu-Orckit	GTE	SourceNet; Sprint
Lucent	BellSouth	JATO Communications
Westell	GTE, Bell Atlantic	OneNet Communications
See, e.g., Press Release, *Alcatel to Offer Cabletron ADSL Routers as Part of Its Speed Touch Modem Family*, Apr. 7, 1999 (describing agreement between Alcatel and Cabletron under which Alcatel will market Cabletron's ADSL SmartSwitch Router 250 to CLECs and ISPs, among others). Press Release, *Alcatel and Efficient Networks Sign Strategic Agreement to Jointly Develop and Market Universal Serial Bus ADSL Modems*, Feb 17, 1999 (describing agreement between Alcatel and Efficient Networks under which they will jointly develop next generation, standards-based Universal Serial Bus (USB) ADSL modems for CLECs and ISPs, among others)		
Sources: See Appendix C		

DSL equipment, including packet switching, is very cost efficient, and easy for CLECs to deploy. Analysts note that "IP-based networks are scaleable, flexible, more efficient, cheaper and easier to provide that traditional voice networks."[114] Intermedia, which employs over 200 ATM data switches, notes that, "an ATM switch can handle approximately ten times as many calls as a voice switch and costs approximately one tenth as much as a voice switch, yielding a cost reduction of up to 99% for the switching components of local telephone calls, compared to the traditional switching method."[115]

ILECs have no technical edge in the equipment market – they are not themselves manufacturers of the equipment, and an extensive array of rules, statutory provisions, and divestiture decree history either exclude ILECs from equipment markets entirely, or require open standards, advance disclosure of network changes, and scrupulously arms-length dealings between ILECs and any affiliates engaged in any manner in equipment markets.[116] CLECs, by

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[114] First Marathon Securities Ltd., *Voice over Internet Protocol*, Dec. 11, 1998, at 1. *See also*, J. Caron, *Multiservices Forum Fleshes Out Plan*, tele.com, Jan. 29, 1999 ("total costs for modular, software adaptable switching systems are expected to be significantly less than the price of Class 5 switching systems today...improving the cost structure for existing carriers and lowering the barriers of entry for newcomers.").

[115] Intermedia Communications, Inc., Form 10-K, filed Mar. 25, 1998.

[116] *See, e.g.*, 47 U.S.C. § 273(a) ("a Bell operating company may manufacture and provide telecommunications equipment, and manufacture customer premises equipment, if the Commission authorized that Bell operating company or any Bell operating company affiliate to provide interLATA services under section 271(d), subject to the requirements of this section and the regulations prescribed thereunder."); 47 U.S.C. § 273(c)

contrast, have formed close technical alliances with a number of major equipment vendors. (*See* Table 8, supra.)

At this point, the technical parameters of the industry are clearly being defined by equipment and computer vendors. The Universal Asymmetric Digital Subscriber Line Working Group (UAWG), recently created by Microsoft, Intel, and Compaq, "has been formed to accelerate the adoption and availability of high-speed digital Internet access for the mass market."[117] The group aims "to establish an open, interoperable International Telecommunications Union (ITU) standard to facilitate high-speed communications to consumers over existing standard phone lines."[118] UAWG members consist of PC, networking, and telecommunications companies, including CLECs such as Covad, and ICG.[119]

Such a universal ADSL standard "will make it possible to cost-effectively extend the benefits of DSL technology to the average consumer."[120] The G.Lite DSL standard is expected to be approved by the ITU in June 1999.[121] Using this standard, companies may deploy DSL service without sending technicians to a customers' premises, making "ADSL modems as easy to install as today's analog modems."[122]

2. Line-Sharing. As noted above, the Commission proposes to require ILECs to unbundle virtual space with individual telephone loops. Without line sharing, the Commission reasons, "the competing carrier effectively may be forced to provide both voice and data over the local loop it leases from the incumbent."[123]

The Commission has already rejected an almost identical proposal for a time-share "long-distance loop UNE." In 1996, long-distance carriers sought "to purchase a loop element solely

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(requires BOCs that have been authorized to engage in manufacturing to disclose information concerning network standards.); 47 U.S.C. § 273(e)(1) (prohibits BOCs from discriminating "in favor of equipment or supplied by an affiliate or related person."); 47 U.S.C. § 273(e)(2) (requires BOCs to make procurement and supply contracts "for equipment, services, and software on the basis of an objective assessment of price, quality, delivery, and other commercial factors."); *Implementation of Section 273 of the Communications Act of 1934, As Amended by the Telecommunications Act of 1996*, Notice of Proposed Rulemaking, 11 FCC Rcd 21784, 21791, ¶ 11 (the FCC tentatively concluded that the Act does not permit collaboration between unaffiliated BOCs); *id.* at 21791-92, ¶ 12 (suggesting that the BOCs' statutory right to enter into royalty agreements might be circumscribed to "protect against anticompetitive abuses."); MFJ § (II)(D)(2) (1984) (forbidding the BOCs to "manufacture or provide telecommunications products or customer premises equipment (except for the provision of customer premises equipment for emergency services).").

[117] *See* Covad Press Release, *Covad Communications to Participate in Advancing Goals of Universal Asymmetric Digital Subscriber Line Working Group*, Jan. 26, 1998.

[118] *Id.*

[119] *See* http://www.uawg.org/lead.html.

[120] *See* Covad Press Release, *Covad Communications to Participate in Advancing Goals of Universal Asymmetric Digital Subscriber Line Working Group*, Jan. 26, 1998.

[121] *See* J. Rendleman, *ITU Backs G.Lite 'Splitterless' DSL Standard*, PC Week Online, Oct. 22, 1998.

[122] *Compaq Deal Promises To Alter Face Of ADSL Landscape*, Communications Today, Nov. 25, 1998.

[123] *Second Advanced Services Order* ¶ 99.

for the purposes of providing interexchange service;"[124] the ILEC would remain the "owner" of the loop when it was used to place local calls rather than long-distance ones. The loop's spectrum, in other words, would be subdivided in the temporal domain, call by call.

The Commission, however, refused to require unbundling at that level, concluding that a loop element should not be defined "in functional terms, rather than in terms of the facility itself."[125] The Commission wanted local competitors to retain "maximum flexibility to offer new services," and that meant giving such competitors "exclusive control over network facilities dedicated to particular end users."[126] The Commission concluded, in short, that "time-division" unbundling proposed by the long-distance carriers would suppress competition, not promote it. The right approach, the Commission concluded, was to extend unbundling no further than the loop itself. Long-distance carriers could purchase unbundled loops like any other competitor, just not on a time-share basis, with the incumbent LEC left as a co-tenant responsible for whatever services the long-distance carrier declined to supply.

As noted above (*see* Table 8), several major CLEC providers of high-speed services have already forged alliances with AT&T, MCI WorldCom, and other long-distance carriers of both voice and data. These alliances can readily provide bundled voice and data services, both local and long-distance. BOC-ILECs, by contrast, may not currently create comparable bundles; the Commission has so far declined to provide section 271 relief, even in connection with high-speed data services.[127]

Any CLEC that does not want to offer voice service can obtain ILEC loops and unbundle the spectrum itself, selling off the voice channel to another CLEC, a long-distance carrier, or back to the ILEC itself. Long-distance carriers have, after all, already informed the Commission that they want to be able to buy partial occupancy in unbundled loops. At least one CLEC has already asked the Commission to protect its right to sell off the voice channel on an unbundled loop to another provider.[128]

But there is no evidence that either suppliers or consumers have any interest in dealing with the inevitable complexity and risk of buck-passing or confusion when two independent providers attempt to provide two separate services over a single loop. Rhythms, NorthPoint, and Covad, the top-three CLECs in DSL deployment, all provide data service alone over unbundled loops, and have been successful and profitable in doing so.

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[124] *Local Competition Order*, 11 FCC Rcd at 15693, ¶ 385.

[125] *Id.*

[126] *Id.*

[127] *See Deployment of Wireline Services Offering Advanced Telecommunications Capability*, Memorandum Opinion and Order, and Notice of Proposed Rulemaking, 13 FCC Rcd 24011, 24045 ¶ 69 (1998).

[128] NorthPoint mentioned the possibility in terms of the Commission's separate affiliate proposal: "if the [incumbent LEC's] advanced services affiliate leases the loop and resells the incumbent's voice service, the competitive LEC must be allowed to do likewise." Comments of NorthPoint Communications Inc., Docket No. 98-78, (FCC filed Sept. 25, 1998).

Finally, as the Commission has already recognized, most heavy users of data services already buy second lines. Secondary line penetration has reached 19 percent for larger ILECs, and is growing very rapidly – the Commission itself has cited annual growth rates of 152 percent.[129] Indeed, as the Commission has noted, additional line growth now far exceeds growth of primary lines.[130] Many households have more than one additional line.[131]

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[129] *See Tariffs Implementing Access Charge Reform*, Order Designating Issues for Investigation and Order on Reconsideration, 13 FCC Rcd 2249, 2256 (1998); *see also* A.D. Barr, PNC Institutional Investment Service, Investext Rpt. No. 3375836, *Telecommunications/Price Performance and Earning Outlook*, Dec. 18, 1998, at *2 ("Residential second lines continue to increase in the 20% range for the local telcos.").

[130] *See Tariffs Implementing Access Charge Reform*, Memorandum Opinion and Order, 13 FCC Rcd 14683, 14694-95 ¶ 19 (1998).

[131] *See 1998 Annual Access Tariff Filings; Southwestern Bell Telephone Company Revisions to Tariff*, Memorandum Opinion and Order, Order Designating Issues for Investigation, and Order on Reconsideration, 13 FCC Rcd 13977, 14692-93 (1998). *See also* A.G. Edwards & Sons, Inc., Telecommunications Equipment, Dec. 9, 1998, at 2 ("Residential line growth continues to be fueled by additions of second (and third) lines for home offices, Internet and LAN connectivity, fax machines, etc.").