

Kingdom.¹⁹² According to one recent survey, one out of four cable carriers is either seriously considering or has actually budgeted for the implementation of interactive services.¹⁹³ Information retrieval, videotex, and other interactive services head the list of services cable operators expect to offer their customers by 1995.¹⁹⁴ IBM recently announced plans for a new venture in partnership with cable interests "to send videos, software, and other interactive information over a new 'digital highway' to businesses and homes."¹⁹⁵ All the while, the FCC has consistently backed cable's right to provide telephone service.¹⁹⁶

in March 1992 using proprietary hardware and FM radio signals exclusively to provide two-way services. Clifford, *2-Way Television Testing Under Way by Peninsula Firm*, SAN FRANCISCO BUS. TIMES, May 29, 1992, § 1, at 1.

TV Answer, a Reston, VA-based firm, uses radio waves to provide its two-way services. *This Isn't the Response TV Answer Expected*, BUSINESS WEEK, June 29, 1992, at 78; P. Wiseman, *Have Bills to Pay, Turn on Your TV*, USA TODAY, July 9, 1992, at B2.

¹⁹²*Multimedia: Videoway Adds Fast-Trax VD-1 Technology for Enhanced Multimedia & Transactional Services*, EDGE: ON & ABOUT AT&T, May 11, 1992. Le Groupe Videotron, Canada's second-largest multi-system operator (MSO), introduced its Videoway package of interactive services to Montreal cable subscribers in 1991. T. Kerver, *Realizing New Revenues*, CABLEVISION, June 18, 1990, at 68. A button on the remote control feeds the viewer's response back to the cable company.

¹⁹³*The Cable Poll: Remotes Reap Revenue*, CABLEVISION, Feb. 11, 1991, at 50.

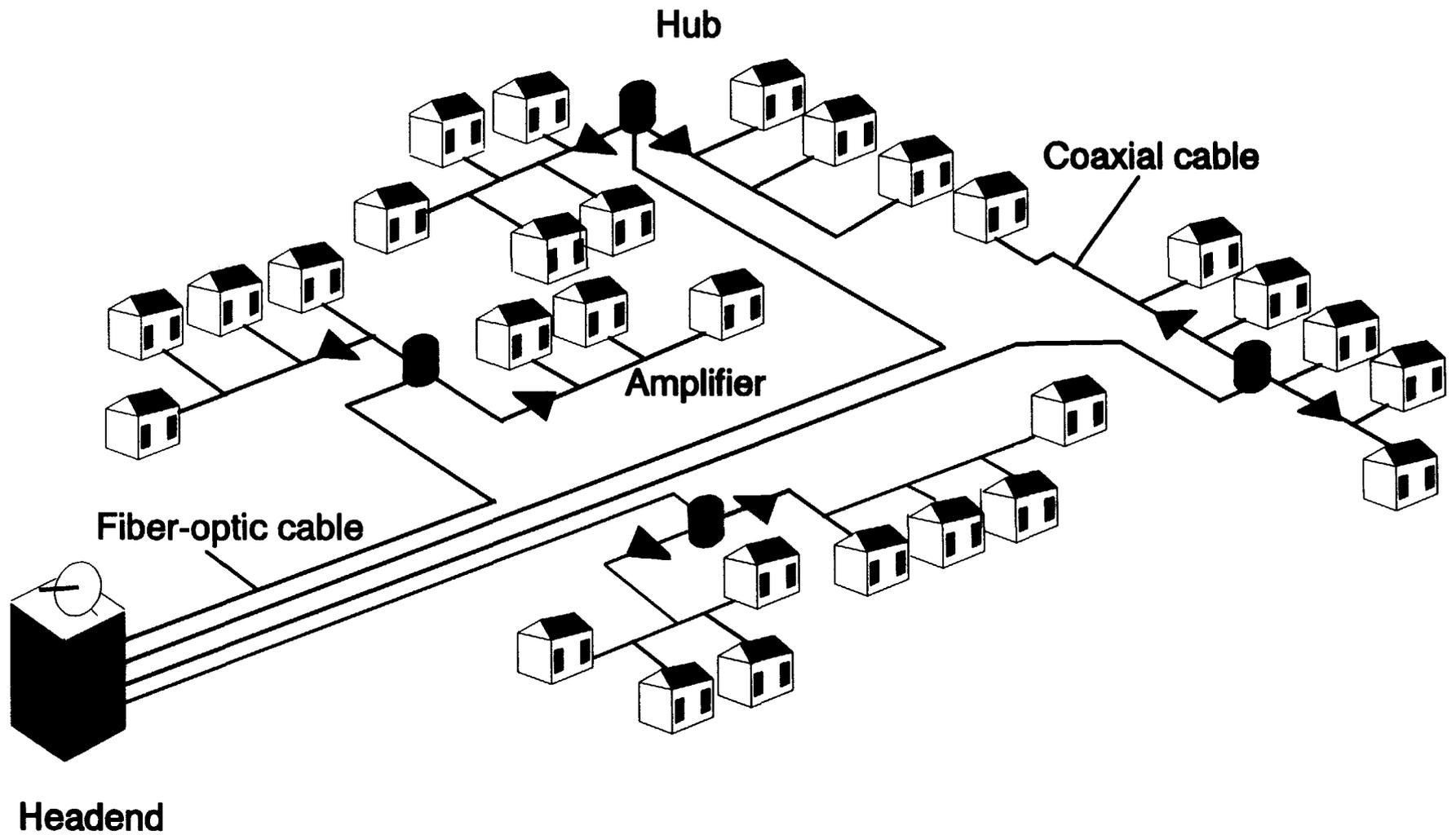
¹⁹⁴National Cable Television Ass'n survey (released May 22, 1990) as cited in S. Applebaum, *Now, Not Tomorrow*, CABLEVISION, June 18, 1990. Cable operators have in fact provided "institutional networks," or "I-Nets" for local data transport for many years. For example, Time Warner's ATC cable TV unit provides data services in Manhattan with revenues of about \$1 million annually. F. Dawson, *Soaring Demand, Sinking Costs Indicate it's Time to Rethink the Bypass Business*, CABLEVISION, Oct. 23, 1989, at 62.

According to a senior executive of Time Warner, the first stage of cable was re-transmission of over-the-air signals while the second was programming specifically for cable. The third stage -- now getting under way, is interactive service and "everything * * * that digital television can offer." T. Kerver, *The Sky is Blue*, CABLEVISION, Apr. 8, 1991, at 62.

¹⁹⁵*IBM Commits More than \$100 Million on Venture to Relay Video, Other Data*, WALL ST. J., Sept. 16, 1992, at B1. Potential partners in this endeavor are cable giants Time Warner and TCI. Michael Schwartz, vice president of Cable Labs, states that "[c]omputer companies now see the cable pipeline as a means of getting multimedia to the home, whether it terminates in a computer or a television set." *Ibid.*

¹⁹⁶*See, e.g., Cox Cable Communications, Inc., Compline, Inc., and Cox DTS, Inc.*, 102 F.C.C.2d 110 (1985), *vacated as moot*, 1 F.C.C. Rcd 561 (1986); *FCC Finds Transfer of Three Microwave Radio Stations From Merrill Lynch Group to Cox Teleport Consistent with Telco-Cable Cross-Ownership Rules*, FCC NEWS, Aug. 5, 1992 (No. CC-463).

Figure 2.2. Fiber-Optic Star Configuration.¹



¹Source: George Gilder, *Cable's Secret Weapon*, FORBES, Apr. 13, 1992, at 82.

Investment analysts now agree that the cable industry is poised to provide "video dialtone,"¹⁹⁷ and that cable companies can provide telephone service more cheaply than telcos can provide cable television.¹⁹⁸ At a recent NCTA convention, cable industry representatives declared their intention "to take on the telephone industry."¹⁹⁹ According to NCTA President James Mooney, "[t]he biggest telecommunications story of the decade may turn out to be not telcos' creating broadband networks, but cable technology and architecture proving to be the most efficient means of delivering the next generation of communications services."²⁰⁰ Fiber optics, signal compression technology and digital technology are rapidly transforming cable television into cable telecommunications.

Cable carriers are now forging a number of key new alliances in preparation for direct, head-to-head competition with local telcos.

Cable-CAP Alliances. Cable networks reach residential subscribers, while the CAPs serve business centers.²⁰¹ The potential synergies between cable companies and CAPs are obvious.²⁰² In February 1992, TCI, the largest cable company, purchased 49.9 percent of Teleport, the largest CAP.²⁰³ Shortly afterward, Cox Cable

¹⁹⁷Peter Lambert, *Technology Key to Bright Cable Future*, BROADCASTING, May 11, 1992, at 4.

¹⁹⁸K. M. Leon, et al., BEAR STEARNS & CO., REPORT NO. 1211120, TELECOMMUNICATIONS SERVICES INDUSTRY (Mar. 5, 1992).

¹⁹⁹*Politics Also Mentioned*, COMMUNICATIONS DAILY, May 5, 1992, at 4.

²⁰⁰*Ibid.*

²⁰¹J. Kraemer, DELOITTE & TOUCHE, COMPETITIVE ASSESSMENT OF THE MARKET FOR ALTERNATIVE LOCAL TRANSPORT (1991) (and "with wireless technology, the LEC may be bypassed entirely because of wireless residential and small business access to cable television transport facilities").

²⁰²Other cable companies are simply buying up independent telcos. Century Communications has invested in Citizens Utilities Co., a local telco, as well as in cellular telephone enterprises. L. Jaffee, *Tow Says Telephone, Cellular Investments Are Paying Off*, CABLEVISION, Sept. 11, 1989, at 11. Integrated Telecommunications Corporation (ITC), a Philadelphia-based cable television company, owns 50 percent of Rico Telephone Company in Colorado. ITC is looking to integrate cable television/telephone service in other Colorado markets and to provide local loop transmission services to other telephone companies. *Universal Service Telephone Corporation*, FINANCIAL WORLD, June 25, 1991, at 110.

²⁰³COMMUNICATIONS DAILY, Feb. 19, 1992, at 4. A market analyst noted that "With this acquisition, it is becoming increasingly clear that cable TV operators are interested in expanding their network capabilities to provide local access in direct competition with local telcos." K. M. Leon, et al., BEAR STEARNS & CO., REPORT NO. 121120, TELECOMMUNICATIONS SERVICES INDUSTRY (Mar. 5, 1992).

Meanwhile, TCI's CAP subsidiaries are using cable company rights of way to build fiber networks. *Malone Sees Bright Future for Teleport*, MULTICHANNEL NEWS, Mar. 9, 1992, at 48 (quoting John Malone).

acquired the other 50.1 percent of Teleport's shares.²⁰⁴ Teleport itself is courting cable companies as joint venture partners in new markets.²⁰⁵ TCI is also the sole owner of Digital Direct, which has fiber networks in Dallas, Chicago, Sacramento, and Seattle.²⁰⁶ Digital Direct, in turn, is acquiring Penn Access, which operates a CAP network in Pittsburgh.²⁰⁷ TCI is also planning to expand to St. Louis, Denver, and other cities.²⁰⁸ Numerous other cable-CAP deals have been announced in the last

²⁰⁴Approving the transfer of microwave licenses necessary for the acquisition, the FCC ruled 5-0 that cable TV companies are permitted to provide telephone service. *FCC Finds Transfer of Three Microwave Radio Stations from Merrill Lynch Group to Cox Teleport Consistent with Telco-Cable Cross-Ownership Rules*, FCC NEWS, Aug. 5, 1992 (CC-463). The telephone company association, USTA, had argued that the 1984 Cable Act, which bars telephone companies from providing video services, should be a two-way street and also bar cable companies from providing telephone service. The FCC, however, ruled that phone companies without monopoly control over their local exchange service are exempt from the 1984 ban. The decision reflects the FCC's belief that "competition to local phone companies is desirable." M. Carnevale, *FCC Opens Phone Sector to Cable Firms*, WALL ST. J., Aug. 6, 1992, at B1, B8.

²⁰⁵*Alternative Access Business Examined at NCTA*, COMMUNICATIONS DAILY, May 6, 1992, at 5.

²⁰⁶T. Locke, *TCI Seeks More Fiber-Optic Clout with Pittsburgh Network Buy*, DENVER BUS. J., Sept. 20, 1991, § 1, at 6. DigiNet, Inc. of Seattle provides digital microwave-based access service. D. Briere, *MANs Provide Digital Services at Low Cost*, NETWORK WORLD, Nov. 12, 1990, at 1. TCI's Seattle operations may also involve Viacom Cablevision with whom TCI has undertaken several other joint ventures in the Puget Sound area. C. Moozakis, *TCI, Viacom Examine Seattle Fiber Loop*, CABLEVISION, Apr. 22, 1991, at 8.

²⁰⁷COMMUNICATIONS DAILY, Feb. 7, 1992, at 3.

²⁰⁸F. Dawson, *Opportunity Knocks*, CABLEVISION, Sept. 23, 1991, at 38.

few years, in cities across the country.²⁰⁹ Overall, cable interests now control over 50 percent of CAP revenues.²¹⁰ TABLE 2.10.

Spurred by the promise of their new alliances, cable-CAP companies are now deploying fiber-optic cable at record rates.²¹¹ TCI claims that it is now the largest single buyer of fiber-optic cable in the world; the President of the cable industry's trade association estimates that cable companies are now installing fiber at almost the same pace (74 percent as fast) as the BOCs, and are "gaining fast."²¹² TABLE 2.11.

²⁰⁹For example:

Kansas City FiberNet, which provides CAP services on both sides of the Missouri River, was formed three years ago when ATC, TCI, and TeleCable agreed to combine their territories to create an all-fiber cable network. F. Dawson, *Opportunity Knocks*, CABLEVISION, Sept. 23, 1991, at 37.

Continental Cablevision and Hyperion Telecommunications have likewise formed a joint venture to operate a CAP in Jacksonville, Florida. F. Dawson, *The PCS Puzzle*, CABLEVISION, June 1, 1992, at 32-33; *Continental Cablevision in Joint Venture To Offer Local Access Services on Fiber System*, TELECOMMUNICATIONS REPORTS, May 18, 1992, at 37.

Comcast, which serves nearly 3 million cable subscribers, has agreed to acquire a 51 percent interest in Eastern TeleLogic, a CAP operating in Philadelphia. *Comcast Acquiring 51 Percent Interest in Competitive Access Provider Eastern TeleLogic*, TELECOMMUNICATIONS REPORTS, July 20, 1992, at 12. As discussed more fully below, Comcast is also a cellular provider and it expects its interest in Eastern TeleLogic to complement its existing Philadelphia-area network of cable TV and cellular telephone properties. *Ibid.*

Teleport Denver is expanding its 115-mile fiber optic network in collaboration with the local cable franchisee. *Teleport Denver Expanding Fiber Network Under Arrangement with Local Cable Franchisee*, TELECOMMUNICATIONS REPORTS, Aug. 17, 1992, at 10.

²¹⁰THE YANKEE GROUP, CAP MARKET UPDATE: YEAR OF TRANSITION 6 (Feb. 1992). Cable companies have also entered into partnerships to provide local telephone service in other countries. In a joint venture with U S WEST, for example, TCI is offering both cable and telephone service in the United Kingdom. *TCI Chief Advocates Ventures With US West*, DENVER POST, June 12, 1992, at C1.

²¹¹F. Dawson, *Soaring Demand, Sinking Costs Indicate It's Time to Rethink the Bypass Business*, CABLEVISION, Oct. 23, 1989. For example, cable companies (ATC and Jones Intercable), have deployed roughly 25,000 fiber-optic cable miles. FCC, 1991 FIBER DEPLOYMENT UPDATE (Mar. 1992). R. Tedesco, *Rewiring America*, CABLEVISION, Mar. 12, 1990.

²¹²Charles F. Mason, *AT&T Takes Center Stage at National Cable TV Convention*, TELEPHONY, May 11, 1992, at 6.

Table 2.10. Cable TV Control of Competitive Access Providers. ²¹³		
Cable TV Company	CAP Investments	CAP Cities
Adelphia Cable	Hyperion Telecommunications (with Continental Cablevision)	Jacksonville (under construction)
American Cablevision	Kansas City Fibernet	Kansas City, Independence, MO
Century Cable	Electric Lightwave is a subsidiary of Citizens Utilities, whose chairman Leonard Tow is also chairman of Century Cable	Portland, Seattle, Salt Lake City (planned), Sacramento (planned)
Continental Cablevision	Hyperion Telecommunications	Jacksonville (under construction)
Cox Enterprises	Teleport (50.1%)	Baltimore, Boston, Cambridge, Chicago, Dallas, Garden City-Long Island, Houston, Jersey City, Los Angeles, Newark, New York City (five burroughs), North Brunswick, NY-NJ Corridor, Princeton, San Francisco, Weehauken
Jones Intercable	Sister company of Jones Lightwave	Atlanta, Chicago (under construction), Tampa (under construction)
TCI	Teleport (49.9%), Digital Direct, Penn Access	Baltimore, Boston, Cambridge, Chicago (both Teleport and Digital Direct), Dallas (both Teleport and Digital Direct), Garden City-Long Island, Houston, Jersey City, Los Angeles, Newark, New York City (five burroughs), North Brunswick, NY-NJ Corridor, Pittsburgh, Princeton, Sacramento, San Francisco, Seattle, Weehauken
Time Warner	Fibernet, Inc. (through Rochester Cable, a subsidiary of ATC), Indiana Digital Access, Inc. (60% owned by ATC)	Rochester, Buffalo, Albany (under construction), Syracuse (under construction), Indianapolis, Terre Haute (under construction)

²¹³Sources: DONALDSON, LUFKIN & JENRETTE, LOCAL TELEPHONE COMPETITION INTENSIFIES AS STRATEGIC COMPETITORS CONVERGE 24 (May 18, 1992); *Jones Chicago Lightwave Plans System*, TELECOMMUNICATIONS REPORTS, Dec. 23, 1991, at 15; CONNECTICUT RESEARCH REPORT, 1991 ALTERNATE LOCAL TRANSPORT ... A TOTAL INDUSTRY REPORT 60-146 (Feb. 1991); COMMUNICATIONS DAILY, May 11, 1992, at 4; Fred Dawson, *Cable's Computer Games*, CABLEVISION, July 15, 1991, at 20.

Table 2.11. Fiber Optics Penetration by the Top 10 Cable MSOs. ²¹⁴			
MSO	Total Subscribers (Millions)	Fiber-Served Subscribers (Millions)	Percent of Total Subs
Tele-Communications, Inc.	12,333,682	1,036,492	8
ATC (Time-Warner)	4,796,200	2,183,182	46
Continental Cablevision	2,786,000	894,463	32
Warner Cable (Time-Warner)	1,677,260	420,540	25
Comcast	1,673,100	800,153	48
Cablevision Systems	1,669,857	114,972	7
Cox Cable	1,661,300	1,548,185	93
Storer	1,633,400	383,766	23
Jones Intercable	1,493,579 ²¹⁵	566,248	38
Newhouse Broadcasting	1,288,200	544,851	42

At the same time, the cable-CAP alliances are upgrading their networks to make direct competition with the local exchange more feasible. Although switches are not necessary for larger customers that connect directly to an interexchange carrier, the cable-CAP companies are now beginning to add switches to their networks to provide switched access as well. In late 1990, for example, Teleport purchased two AT&T 5ESS central office switches from its then-parent company Merrill Lynch.²¹⁶ Teleport now provides digital Centrex service in New York City, has applied to provide

²¹⁴Source: CABLEVISION, May 4, 1992, at 20 (National Cable Television Association figures as of Jan. 1992).

²¹⁵As of April 1992, Jones Intercable/Spacelink had 1,501,796 subscribers. CABLEVISION, May 4, 1992, at 100.

²¹⁶B. Brown, *N.Y. Carriers Offer Up ISDN Basic Rate Links*, NETWORK WORLD, May 6, 1991, at 13.

similar service in Illinois, and is expected to deploy additional switches elsewhere.²¹⁷ MFS and MetroComm (Ohio) are also planning to offer Centrex services.²¹⁸

As homes and offices become wired with high-bandwidth connections, centralized exchanges can often be eliminated altogether. Local area computer networks already interconnect without central exchanges; each computer on the network is connected on a single communications ring, which carries every signal to every other device, in much the same way as the airwaves carry every radio and television signal from every transmitter to every receiver. Private, two-way, addressable communication is perfectly feasible on a broadband ring network, just as it is possible over the airwaves on (for example) a walkie talkie. The communication medium is shared, but each communication is tagged, coded, and addressed, so that it is picked up only by a single, designated recipient.²¹⁹ From the individual user's perspective, the entire system operates like a telephone exchange, but the exchange intelligence in fact resides in each "terminal" node; in between the nodes there is nothing but transmission.

Digital Equipment Corp. is testing a new technology called Ethernet on Cable TV or "ETV" which uses existing cable television facilities for similar applications;²²⁰ Digital and TCI recently announced a joint venture to develop data communications services using TCI's cable plant.²²¹ Another similar concept developed by First Pacific Networks is the "Multiple Hub PX System," or "Personal Xchange" (PX), which uses time division multiplexing to permit fully switched services over broadband coaxial networks without resort to any central switching facilities.²²² The unit transforms a cable television network into the equivalent of a local area network capable of carrying data, voice, and video communications simultaneously on a single

²¹⁷D. H. Leibowitz, et al., DONALDSON, LUFKIN & JENRETTE, REPORT NO. 1223384, TELECOMMUNICATIONS, INC. (Apr. 28, 1992).

²¹⁸D. Briere, *Bypass Companies Win Respect as Local Carriers*, NETWORK WORLD, Sept. 9, 1991, at 1.

²¹⁹Traditional cable TV also works this way although at present the transmissions are primarily one-way. Each subscriber receives the total transmission, the converter is used to choose which piece of the transmission will be displayed.

²²⁰The technology is being tested on cable systems in Portland, Boston, and in North Carolina. Fred Dawson, *Cable's Computer Games*, CABLEVISION, July 15, 1991, at 20; F. Dawson, *Opportunity Knocks*, CABLEVISION, Sept. 23, 1991, at 36.

²²¹D. H. Leibowitz, et al., DONALDSON, LUFKIN & JENRETTE, REPORT NO. 1223384, TELECOMMUNICATIONS, INC. (Apr. 28, 1992).

²²²Fred Dawson, *Does Cable Need a New Vision for the '90s?*, CABLEVISION, Dec. 18, 1989.

wire.²²³ As described in one recent report, the "switching architecture is totally distributed as in a true data network, not forced into pyramid architecture that telephone company traditionally uses."²²⁴ See FIGURE 2.3.

Cable-CAP-Radio Alliances. The cable-CAP consortia are in turn allying themselves with providers of cellular and PCS radio services.²²⁵ In the radio world, the "LATA" is the individual mobile switch or (arguably) even the individual cell or wireless PBX. Beyond that everything is "inter-exchange." Beyond that, in other words, traffic can be picked up directly by CAPs, cable television companies (which are also in the trunking business) or long-distance carriers themselves.

This is in fact precisely how the new-generation radio networks are being assembled. Consortia of CAPs and cable television companies are leading the charge to deploy PCS. The high-capacity trunks that cable-CAP companies operate are perfectly suited to serve as backbone networks; they can knit together cell sites and mobile switches, link mobile switches into local and regional networks, and connect them to long-distance carriers.²²⁶ In February 1991, for example, the FCC approved applications by three major cable companies to build PCS networks in San Diego, New York, Boston, Chicago, Cleveland, Stockton, and Jacksonville.²²⁷ Fully 20 percent of the applications the FCC has received over the last two years to test PCS systems have come from cable TV companies.²²⁸ Cable companies now account for more of

²²³STATES NEWS SERVICE, May 20, 1992.

²²⁴*Regulation Questionable*, COMMUNICATIONS DAILY, May 12, 1992, at 1; *Interactive Videodisc Vendors*, INFORMATION ACCESS COMPANY, Nov. 1989. According to First Pacific's executive vice-president, "The most strategic way for cable operators to fight back in the telecommunications arena is in offering plain old telephony -- giving their current cable subscribers telephone service. An all-encompassing service: one company, one bill." *Ibid.*

²²⁵Sixty-five cable television companies have formed Cable Television Laboratories, an information-sharing alliance with P.C.N. America. Andrews, *Cable TV in Phone Challenge*, N.Y. TIMES, Feb. 28, 1991, at D1.

²²⁶PacTel Cellular Detroit, for example, uses a combination of leased fiber and microwave for its network and has replaced some BOC-provided local loop circuits with leased cable TV fiber to ICs' facilities.

²²⁷*Ibid.* Four other cable companies have also applied for permission to build experimental systems. *6 Others Granted; FCC Awards Experimental PCN Licenses to Cable MSO's for First Time*, COMMUNICATIONS DAILY, Feb. 27, 1991, at 3. One of the four, Comcast Corp., already operates both cellular and cable systems in several of the markets for which it is seeking PCS licenses. Comcast "plans to use existing cable architecture * * * to connect PCN microcells to cellular switches and to [the] public switched network." COMMUNICATIONS DAILY, Jan. 11, 1991, at 4.

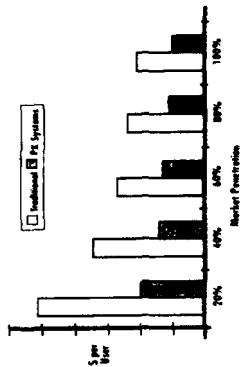
²²⁸C. Lazzareschi, *Cellular, Cable-TV Giants to Test New Wireless Service*, L.A. TIMES, May 23, 1991, at D1.

Figure 2.3. First Pacific Flyer.

Personal Xchange

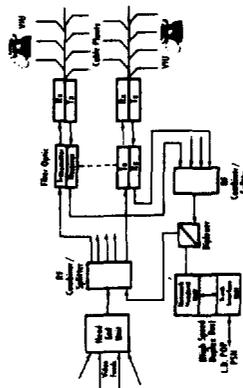
FULLY-SWITCHED DIGITAL TELEPHONY OVER CABLE TELEVISION NETWORKS

Incremental Deployment Provides Economic Advantages



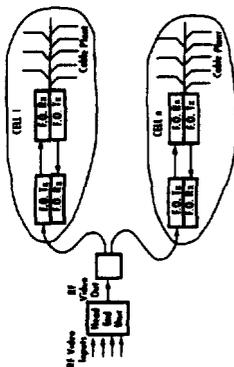
- Cellular-like topology allows bandwidth to be re-used
- Fiber-to-the-feeder (FTTF) architecture with 5 mile radius
- Use cable television system wiring for voice and video
- As subscribers increase, split into smaller cells

Multiple Hub PX™ System



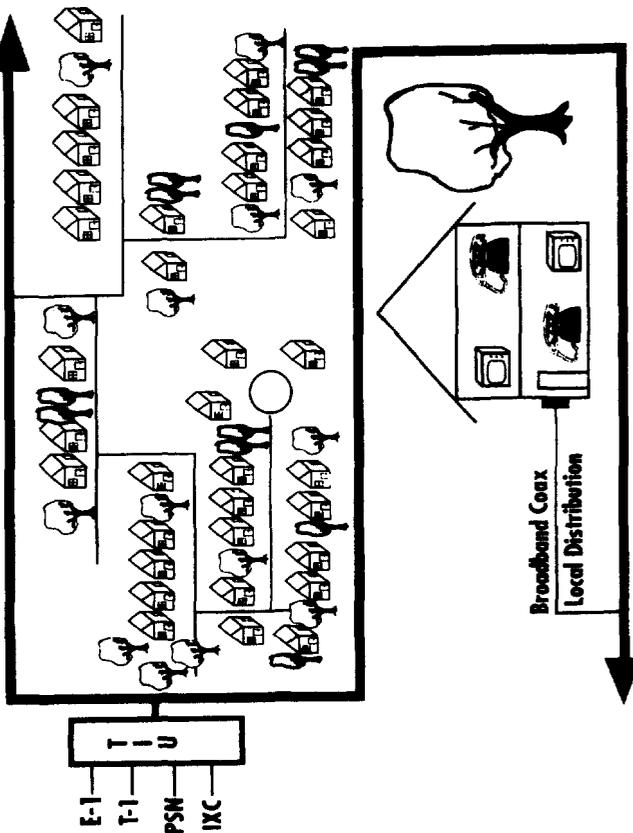
- Cost per subscriber is virtually level regardless of take-up rates
- Be the low-cost provider of digital telephony
- Eliminate heavy capital requirements for switching
- Lower initial cost — faster time to market

Cable System Topology



- Local voice traffic handled within the cable network
- Off-net traffic direct connected to long distance carrier or local telco
- Simplified centralized voice network management
- Provider-defined grade of service

Fiber Optic Trunk with Coax Cable Drops



Voice Services

- Fully-distributed digital voice switching (no central switch)
- Delivers digital voice to every home
- Incrementally expandable from 10 to 10,000+ subscribers
- Simplified wiring: fiber, coax, or fiber/coax hybrid
- Uses standard household telephones; no special phones required

- Provider-defined feature packages for enhanced revenue
- Uniform numbering
- Voice network management for traffic analysis, usage reports, billing, and automatic route selection
- Protects investment in current network infrastructure
- Easily expanded to include data networking

the experimental licenses issued by the FCC than all seven Regional Bell companies combined.²²⁹ TABLE 2.12.

The cable-CAP-PCS ventures have already progressed far beyond the drawing board. The first PCS call in the U.S. to use cable plant for a portion of the transport was placed on February 12, 1992, from the President of Cox Enterprises to FCC Chairman Al Sikes.²³⁰ Similar capabilities are being deployed by cable companies throughout the U.S.²³¹ According to one cable company executive, cable operators

²²⁹Office of Engineering and Technology, FCC, PCS Experimental Applications by Filed Date (Jan. 6, 1992).

²³⁰Fred Dawson, *The PCS Puzzle*, CABLEVISION, June 1, 1992, at 33; see also TELECOMMUNICATIONS REPORTS, Feb. 17, 1992, at 45; *PCS Schooling*, CABLEVISION, May 4, 1992, at 42.

²³¹For example:

The "Ashland Personal Telephone Service" in Ashland, Oregon, is a PCS trial in which microcells operated by McCaw cellular are linked to McCaw's MTSO via fiber optic cable provided by TCI. D. H. Leibowitz, et al., DONALDSON, LUFKIN & JENRETTE, REPORT NO. 1223384, TELECOMMUNICATIONS, INC. (Apr. 28, 1992). According to TCI, "Cable's most logical role -- and its fundamental role in personal communications networks -- is to be a carrier of the voice signal from the microcell upstream to a higher level in the system." *PCS Schooling*, CABLEVISION, May 4, 1992, at 42; John Malone, CEO of TCI is also a director of McCaw Cellular. McCaw, 1990 ANNUAL REPORT 44 (1991).

Time Warner has established an entire unit, Time Warner Telecommunications, headed by former FCC chairman Dennis Patrick, to explore wireless telecommunications opportunities. Fred Dawson, *The PCS Puzzle*, CABLEVISION, June 1, 1992, at 32.

Comcast, another major cable operator, is acquiring Metromedia's cellular interests, and is planning PCS tests in five markets. F. Dawson, *Building Business Opportunities*, CABLEVISION, July 1, 1991, at 16; Comcast's cable systems serve a market with a total population of 7.3 million. *Comcast To Acquire All of Metromedia's Philadelphia Cellular Interests*, TELECOMMUNICATIONS REPORTS, Mar. 9, 1992, at 21.

On September 10, 1992, Comcast demonstrated that it could complete calls between Philadelphia, Trenton, and London (UK) using cable, CAP, cellular, and PCS facilities. To complete the calls, Comcast knit together the Comcast cellular network, Eastern Telelogic's fiber optic CAP network, Comcast's experimental PCS network operating with its cable TV system, and Comcast's London cable system. No local telco facilities were involved. Comcast's president declared, "we have the ability -- right now -- to interconnect existing wireless and wireline technologies to create a new seamless telecommunications network." *Comcast Completes Calls via Integrated Cellular, PCS, Cable TV, Fiber Optic System*, TELECOMMUNICATIONS REPORTS, Sept. 14, 1992, at 12.

Comcast has also acquired a major stake in Fleet Call. Fleet Call President and Chief Executive Officer Brian D. McAuley said that Comcast and Fleet Call make perfect partners because they "share a vision of a national ubiquitous wireless network and anticipate the future merging of wireless and cable technologies." *Cable TV Provider Comcast Agrees to Invest Up to \$100,000,000 in Fleet Call*, TELECOMMUNICATIONS REPORTS, July 6, 1992, at 9.

will soon offer basic cable service free to households that would otherwise decline to subscribe in order to promote the sale of telephone and other services.²³² Other observers agree that cable TV companies are aggressively deploying fiber-optic lines because they are looking beyond ordinary television to such uses as backbone networks for PCS.²³³

The cable-CAP-radio alliances appear to be very favorably positioned. Fiber in the higher reaches of the network, and radio in the lower, appears to offer a promising combination of customer convenience and provider economy.²³⁴ Despite recent advances, it is still difficult to deliver the true broadband capabilities over a radio link. But radio can provide a rich range of mobile telephone services. And as compression capabilities improve, radio may yet prove to be the ideal link between the consumer and the broadband network.

Jones Lightwave Ltd., a subsidiary of Jones Intercable has obtained FCC licenses for PCS trials in Virginia, Illinois, Florida, and Colorado. "The trial objectives include quantifying the capacity and interference characteristics of transporting PCS traffic over cable TV networks; identifying appropriate switch configurations to deliver PCS over a cable network interconnected to the public switched telephone network, interexchange carriers, and other cable networks; * * * and studying various techniques for transporting PCS over different cable networks." *Jones Lightwave Seeks Experimental Authority To Test PCS/Cable Television Transport*, TELECOMMUNICATIONS REPORTS, Feb. 3, 1992, at 12.

²³²*Record CAB Attendance*, COMMUNICATIONS DAILY, Apr. 8, 1992, at 3 (quoting Amos Hostetter, chairman of Continental Cablevision).

²³³R. Sukow, *It's Cable vs. Telcos, Again, on PCS*, BROADCASTING, Jan. 28, 1991, at 53 ("Cable television operators who have installed fiber optic cables to upgrade their systems will be well positioned to provide low-cost interconnection between PCN microcells," said TeleCable Corp.). *Rx For Tough Times*, CABLEVISION, Jan. 14, 1991, at 17. (remarks of Bill Johnson, Pres., Scientific-Atlanta: "The fiber-to-the-serving-area type of architectures we can put in today are designed * * * to make it very easy to migrate to the * * * incorporation of PCN-type networks."). F. Dawson, *Mapping Fiber's Path*, CABLEVISION, Aug. 12, 1991, at 18 ("Over the long term, they also expect that future spectrum requirements will include transmission of PCS and low- and high-speed data for interactive services. It also allows for a third fiber to carry the PCS and data traffic.").

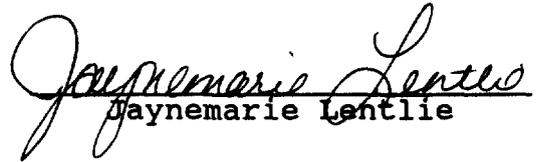
²³⁴GEORGE CALHOUN, WIRELESS ACCESS AND THE LOCAL TELEPHONE NETWORK 550-551 (1992).

Table 2.12. PCN Licenses Granted to Cable Operators.

PCN Licensee	City
Cox Enterprises	San Diego, CA; New York, NY
Cablevision	Cleveland, OH; New York, NY; Chicago, IL; Boston, MA
Cable USA	Omaha, NE; Kearney, NE; Grand Island, NE; Hastings, NE
Continental Cablevision	Boston, MA; Stockton, CA; Jacksonville, FL
Time Warner Cable Group	New York, NY; St. Petersburg, FL; Cincinnati, OH; Columbus, OH
Casco Cable Television	Brunswick, ME
York Cable Television	York, PA; Pearl, MS
Cable TV of East Providence	East Providence, RI
Viacom International	Nashville, TN; Seattle-Tacoma, WA; Milwaukee, WI; Dayton, OH; San Francisco, CA
United Artists Cable Corporation	Denver, CO; Baton Rouge, LA; Westchester, NY; Oakland, NJ; Tulsa, OK
Buckeye Cablevision	Toledo, OH
Wometco Cable TV of Georgia	Lilburn, GA
Media General Cable of Fairfax County	Fairfax, VA
Cencom Cable Associates	Riverside, CA; Alhambra, CA; Olivette, MO; Fultondale, AL
Adelphia Cable Communications	Pittsburgh, PA; Miami, FL; Tequesta, FL; Buffalo, NY
Telecable Corporation	Greenville, SC
Ventura County Cablevision (pending)	Ventura, CA
Las Cruces TV Cable (pending)	Las Cruces, NM
Inland Valley Cablevision (pending)	Hemet, CA
Western TV Cable (pending)	S. San Francisco, CA
Concord TV Cable (pending)	Concord, CA
Chronicle Cablevision of Hawaii (pending)	Kahului, HI
Suburban Cablevision (pending)	Union, NJ
Monterey Peninsula TV Cable (pending)	Monterey, CA

CERTIFICATE OF SERVICE

I hereby certify that a copy of the foregoing "Joint Reply Comments of Bell Atlantic, the NYNEX Telephone Companies, and the Pacific Companies in Response to Notice of Proposed Rulemaking" was served this 14th day of September, 1993, by first class mail, postage prepaid, to the parties on the attached list.


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