

Competition and "Local"
Communications:
Innovation, Entry, and
Integration

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Competition and "Local" Communications: Innovation, Entry and Integration

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I. Introduction

"Local" communications, but for regulation, is about to become an anachronism. Its utility as a meaningful economic concept has faded. Its viability rests solely on the continuation of state and federal regulatory distinctions and the enforcement of the provisions of the Modification of Final Judgment (MFJ). The MFJ provisions -- which are now nearly 10 years old -- set up artificial LATA boundaries to separate inter- and intra-exchange calls. The size of LATAs reflected the minimum traffic requirements considered necessary a decade ago to ensure competition for interLATA services rather than any technical or economic requirements or "natural monopoly" characteristics present in the "local" exchange.

In this paper we suggest that if the local exchange was ever a natural monopoly by virtue of underlying cost conditions (rather than regulation), it is no more. We question whether the fundamental economics of the local exchange really requires regulation of local telephone service. Furthermore, we point out that technological development is sharpening competitive forces in practically all aspects of telecommunication, blurring competitive distinctions of all kinds, and requiring new organizational forms. Moreover, the willingness of some local exchange providers like Ameritech and Rochester Telephone to unbundle has laid the foundation for a further rollback of regulation in several parts of the country so that competitive forces, currently checked by regulation, can be unleashed.

With the removal of regulation an avalanche of new services will be advanced which will greatly benefit consumers and U.S. competitiveness. We also contend that because of regulatory lags, regulation must take a forward looking perspective and attempt to deal with the industry as it will be, not as it was. This is particularly true when technology is advancing rapidly. While there is often considerable uncertainty with respect to the way technologies can unfold, there is often enough definition to the

trajectory of technology to enable one to take the future into account without making egregious errors. Thus, in our view, it is appropriate to contemplate restraints on an industry that currently is competitive, but moving towards monopoly, and to lift constraints on an industry with only modest competition which is nevertheless being inexorably propelled towards greater competition.

II. Local telephone service as a "natural" monopoly?

John Maynard Keynes remarked over half a century ago that "in the field of economic and political philosophy there are not many who are influenced by new theories -- so that the ideas which civil servants and politicians and even agitators apply are not likely to be the newest."¹ Civil servants, politicians, agitators and even some economists have been far too quick to see the local exchange as a natural monopoly. "The defining characteristic of natural monopoly is the necessity to have production done by a single enterprise if costs are to be minimized."² To the extent that the regulation of the local exchange has any grounding in economic theory, it is in the theory of natural monopoly. According to this theory, in industries characterized by cost conditions such that market demand is insufficient for all but one supplier (the "natural" monopolist) to install facilities of optimal scale, society is better off accepting the condition of monopoly -- since industry costs are thereby minimized -- but then regulating to prevent the charging of monopoly prices.

The traditional case for regulation assumed the existence of a "natural" monopoly - a situation where economies of scale persist over all relevant ranges of demand so that a single firm can serve the market at lower cost than two or more firms. Textbook

¹ Keynes, J. The General Theory of Employment, Interest, and Money, p.384.

² Schmanlensee, 1979, p-143.

treatments (e.g., Scherer 1980) then typically use electric power and gas distribution, local telephone service, rail transport between small and medium city pairs and the long distance pipeline transport of petroleum and gasoline as examples of natural monopolies. It was often assumed, because detailed analysis was rarely performed or even reported, that regulation was necessary in such instances to protect consumers from the monopoly pricing behavior that achieving all scale economies supposedly render virtually inevitable.

Recently, however, the scholarly literature has begun to recognize that natural monopolies are not only extremely rare, but that they do not necessarily have to be regulated. The theory of contestable markets demonstrates that it is not necessary for large numbers of actively producing firms to be present to produce efficient outcomes. Where costlessly reversible entry -- sometimes referred to as "hit and run" entry -- is possible, firms which are characterized by economies of scale will still price at efficient levels. Put differently, the threat of potential competition can under certain conditions produce efficient outcomes even in markets where there is only one supplier, or where a single supplier holds a substantial market share. However, the argument here is not that markets characterized by natural monopolies do not need to be regulated, although in some circumstances that is true. Rather, the proposition is advanced that the local exchange is not a natural monopoly any more, if it ever was.

In the telephone business, local telephone service has almost since the beginning been provided by a copper pair of wires strung to each house. Since the major cost of providing local phone service was the cost of the wire, and the wire was sufficient to carry the calls of each customer, it was significantly cheaper to have a single provider of local services. The cost savings from a single provider led to the widespread belief that a "natural monopoly" existed.

Technological change has transformed the economies of traffic aggregation and delivery to blur the distinction between local and long distance service. Technology and the network nature of telecommunications make interconnection a major "local exchange" issue. To be successful, complementary and substitute telecommunications technologies require that users be able to communicate with the current large stock of users connected to the local exchange company (LEC) network. For example, very few subscribers would be likely to pay for cellular telephones if they could not call and be called by wireline telephones. As other networks such as Local Area Networks, cable telephone networks and competitive access provider networks develop, interconnection amongst them will be an important factor in their mutual success.

With the advances in technology, there will be many alternative "local" exchange provision choices available to consumers in the very near future. The introduction of telephone services over cable television systems, vast increases in carrying capacity of wireless technology, and other alternatives to the LEC wireline network will provide telecommunications users with a wide array of choices of interconnected networks. The availability of a number of competitive alternatives for service will reduce the need for regulation of local service prices. In addition, the presence of multiple competitive offerings provides evidence that the "local" exchange is not a natural monopoly, and the differing coverage areas of the competing networks provides evidence that a single geographic definition of "local" service will be difficult to implement. However, the network nature of telecommunications requires an interconnected network of networks.

Computers, communication and cable technologies are converging to create vast new opportunities for the transmission of information to customers. The ability of current organizational structures to fully implement these technologies may be tested in the face of rapid technological change. With significant uncertainty, even in an unbundled, open entry

world, integrated firms may well be the best structural form to bring the age of information into the age of the superhighway.

III. History

An historical perspective can help to explain the current status of telecommunications provision as well as to understand the nature of the need for a network of networks (and future system of systems³) and the organizational structure to enhance innovation. The development of the telecommunications infrastructure in the U.S. illustrates several points that are important for analyzing the current and likely future status of the telecommunications industry: 1) competition existed in the local exchange in the early days; 2) the industry may well have continued as competitive if AT&T had not invited regulation upon itself; 3) interconnection was, and remains, the primary requirement for supporting a competitive and efficient telecommunications industry.

A. The era of competition

The telephone initially competed with the telegraph. Moreover, Western Union, the dominant provider of telegraph services formed the American Speaking Telephone Company in 1877 to go after the telephone business. Western Union hired Thomas Edison to advance the technology and he quickly came up with the carbon transmitter which provided voice quality superior to Bell, thus giving Western Union a considerable competitive advantage. With Theodore Vail as CEO in the late 1870s, Bell competed head to head with Western Union in installation, racing to install exchanges in large cities and pushing on technological development. Bell's ability to install phone lines was hindered by Western Union's control of the telegraph lines because Western Union refused

³ See Noam (1993) for the origins for these terms.

services to places that installed Bell telephones, thus effectively prohibiting Bell installation in hotels, railways and newspaper offices that needed Western Union telegraph services.⁴

In September, 1878, Bell filed a patent infringement suit against Western Union over its telephone patents. As part of a settlement to this litigation, in 1879 Western Union agreed to withdraw from telephone service for seventeen years and to sell its telephone business -- then 56,000 subscribers in 55 cities -- to Bell. In return, Bell agreed to stay out of the telegraph business. Bell kept its rights to compete against Western Union for long distance services. Thus Bell was free to compete with Western Union at all levels, so long as it stayed out of telegraph, but Western Union and the telegraph was basically killed as a competitor to Bell.⁵ It is unlikely that such an agreement would be sanctioned under the antitrust laws in place today. (At the time, however, the telephone and telegraph were complementary as the telephone technically did not have the capacity for long distance services and the telegraph was not competitive for local service because it required skilled operators. The telegraph increased the value of telephone service by allowing long distance communication.) From 1879 on, Bell had a virtual monopoly on telephone service until its patents expired in the mid-1890s. Following the 1879 Western Union agreement, the Bell Company was reorganized as the American Bell Company in 1880. The agreement eliminated Bell's strongest competition and according to one observer, "left Bell close to the position of a textbook pure monopolist until 1894."⁶

⁴ See Brock, G. The Telecommunications Industry, p. 94.

⁵ This "surely was one of the most one-sided deals ever struck." Noll, R.G. and Owen, B.M. "The Anticompetitive Uses of Regulation: *United States v. AT&T*" in Kwoka, J.E. and White, L.J. (eds.) The Antitrust Revolution, 1989, p. 291.

⁶ Brock, G. The Telecommunications Industry, p. 99.

Bell's market position was not based on natural monopoly; rather it was based on Bell's patent position and its market division arrangement with Western Union. In 1893 and 1894, with the expiration of two key Bell patents -- though another 900 or so covering every aspect of the telephone and related equipment remained alive -- entry rapidly occurred, despite the network externalities and scale economies that Bell enjoyed.⁷ In 1894, 80 commercial systems and seven mutual systems were established. By the end of the year, new entrants had 5% of the market, or 15,000 installed phones. "By 1900 telephone competition was widespread."⁸ (By 1902, 3,000 non-Bell commercial systems had been established.) The non-Bells controlled 38% of the installed phones in the U.S., and "provided direct competition to almost all Bell operating companies."⁹ The large number of providers present and viable does not appear to be indicative of strong natural monopoly conditions.

Generally Bell prices fell after competitors entered.¹⁰ Bell itself pushed to compete by expanding its long distance offerings, which it did through innovation and investment.

⁷ As Brock notes "While it would be practically impossible for a new entrant to establish a system equal to Bell's in a short period of time, the systems advantage to Bell was reduced by the fact that most telephone subscribers communicated with a relatively small number of people. Although the value of having a telephone would rise with the total number of people connected, the amount of increase would depend on the existing subscribers' desire to communicate with new subscribers. If a new entrant could connect to a small but homogeneous subgroup of the population, its service would be valuable despite the limited total number of phones in the system. If the Bell system and the new competitor generally served different social classes in the same city (as often happened during the period of competition), the advantage of having the two systems interconnected could be relatively small. The fact that telegraph service was far more pervasive than long-distance telephone service at the expiration of the patents also reduced the systems advantage by allowing subscribers to an isolated telephone exchange to conduct long-distance business via telegraph."

⁸ Brock, p. 114.

⁹ Brock, p. 124. See also Noll, R.G. and Owen, B.M. "The Anticompetitive Uses of Regulation: *United States v. AT&T*" in Kwoka, J.E. and White, L.J. (eds.) The Antitrust Revolution, 1989, p. 291.

¹⁰ Irwin, M. "The Telephone Industry," in Adams, W. (ed.) The Structure of American Industry, 6th ed. 1982, p-300.

Competition clearly worked; in fact it worked very well, despite the lack of interconnection. Moreover, " the price reduction, selling efforts and service improvements of the competitive era created a dramatic surge in telephone demand -- the total number of telephones doubled during the last 10 years of monopoly, but were multiplied by a factor of 12 during the first 10 years of competition."¹¹

As Bell lost market share to the independents, it began a series of mergers and acquisitions. This policy reversed Bell's decline in market share. The political opposition to Bell began to mount, however, so in 1913 the company entered the Kingsbury commitment with the Department of Justice. The Kingsbury Commitment required AT&T to interconnect its long distance service with the remaining independent telephone companies and be subject to state and federal regulation. It did not have to divest any operating companies other than Western Union, which it had acquired five years earlier. In addition, it was able to continue to acquire local telephone operating companies. In fact, in 1921, Congress immunized telephone and telegraph company mergers from the antitrust laws.¹²

B. The era of regulation

While the market had clearly demonstrated that it could support competition, the political winds in the early decades of this century favored regulation. Vail's strategy was to embrace regulation rather than to fight it. In Bell's 1907 annual report, Vail stated:

"It is contended that if there is to be no competition, there should be public control.

¹¹ Brock, p.122.

¹² Irwin, M. "The Telephone Industry." in Adams, W. (ed.) The Structure of American Industry, 6th ed. 1982, p-301.

It is not believed that there is any serious objections to such control, provided it is independent, intelligent, considerate, thorough and just, recognizing, as does the Interstate Commerce Commission in its report recently issued, that capital is entitled to its fair return, and good management or enterprise to its reward."

In a 1915 speech, Vail forthrightly stated that regulation "is as necessary for the protection of corporations from each other as for protection to, or from, the public." With the support of both Bell and the independents, the Interstate Commerce Act was amended in 1910 to bring interstate telephone companies under the jurisdiction of the ICC. Regulation simultaneously stabilized rates, increased the difficulty of new entry and calmed public criticism of Bell. Regulation in subsequent decades helped maintain AT&T's dominance against the threat of new technologies, such as microwave radio. With the assistance of regulation, social subsidies were strengthened at first to advance Vail's vision of universal service, then subsequently to redistribute income. The economic concept of natural monopoly was used to ratify the logic of regulation.

The divestiture of AT&T in 1984 supposedly marked the separation of the "natural monopoly" portion of the telecommunication infrastructure from the competitive portion. Divestiture was accomplished with such a broad brush, however, that "natural monopoly" boundaries, if they existed, could not possibly have been honored. In addition, changes in technology since divestiture, both in the "local" exchange and long distance transmission, have significantly altered the economics of transport such that any relation of the LATA boundaries to fundamental cost discontinuities must be purely coincidental.

Changes due to technological advance since divestiture are continuing, pushing at the boundaries of the local exchange from many different directions. The next section will explore the variety of technologies that are and will soon be available and how those technologies affect the economics and definition of local service.

IV. Further challenges to the local exchange "natural monopoly"

For the past 20 years, technology has further challenged the notion of the natural monopoly. Technology is not only making the local exchange more susceptible to competition, it is further blurring the distinction between interexchange and intraexchange services. Regulatory distinctions between categories of service themselves affect technical choice and network design and therefore may themselves be an important factor in determining the direction of innovation and the nature of competition.

For example, the introduction of fiber optics into the telephone networks has significantly reduced the cost of transport so that the cost of calls is very insensitive to distance. As a result, depending on the amount of switching, the real resource cost of a 10 mile "local" call may not be very different than the cost of a 100 or 1,000 mile long distance call. However, because of regulation and imbedded subsidies, the prices for these calls may be very different. In response to these price-cost discrepancies, many companies have been able to arbitrage the difference, and route calls through the least cost jurisdiction even if it is not the least resource cost routing. This results both from the implicit subsidies as well as the decrease in cost of call transport.

The implementation of fiber optic technology is not the only change that is affecting the economics of local communications. There are a variety of technological advances that have lowered local exchange costs, changed the nature of local exchange costs to threaten the natural monopoly and reduced the difference between long distance and local telephone calls.¹³

¹³ A variety of authors have investigated the impact of alternative technology. Rapid technological change has made it difficult for the references to remain up to date, but a few include Reed, D. Residential Fiber Optic Networks: An Engineer and Economic Analysis, Artec House, 1992, Calhoun, G. Wireless Access and the Local Telephone Network, Artec House, 1992, Huber, P. Kellogg, M. and Thorne, J. The Geodesic Network II: 1993 Report on Competition in the Telephone Industry, The Geodesic Company,

New enabling technologies have and will lead to alternative provision and enhanced provision of telephone service. The advance of technology has come in many different arenas and from many different enterprises in response to several different regulatory regimes. Especially pertinent to the discussion of "local" telephony are the impact of radio based technology, the introduction of fiber optics and significant advances and decreases in prices of microelectronics and computing power.

A. Radio based technology

Radio based technologies are rapidly increasing quality, capacity and decreasing costs of wireless telephone service. The combination of these three factors makes radio based local loops much more of a competitive threat to the traditional wireline based local "natural" monopoly.

Radio has gone through a series of advances since it was first introduced. These advances are currently most evident in the explosion of cellular phone usage that has occurred over the past ten years. Last year, there were more new cellular phone "lines" activated than local exchange lines. Despite its success, and the predictions that cellular might compete with landline service, it has yet to provide significant price competition for landline telephone service. In some respects, this may be due to capacity limitations and the inability of providers to price discriminate for mobile versus fixed service. The first problem, capacity constraints, is in the process of being rectified for the majority of the country with the conversion to digital signaling. Digital cellular transmission is expected to bring an immediate 3-fold increase in capacity. System capacity at that level will be

1992, Reed, D. "Putting it all Together: The Cost Structure of Personal Communications Services," FCC Office of Plans and Policy Working Paper No. 28, November 1992, DeSurvire, E. "Lightwave Communications: The Fifth Generation," *Scientific American*, January 1992, and Egan, B. Information Superhighways: The Economics of Advanced Public Communication Networks, Artec House, 1991.

sufficient to provide a competitive alternative to wireline service in all but the very largest areas of the country.

Although cellular is currently providing only modest competition to landline service, several factors are likely to reduce cellular prices in the near future and make it more of a competitive alternative to landline service. Cellular is likely to face price competition from two sides in the near future. Nextel recently began operation of its digital, cellular SMR service in Los Angeles. With advanced technology, they are expected to be able to provide cellular quality service. The addition of a third high quality mobile service provider will expand capacity further and put downward pressure on prices. Other SMR operators also appear to have plans to introduce digital cellular technology to their networks.

In addition, future wireless competition will put pressure on both cellular and landline service. PCS is expected to provide mobile communications and to add significantly to wireless capacity. Because the higher PCS frequencies have limited effective ranges, the handsets will be smaller than comparable cellular phones. However, the systems will require significantly more cells, and thus may impose limitations on mobility. This will cause them to charge lower prices than cellular systems and serve as competitors to portable and wireline phones in addition to many portable cellular phones.

The additional capacity offered by the introduction of digital signaling and the increase in spectrum available for mobile communications will eliminate the capacity constraint in most areas. At that time, service prices should be based on the cost of installing the infrastructure and maintaining the system. In many cases, these costs will be comparable to or lower than the costs faced by a traditional wireline company. Especially as one moves away from dense urban areas, wireline costs increase, spectrum scarcity

decreases and cell siting becomes less expensive. As a result, the wireless technologies become much more competitive with wireline service.

On additional future radio based technology is the Iridium project proposed by Motorola. This project proposes a world-wide satellite network so that users can communicate anywhere throughout the world. The signal will be directed to a satellite from the handset and then back to the other handset or local network. Although this is expected to be a relatively expensive service, it is another wireless technology that may someday turn "local" communications into global communications.

B. Fiber optics

Fiber optics have dramatically changed the nature of competition in communications. Because fiber is so much more efficient than microwave technology, the cost of transmission of calls is much less sensitive to distance than it was at the time of divestiture. Because of the negligible cost differences, it is hard to determine why a 10 mile call should be "local" and a 100 mile call long distance. The decline in transmission costs will lead to the substitution of fiber for switching. It will become more cost effective to circuitously route calls over fiber networks if it allows the network to minimize its switching costs if the cost of transmission decreases relative to the cost of switching.¹⁴

Fiber has not only affected the cost structure of the interLATA carriers. It has become an integral part of the local exchange. Local telephone and cable companies are racing to introduce fiber into their networks. Just as Bell and the other telephone

¹⁴ Note that both technologies have been experiencing significant decreases in cost, but if transmission costs decrease more rapidly than switching costs, system designers will substitute transmission for switching at the margin. See Huber, P. Kellogg, M. and Thorne, J. The Geodesic Network II: 1993 Report on Competition in the Telephone Industry, The Geodesic Company, 1992, p 3.37, and DeSurvire, E. "Lightwave Communications: The Fifth Generation." *Scientific American*, January 1992.

companies competed to wire networks, these two competitors are racing to be the first to have a high capacity two-way network and to reap the benefits of early adoption. There are many issues to be resolved about the introduction of fiber -- whether it will be fiber to the home, fiber to the curb or fiber to the neighborhood -- but it is clear that fiber and its carrying capacity have had a strong impact on the nature and cost structure of communications.

The development of fiber optic technology has led to the first competitive alternative to the LECs -- competitive access providers. CAPs have deployed fiber optic networks through dense downtown areas. In addition to the arguments that they are able to avoid the social subsidies embedded in LEC access rates, the CAPs claim that they are satisfying a need for high capacity high quality high speed data transmission links. Without the transmission quality of fiber, CAPs would not be able to fill this need and therefore might not be able to justify their existence, and the competitive pressure they bring to bear on LEC rates.

Cheap transmission has a significant impact of the economics of information services.¹⁵ A large portion of information services rely on accessing databases. With cheap transmission, it becomes economical to have a single version of the database and allow users from a wide area access the same database. In this way, the provider does not have to duplicate the facilities to run the database, updates to the database are simplified and all users accessing the database receive consistent information.

The preceding two sections show the complementary nature of the competitive effects of fiber and wireless technologies. Fiber is being introduced by CAPs and cable companies in dense urban areas to provide high capacity service. In these areas, the costs

¹⁵ See submission of Jerry Hausman (1993).

of wiring per telephone is relatively low since the density is high. In these areas, spectrum is also relatively scarce and expensive. Construction and operation of a high quality cellular like system would be expensive because of the opportunity cost of the spectrum, the high price of the land rental for cell sites and the requirement of a large number of cell sites. On the other hand, in suburban and rural areas, it is more expensive to string wires, but spectrum is less intensely used and there is more choice for cell sites. As a result, technology is changing the nature of the natural monopoly in both high population and low population areas.

C. Equipment costs

The relentless advance in power and decrease in price of microelectronics and computing technology has had a large impact on the price and performance of customer premise equipment as well as central office switching equipment. For example, these cost decreases affect the total cost of cellular service since the handsets have become significantly cheaper, and operators pay lower prices for incremental switching capacity. Because switching and controller costs have decreased, the costs to provide alternative forms of local access have decreased. Cable, CAPs and radio based carriers will benefit from these lower costs as they begin to compete with local exchange carriers.

The decline in microelectronics prices will make it easier for cable companies to compete with LECs. For example, if the cable version of telecommunication provision is a 500 channel interactive broadband network, the cost of the customer premises equipment to link into that network will be significantly cheaper and more sophisticated than it would have been only a few years ago. As a result, even if the cable and telco networks are significantly different, the competition on a variety of features ensures that the reductions

in cost for cable telephony will make them more competitive with LEC providers than they would have been.¹⁶

The pace of electronics advance has blurred the distinction between transmission and switching as well as between central office equipment and customer premises equipment. For example, the increase in central office technology has allowed the offering of advanced voice messaging systems. While these may offer more features than standard home answering machines, they provide direct competition for each other. PBXs are an example of an advance outside the central office that also increased the competition between central office services, Centrex, and customer premises equipment. PBXs not only provide competition for central office services, but because they provide switching services, they allow users to reduce their use of loops, and to pay for fewer lines.

The next section analyzes the effect of these technologies on the entry strategies of potential entrants into the local exchange.

V. Entry

Entry can be divided into two broad categories: entrants using existing local distribution technology and entrants using new technologies. This discussion will also consider entry in the context of an unbundled network like the one proposed by Ameritech in its Customers First Plan filed earlier this year with the FCC. This analysis seems to be applicable for other regions as well since the FCC has steadily been decreasing the size of the "bottleneck" and increasingly allowing competition. The recent switched and special access orders and expanded interconnection have opened traffic on the local exchange network to competition beginning just outside the local switch.

¹⁶ See Teece, Mitchell, and Hartman (1993) for a discussion of the impacts of competition on a variety of features in addition to price.

A. Entry using new technology

1. Cable company entry

Cable companies are positioning themselves to provide local exchange services. Cable companies have capacity to provide transport from LEC end offices to IXC POPs.¹⁷ They are also interconnecting their headends with fiber cable to offer advertisers the ability to reach region-wide audiences.¹⁸ One indirect, but non-trivial result is the creation of capacity for the transport of telephone calls. Cable companies are also putting fiber further into their networks, giving them the ability to provide end-to-end voice and video service.

At the forefront of cable company activity is Bell Atlantic's proposed acquisition of Tele-Communications Inc., a move that will give the merged entity access to 42 percent of U.S. households and positions the company to offer consumers a complete package of telecommunications and interactive video services.¹⁹ In the News Release issued by Bell Atlantic, TCI President and CEO John Malone and Bell Atlantic chairman and CEO Raymond Smith both stressed their commitments to quickly forging a full service network within the Bell Atlantic region. Smith is quoted as saying that "We [Bell Atlantic/TCI] will complete fiber optic video network capabilities in some areas in 1994 and in our top 20 current markets by 1998."²⁰ In a related article, Smith states that the merged entity will

¹⁷ TCI, in 1992, became the largest single buyer of fiber in the world, based on mileage. (Telephony, May 11, 1992, v.222(19), p. 6.) Time Warner already offers local connections to long-distance carriers in Indianapolis and Kansas City. (Wall Street Journal, June 24, 1993, p. B7)

¹⁸ The headend is the originating point of a signal in cable TV systems.

¹⁹ New York Times, October 13, 1993, pp. A1, C7; Wall Street Journal, October 13, 1993, p. A3.

²⁰ Bell Atlantic News Release. "Bell Atlantic, TCI and Liberty Media To Merge," October 13, 1993, pp. 1-2.

be "the first truly nationwide provider of wire and wireless service, video-on-demand, and interactive media, all rolled into one."²¹ These statements are very credible, especially given Bell Atlantic's reputation as a forward-looking telecommunications company, and TCI's success with its CATV/telephony venture in the U.K.

In another cable and RBOC joint effort, Time Warner/US West recently made a presentation disclosing that they intend to upgrade their physical plant to begin the provision of telephone service by the end of 1994.²² Their proposed service seeks to target residences and small businesses in addition to large businesses. They expect to charge rates that will undercut LEC rates. The partners are both well-financed, experienced companies. Time Warner claimed in its presentation that it has been very successful competing against British Telecom in England.²³

Time Warner's Orlando, Florida trial is another example of cable competition for local service.²⁴ Set to be completed next year, the system as envisioned will be based on a fiber optic backbone/copper to the home architecture, digital compression technology and digital storage and switching systems. The network will give the cable company the ability to offer, among other things, voice and data transmission services and PCS. Jones

²¹ Business Week, October 25, 1993, p. 37.

²² Time Warner/US West presentation to the Ameritech Region Regulatory Council Customers First Ad Hoc Committee (a group of state regulators from the Ameritech region who are jointly reviewing Ameritech's Customers First Plan)

²³ Time Warner's success in England comes without the benefit of the unbundling and switch integration proposed in Ameritech's Plan. As a result, the exclusionary practices opponents suggest Ameritech might engage in are distinct possibilities in England and yet have not served to prevent competition.

²⁴ Time Warner is also seeking regulatory approval to offer telecommunications services in San Diego. The services, which are scheduled to begin in 1995, would compete directly with Pacific Bell for business customers. The company has said it will build a fiber-optic network to connect the local businesses to long-distance carriers and to link offices of companies in the area. Time Warner will also offer video conferencing and data transport. (Wall Street Journal, June 24, 1993, p. B7.).

InterCable recently announced a test of telephone service over its cable system. With the help of MCI and Scientific Atlanta, the test will allow users to bypass the LEC and receive faxes while using the phone and have access to interactive games.²⁵

Comcast is also poised to begin telephone service.²⁶ The New York Times reported that Comcast had continuing talks with both AT&T and MCI, indicating their interest in telephone service. Comcast also is one of the owners of Nextel, a specialized mobile radio company that recently received FCC approval to provide cellular-like service in a number of major cities. Furthermore, Comcast offers cable and telephone service in Britain. In the U.S., Brian Roberts, President of Comcast says "Long term, the cable companies want to look like the phone companies with ubiquitous coverage. We've wired up nearly all the homes, but not the businesses. So that's why we're investing in Teleport."²⁷

Once these ventures and others begin offering services to consumers, a significant marketing advantage will emerge. A cable company can package its programming and phone service, offering the customer the convenience of one stop shopping and possibly adjusting the prices of the individual services to convince the customer to subscribe. Such bundling has proven highly successful in the U.K. As one example, Cable and Wireless, a British concern, is now signing-up close to 15,000 residential customers per month through the local cable companies.²⁸ There is no reason not to expect similar inroads here in the U.S., especially with an interconnected network of networks.

²⁵ San Francisco Chronicle, November 23, 1993, p. B1.

²⁶ Comcast is not only the third largest cable company, they are also the fifth largest independent cellular telephone provider, giving them a significant presence as a local service provider.

²⁷ New York Times, September 8, 1993, p. C13.

²⁸ Cable and Wireless, Report and Accounts 1993, p. 12.

2. Wireless entry

Wireless carriers provide both immediate and future competitive entry alternatives for local exchange service. AT&T's planned \$18 billion purchase of McCaw Cellular will position wireless technology as a direct competitor to the RBOCs' local telephone business.²⁹ The company's brand name, marketing prowess and financial resources eliminate any doubt that an AT&T backed cellular venture could quickly become a nationwide player in the local telecommunications services area. Furthermore, the merger places AT&T in the enviable position of being able to offer its subscribers a complete package of local, cellular and long-distance calling.

"Nonwireline" cellular carriers provide nearly ubiquitous service throughout the country. While their "loops" may not currently provide a complete competitive alternative to LEC loops, they are positioned to do so easily. Cellular carriers have sophisticated switches and, in some cases, fully functional networks and office support in place that will allow them use spectrum for "fixed" loops and to provide competitive local service. Cellular carriers also possess a select list of customers with a high demand for telecommunications services.

Cellular and other wireless carriers appear well situated to provide future competition for the local loop, especially in relatively high cost areas. In these areas, spectrum is used less intensively than in major metropolitan areas, so providing competitive loops would not divert spectrum from a relatively more valuable use.

In the future, the combination of leased wireline access and wireless access may give the cellular carriers a unique advantage in marketing to customers. If they succeed in

²⁹ The New York Times, August 25, 1993, pp. C1, C2.

their drive to receive PCS licenses, wireless carriers would provide customers with three options for "loops."³⁰ Under one example, the cellular provider can position a cell site directly adjacent to a wireless PBX serving a large corporate complex. The cellular carrier could handle local mobile traffic and serve as the local carrier for all interLATA traffic originating and terminating at the PBX. Though the coverage for the cellular portion of the traffic would be more limited than for wireline traffic, the volume of traffic, combined with the absence of interconnect charges for the cellular carrier, would offset at least some of the gap.³¹

With the imminent conversion to digital signaling for cellular, there are a number of cellular operators that will have significant excess capacity. They can market this capacity for use as simple local service. In fact, products are being developed to allow cellular operators to sell service to wireline customers that is transparent to the user.³² Other implementations could include selling "loops" to serve as connections for alarms that need only infrequent access.

3. Amalgamations and alliances

Given the infrastructure of cable companies, CAPs and cellular carriers, and the emergence of alliances among them,³³ a possible future competitive alternative combination would be to use CAPs to provide downtown loops, cable companies to

³⁰ Goldman Sachs, analyzing the recent AT&T/McCaw deal, wrote that the "relationship opens up a major opportunity for McCaw to provide bypass services for AT&T...." (Goldman Sachs Investment Research, The McCaw/AT&T Alliance, November 24, 1992, p. 1.).

³¹ See Goldman Sachs Investment Research, The McCaw/AT&T Alliance, November 24, 1992, p. 14, for an example of such a strategy.

³² See the discussion of Telular Inc.'s "magic box." (Wall Street Journal, October 4, 1993, p. B1.)

³³ For example, one of the largest CAPs, Teleport, is owned by two of the largest cable companies, TCI and Time Warner.

provide loops for suburban and residential customers, and cellular companies to provide loops in rural areas. Combinations of the various technologies also lead to greater geographic coverage. An entry strategy using a combination of the assets of these companies would be reflected in the pervasive entry at multiple nodes shown in Figure 2.

Another group of potentially formidable competitors, and moving closer to a position of actual entry with each passing month, are the LECs from other regions. The RBOCs and GTE are all large, financially sound carriers with the requisite technical engineering, marketing and billing capabilities to provide local exchange services.

As already noted, US West (with Time Warner) intends to enter other regions and begin providing local exchange service within 2 years, and Bell Atlantic, through its purchase of TCI, is readying itself to provide nationwide local service. Entry by the other LECs is just as likely. Both Sprint and GTE have local exchange operations and it would be logical for them to expand their service areas through a combination of resale and facilities construction. Most RBOCs have cellular operations in areas outside their local exchange territories. The market presence of these companies provides a natural springboard for the extension of the scope of their services into the local exchange. Such a strategy could be accomplished via their own facilities, or by a pooling of talents and resources with the other potential entrants (except the IXC's because of the consent decree).

B. Entry using existing technology

Competitors using existing technology, depending on their specific capabilities, are poised to compete for either the entire market or for distinct subsets of customers. Because each potential competitor has different competitive advantages, the range of customers benefiting from new entry and expanded competition nearly spans the gamut of local exchange customers. In addition, the ability to enter with minimal investment and to

act as a reseller in an unbundled local network gives an entrant complete market presence with little risk.³⁴

1. Interexchange carriers

The most likely source of immediate and influential entry into local service will be the IXC's, especially the large, nationwide carriers like AT&T, MCI and Sprint.³⁵

AT&T has itself advanced the case for seamless end-to-end integration through its Megacom service and private networks. The McCaw acquisition is the sine qua non of a company positioning itself for the end-to-end provision of service. AT&T's purchase shows the obvious synergies between the two businesses and the expected future synergies. Indeed, AT&T's public statements suggest that the company's strategy is to provide their customers with end-to-end service.³⁶

³⁴ See Porter, Michael E., "Competition in the Long Distance Telecommunications Market," p. 9, Appendix A to "Motion for Reclassification of American Telephone and Telegraph as a Nondominant Carrier." In the Matter of Policy and Rules Concerning Rates for Competitive Common Carrier Services and Facilities Authorization Therefor, CC Docket No. 79-252. He discusses the entry of WilTel and others into interLATA service by employing a niche strategy in combination with resale to expand service to the entire marketplace.

³⁵ Indeed, Sprint already provides local wireline service. In 1991, the company had local service revenue of \$2.3 billion for the nation, \$478 million in the Ameritech region alone. (Table 29, FCC Preliminary Statistics of Communications Common Carriers, 1991.) AT&T, despite its protestations to the contrary, will also enter the local service business with its imminent acquisition of McCaw Cellular.

³⁶ For example, Bob Stanzione, AT&T Vice President of transmission systems, recently acknowledged that for AT&T to compete in the delivery of multimedia communications services, the company will "have to have alliances of some sort with the companies that provide the last-mile access to the home." San Francisco Chronicle, June 7, 1993, p. E7. These actions diminish the credibility of AT&T's public pronouncements that its acquisition of McCaw does not make it a local phone company.

Earlier this year, in an interview with Forbes, AT&T's vertical integration was touted by Arno Penzias, vice-president of research at AT&T's Bell Laboratories, as being "a far greater asset than it's ever been in the past." The article went on to say that "the ability to merge all the elements" - wireless, voice, data and video - is "what makes [a] network valuable" in today's marketplace. Forbes, February 1, 1993, p. 67. See also AT&T 1993 Annual Report.

MCI, through its subsidiary, Access Transmission Services, has filed for a permit to begin competitive access service provision in Indiana. MCI also recently announced the planned test of cable telephony with Jones InterCable discussed above. Sprint is already an active participant in local exchange telephony. MCI and Sprint will have additional incentives to add end offices because of prospective changes to switched and special access transport pricing under the recent FCC rulings. MCI and Sprint currently receive transport on an equal charge basis with AT&T, but the recent FCC orders regarding special and switched access may make the IXC's more sensitive to the location of their switches. MCI and Sprint will now have incentives to provide their own trunks from high volume end offices to their POPs. This will create excess capacity and position them to take advantage of the unbundling and switch integration plan.

All three companies have the ability to self-supply transport, and, once the necessary construction and right-of-way expenses are incurred, the incremental cost to add traffic is quite small.³⁷ Specifically, once the IXC's have successfully developed the transport segment of their network, they will be able to sign up additional subscribers at little added cost in an unbundled environment since they can rent loops from the LEC and transport the traffic to their own switches.³⁸ In addition, as a major manufacturer of switches, AT&T is in the position to obtain switching at a lower cost than any of its competitors and could easily position switches for local service.

³⁷ MCI has purchased a significant amount of right of way from Western Union. (Telecommunications Alert, May 11, 1992) MCI has also recently filed for state certification as a competitive access provider in Indiana.

³⁸ According to an MCI expert economist, Kenneth Baseman, "the marginal activation costs and marginal operating costs for new circuits activated on facilities already in place are generally quite low and do not differ significantly depending on whether the IXC is collocated or the IXC's POP is several miles away." Affidavit of Kenneth Baseman in CC Docket No. 91-141.

IXCs enjoy their highest margins in the small and mid-size business segment.³⁹ Consequently, IXCs are likely to pursue these customers first for their provision of end-to-end service.⁴⁰ AT&T, as well as other large IXCs, could compete by installing switches (or using excess capacity on its existing switches) to supply dial tone and usage services and routing the traffic to one of their many existing POPs. This could be economical even in an area with a small amount of traffic because the large IXCs could either share capacity on a nearby existing long distance switch or economically use a somewhat distant switch to provide local dial tone until traffic justifies a truly local switch. Adding switch capacity is relatively simple with modern modular switches such as the 5ESS. Since the IXCs have fiber facilities in place with excess capacity, the cost of transport to take advantage of a distant "local" switch would be minimal.

An unbundled local network means that the IXCs, and everyone else for that matter, will always be able to access LEC facilities; entry can occur before proprietary facilities are built, or even planned. New construction can be delayed until such time as the current or forecasted volume of traffic justifies the investment. As a result, entrants avoid large, risky infrastructure investment.

2. Competitive access providers

Competitive access providers (CAPs) have entered many major cities by deploying fiber loops through dense downtown areas. They are already providing competition for local exchange carriers without the benefit of unbundled local networks. With the recent

³⁹ "Long Distance - A Healthy Industry Ready To Conquer New Territory", Bernstein Research. May 1993, p. 10.

⁴⁰ IntraLATA margins are also quite high for this customer class. The average revenue per line, at \$60-80 (which can be computed from Ameritech's access revenues by customer class), is far above the overall per line average of \$45-50.

FCC orders discussed above, the competition for transport services will increase the traffic on CAP networks, decreasing their average unit costs and making them more effective competitors for a larger portion of business.

CAPs appear to have their eyes on expanded services. MFS has recently announced that it will offer local and long distance services in New York City.⁴¹ To support this effort, it plans to install Ericsson switches in its network. The service will be "available immediately in Manhattan and will be extended to the rest of the New York metropolitan area over 'the next few months.'"⁴² MFS does not intend to stop with New York. According to its half page advertisement for this new service, "Service is available in New York now. National expansion is underway."⁴³

CAPs have invested in loops that give them access to a large number of customers with a relatively high demand for telephone service. CAPs may not be positioned to compete for customers throughout the local service areas, but they are well beyond the venture capital stage and now represent formidable competitors to the local exchange carriers. The largest CAP, Teleport, is owned by several large cable companies, including TCI, Comcast and Cox, and thus possesses the financial backing to ensure its ability to effectively compete. In addition, the cable investment in a telephone service provider indicates that synergies may be expected and that the CAPs are expected to provide some of the telephony expertise.

⁴¹ Wall Street Journal, October 6, 1993, p. B3. MFS has also filed a petition in Illinois to provide dialtone service. [Cite needed.]

⁴² Id.

⁴³ Wall Street Journal, October 6, 1993, p. B7.

Investment houses and the CAPs themselves believe that CAPs will play a significant role in local telecommunications. In discussing the acquisition of Teleport by Tele-Communications, Inc. and Cox Communications, Goldman Sachs says that the alternative access market is "substantial" and represents a significant opportunity for cable companies.⁴⁴ TCI's CEO, Dr. John Malone, believes that there is a potential market for alternative access carriers of as much as \$40 billion annually; he expects that the business will be at least \$1 billion in three years with a potential to represent 25% of the total access marketplace.⁴⁵ Such heady numbers, while obviously not precise, are indicative of the potential for CAPs to become significant access providers.

With switch integration, CAPs with switches can easily become the local phone service provider to those businesses passed by their network. In addition, the ability to rent loops in areas their networks do not pass, means that they can provide service, with little incremental investment, to any business or residence that is served by the end offices they pass with their loops. CAPs can also expand their geographic coverage sequentially and determine the optimal path for their new fiber loops by leasing capacity in the short term while determining where to install plant expansions. Finally, the CAPs will be able to compete to serve multi-location businesses even when they do not have a physical presence near each of the satellite offices.

CAPs will be able to increase their target customer base significantly with unbundling. CAPs are starting with a customer reach already. With unbundling, CAPs may deploy fiber in other areas, giving them even more potential customers. CAPs can use unbundling to determine demand for their services and perform true market research

⁴⁴ Goldman Sachs, Communicopia: A Digital Communication Bounty, July, 1992, p. 20.

⁴⁵ Id. at 21.

by purchasing pieces of LECs' networks before determining where to construct their own facilities. They can greatly reduce the risk of new construction by acquiring an active customer base prior to completion of their facilities.

C. Unbundling and integration

Because of the network nature of telecommunications, stand-alone networks cannot always deliver head to head competitive threats to existing telephone systems. While there are many instances where private networks, or arrangements which provide direct access to IXCs through CAPs, provide competition to LECs without interconnection to the LEC network, however, these networks do not always provide the entire communications needs of their customers, and they are generally not stand-alone networks. In short, mutual interconnection is very important for the success of alternate "local" networks.

Ameritech recently proposed its Customers First plan to the FCC. Under this plan, Ameritech proposes not only to provide mutual interconnection to other local carriers, but it will unbundle its local network. Rochester Telephone also proposed fundamental unbundling of its network elements, including unbundling the local loop from switching. In addition, they proposed full interconnection, including interconnection with its SS7 network. In essence, the unbundling allows for immediate competitive local service entry by any of the parties discussed above. They can use portions of their own networks and combine them with portions of the unbundled LEC network to provide service. Unbundling means that entry requirements will be lowered dramatically.⁴⁶ Any portion of

⁴⁶ The provision of a bundle of services may create entry barriers when combined with network externalities. However, the implementation of interconnection and the unbundling plan means that the possible natural monopoly problems that conceivably could arise from provision of a bundle of services will not constitute a competitive problem.

the network that involves significant investment will be leased to competitors by the most efficient provider (initially this is likely to be the incumbent) so that if there are economies of scale or scope, all competitors and consumers will benefit. When scale and scope economies are not present, or consumers desire specific services, other providers can tailor their network services to fill those needs.

Figure 1 shows the current status of the local exchange. The majority of traffic originating at the CPE uses the LEC network. However, for some large customers, CAPs provide an alternative. Note that the diagram ignores the presence of alternative local loops such as cellular. Figure 2 shows the change in the structure of the local exchange with unbundling in place. The variety of options for traffic carriage is significantly greater with unbundling. A large number of options are available to potential entrants to take advantage of the ability to purchase pieces of the LEC network and to self supply the remaining portions, whether they be transport or switching.

One possible concern is that the threat of entry may not be sufficient to discipline prices for each individual portion of the network. To make sure that it does not exploit any remaining power over a bottleneck portion of the local exchange, Ameritech has agreed to freeze prices for 3 years and then subject them to price cap regulation. The combination of this pricing proposal ensures that Ameritech will not take advantage of any remaining power to disadvantage its competitors while waiting for the implementation of alternative local loops.

As noted earlier, advances in technology are accelerating local exchange competition. The coupling of unbundling and price caps makes sure that if there is temporary market power, that it will not be extended to competitive services through cross subsidies or discrimination. With unbundling and integration, an efficient network of networks will develop and be priced at competitive levels.

1. Unbundling in other industries shows rapid entry

Comparisons with other industries are instructive because they demonstrate the feasibility of unbundling and switch integration; and how entry in industries believed to have certain natural monopoly features can be assisted by such mechanisms. This section provides a brief overview of unbundling and entry in two regulated industries: natural gas and electricity.

a) Natural gas

The natural gas interstate pipeline business represents a clear instance where unbundling has led to substantial entry. Traditionally, interstate natural gas pipeline service involved the purchase of natural gas at the wellhead, followed by transportation and sale at the city gate all provided on a bundled basis by interstate pipelines. Pipelines were both merchants and shippers. As discrepancies widened between gas prices at the wellhead and the city gate, pressures arose to gain access to transportation on an unbundled basis. FERC responded with Order 436, which represented a limited form of unbundling; it did not *require* that pipelines carry natural gas for sale in their city gate market but established nondiscriminatory tariff provisions. Despite the limited form of unbundling represented by Order 436, the effects were dramatic. The share of natural gas sold in competition with the pipeline in its city gate markets rose from approximately 15 percent of total gas carried by interstate pipelines in 1985 (when Order 436 was issued) to over 70 percent of total gas carried in 1989. Entry was also rapid. Initially most entry was by former pipeline customers buying natural gas for their own account. Increasingly however, new marketers entered, purchased natural gas at the wellhead and resold it in competition with the pipeline's own sales business downstream. FERC Order 636 represents a further step in the unbundling process because pipeline control of facilities

will be reduced. Potential shippers will now be able to acquire rights to pipeline capacity as well as rights to storage.⁴⁷ Pipeline customers will also be able to trade such rights, allowing them to realign allocated capacity and obtain the flexible services customers desire. The competitive forces set in motion by Order 636 are still working their way through the regulatory process and the market. Even so, new companies have emerged and offer new services using the pipeline's unbundled transportation and storage capacity.

b) Electricity

Various parts of the electrical system have likewise been unbundled. In most regions of the United States there are markets in which utilities can buy and sell bulk power. Interruptible power can be sold separately from reliable capacity that is provided under long term contracts. Furthermore, intermediate commodities can also be sold by one utility to another. Examples of these include commitments to have a certain plant available for an intermediate period of time to provide back up in case of unanticipated changes in demand at a second utility. Unbundling has provided benefits, allowing electric utilities to sell power from plants that are underutilized on a seasonal basis, thereby reducing unit costs. It has also permitted the shut down of inefficient plants, since the owners can purchase power from more efficient utilities.

The evidence from gas and electricity indicates that opening up the local exchange is feasible, and that at least in the case of gas it indicates that new entry is facilitated. Moreover, because new entrants can access the embedded facilities of the incumbent at

⁴⁷ Limitations on pipeline space and use of storage meant that sellers of natural gas could not offer service fully comparable to pipeline sales service: especially in winter months when demands typically peak. Potential competitors were therefore precluded from offering winter service. Limited delivery and withdrawal flexibility prevented sellers from reaching all the customers they would have liked and similarly limited customers from purchasing natural gas from as full a range of sellers as possible. For example, distribution customers typically have highly variable delivery needs even over limited geographical areas as weather and operational conditions on their systems vary.

the incumbent's costs, it causes the incumbent to yield the basis of its own competitive advantage from scale to its competitors. Clearly, unbundling is great for new entrants, as it in essence enables them to rent the competitive advantage of the incumbent, at the incumbent's cost.

D. Assessment

Many different entry strategies are likely to arise. Some new entrants may be better suited for niche plays; others may choose more comprehensive strategies. Both can coexist in the marketplace. Entrants can target high profit customers by supplying a small dedicated system catered to the specific customer's needs. This would make them more difficult for and LEC to dislodge. Such niche plays are likely to be very successful since unbundling enables the niche player to take advantage of LEC scale economies.

A critical characteristic of local/intraLATA service to note here is the concentration of revenue in a handful of business customers. On average, 30% of a LEC's revenues, and a still larger percentage of its profits, come from 1% of the customer base.⁴⁸ A new entrant need not win over many customers to have a noticeable impact in the marketplace. The top 1% of customers account for more than 30% of profits because they purchase large volumes of high margin services. Thus, while CAPs only have a small geographic presence, their actual market presence is significant. With unbundling, a new entrant can avoid large capital outlays and can focus its limited resources on several key business customers to quickly achieve a positive cash flow. These funds can then be used to secure additional customers leading to a self-sustaining cycle of profitability.

⁴⁸ Federal Communications Commission, Bypass of the Public Switched Network, 3d Rep and Ord., rel'd May 26, 1987, at 32. Note that any attempt to evaluate the state of local competition with references to shares based upon the customer base are entirely misleading and inapt. What is directly relevant is the share of revenues and, more importantly, profits that are exposed to competitive pressures.

AT&T and MCI are unlikely to be content with niche plays. These companies have expressly stated their interest in providing end-to-end service for their customers.⁴⁹ Unbundling offers the opportunity to provide ubiquitous service and the IXCs will have the added advantage of being able to complement their existing assets with the use of unbundled portions of service from the LEC. They can also obtain all of a customer's traffic without the need for providing local switching or loops.

While many of these entry strategies appear likely, it is instructive to examine and contrast the status of AT&T's competitors at the time of divestiture with the status of local exchange competitors now to see how facilities-based entry occurred in that segment of the business. The meteoric rise of MCI and Sprint and the concurrent rapid dissipation of AT&T's market position in long distance are well known and need not be repeated here. However, it is informative to compare AT&T's competitors as they existed in 1983 to LEC competitors today. Specifically, this exercise convincingly demonstrates that actual and potential competitors, not least among them AT&T, MCI and Sprint, all possess financial and marketing wherewithal and installed facilities that far surpass anything facing AT&T back in 1983. Indeed, the FCC has already noted that competition for access will "develop much more rapidly than interexchange competition did."⁵⁰

This point is made clearly by the comparisons in Table 2. Compared with the 1983 versions of Sprint and MCI, actual and potential LEC competitors have considerable financial muscle.⁵¹ AT&T is the leading communications provider in the world. AT&T

⁴⁹ Even MFS has set its sights on becoming a full service provider. In its recent prospectus, MFS states that "Through MFS Intelenet, the Company will offer a single source for telecommunications services to small and medium sized business." (Prospectus of MFS Communications Company, Inc., May 19, 1993, p. 18.)

⁵⁰ FCC Docket 91-141, 92-222, October 19, 1992 at n. 253.

⁵¹ For example, Sprint, in 1987, began a \$3 billion fiber deployment program.

provides long-distance service to three-quarters of all U.S. households; owns one of the five most recognizable brand names in the country; annually spends \$3 billion on R&D; and is vertically integrated across major business lines.⁵² Furthermore, the McCaw deal will make AT&T the nation's largest cellular provider. AT&T's entry into local/intraLATA will be vigorous, as the company has all the relevant complementary assets needed to be a successful competitor.

E. Implications of entry for "natural" monopoly arguments

Although not all of these entry scenarios will take place immediately, the threat of entry and ability of entrants to target specific groups have significant implications for the natural monopoly arguments put forth to justify regulation of local telephone service. New entry is evidence that either the monopoly is not natural or it is not sustainable. Given the number of different entry strategies, it seems obvious that a large number of urban and suburban customers will be passed by two wires capable of providing two-way voice grade service in the near future (either cable or CAP in addition to the LEC). In addition, advances in radio technology and the release of additional spectrum will provide an alternative for rural customers. Thus it appears that for two-way voice grade telephone service, the natural monopoly will not continue (if it exists now).

Unbundling adds force to the entry scenarios. With unbundling, uncommitted entry can occur quickly. The Department of Justice distinguishes between committed and uncommitted entry in its Merger Guidelines.⁵³ Uncommitted entrants are defined as firms whose "supply responses must be likely to occur within one year and without the expenditure of significant sunk costs of entry and exit, in response to a 'small but

⁵² "Long Distance - A Healthy Industry Ready To Conquer New Territory", Bernstein Research, p. 14.

⁵³ See DOJ Merger Guidelines, sections 1.3 and 3.0.

significant and nontransitory' price increase."⁵⁴ Such uncommitted entry does not have significant costs and is a continuing competitive threat, even when potential entrants are not actually participating actively.⁵⁵ With unbundling, the local exchange business will be contestable since up front expenditures by new entrants will be minimal. This is because potential competitors can rent/lease various components of the LEC's embedded investment while determining the demand for their services. In this way, entrants can reduce their risk by performing real market research in advance of making large capital investments. For potential entrants, unbundling creates a market for non-redeployable assets. In addition, entrants can benefit from any LEC scale and scope economies, augmented by their own competitive advantages. Unbundling essentially drives entry and exit costs to zero for the unbundled components. As a result, the market becomes contestable and, in a contestable market, market power cannot exist, regardless of market share.

However, the future appears to be somewhat different. Voice grade telephone service may soon become simply an ancillary service provided with interactive two-way video service. In this case, bandwidth needs of wireless providers may currently be too great to pose an alternative to a wire-based technology. In addition, the cost to upgrade a system to provide advanced services may justify only a single wire-based system. However, the recent spate of mergers and the investment projects by both cable and telephone companies projects a world where most homes will be passed by two high capacity wires and the homes will also be addressable by a large variety of wireless service providers.

⁵⁴ DOJ Merger Guidelines, section 1.3.

⁵⁵ See Baumol, Panzar and Willig. [

VI. Interconnection

A. Network of networks

In the near future, a relatively large number of "local" networks will exist. Among them will be the traditional local exchange, the two cellular carriers, SMR networks, PCS networks, cable companies, and CAPs among others. For these networks to succeed and to maximize the network externalities available to their customers, they will need to interconnect with the other networks. Currently, each network is likely to desire interconnection with the local exchange carrier, and through that carrier interconnection with all of the other interconnected networks. As the other networks become larger and have the need and justification to interconnect directly with each other, these facilities will become adopted.

Unfortunately, interconnection is not as cut and dried as the paragraph above indicates. There are various problems that need to be resolved in order to provide the seamless interconnection desired by users. First, the technical interface between the various networks has to be agreed upon. The parameters of the agreement include the physical interconnection and the location of that interface, and the intelligence required on either end of the interconnection. In addition to resolving technical questions, the compensation for the use of the facilities is an important question to resolve. The price and the technical interconnection are interdependent.

B. Economic issues

In order to effectuate an interconnection between two networks, each side must invest in capital equipment. This investment must be coordinated so that the equipment from one network will interface with the other network. Many different types of network interconnection are "feasible" but many fewer are "economically feasible." The distinction

arises in many cases because potential interconnectors demand feasible interconnection that may not be economically feasible.

Interconnection pricing is critical to success of competitive networks. Providing interconnection imposes both fixed and variable costs on the operator of network. The fixed costs are the investment required for the interface with the interconnecting network. In some cases this may be an incremental cost if additional capacity is needed for increasing amounts of interconnected traffic. In addition, each interconnected call needs to be switched and to use the network facilities and in doing so imposes a cost on the network operator.

Baumol has proposed an "Efficient Component-Pricing Principle" for access services.⁵⁶ This rule is discussed in relation to the prices that ought to be charged to an interexchange carrier by a local exchange carrier for access to local customers when the LEC also provides interexchange services. Since similar principles apply to interconnection of competing local networks, the principle should be able to be applied to the interconnection charge as well as the access charge.

The efficient components price principal states that the price charged for interconnection should be equal to the average incremental cost including the incremental opportunity cost of the service. In this way, the interconnecting network will be compensated for the direct cost of the service and will be able to obtain a contribution to the joint and common costs that are present on a network with economies of scale and scope.

⁵⁶ See Baumol and Sidak, Toward Competition in Local Telephony, Ch. 7.

There may be some objections to this rule. In the interconnection case, some may argue that this pricing rule puts the LEC in a "no lose" situation. If the LEC retains the customers, then it will retain the profits from those customers, and if it loses customers to other networks, it will still retain the contribution from those customers through the component of the interconnection charge that includes the opportunity cost.

Another argument criticizing this method is that if the contribution includes monopoly prices, then the after competition prices will be monopolistic also and the benefit of competition will be lost. Finally, the determination of the lost contribution depends critically on the assumption of the amount of traffic that will be diverted compared with the amount of new traffic generated by the impetus of competition. If the new network adds only new customers, then its price should include no opportunity cost component if there is excess network capacity.

The efficient component pricing and its objections need to be analyzed in a long run dynamic context to determine their efficiency effects. If the price for interconnection to the existing LEC is too high, then the other competing networks will have additional incentives to invest in the infrastructure needed to complete their calls on the other networks and to bypass the LEC.

1. Mutual compensation

The pricing rules and the discussion of efficiency and scale and scope economies for interconnection pricing can be applied to rules for mutual compensation. In other words, should the payment by network A for traffic terminating on network B be the same as the payment network B for traffic terminating on network A. On the face, it appears that this is an equitable answer. However the proposed efficient component pricing rules do not necessarily result in this outcome. If the two networks have similar incremental

costs, but different opportunity costs, the efficient component pricing rule would dictate that the price for interconnection should be higher for one network than the other.

It will generally be the case that initial interconnection will take customers away from the LEC so that the opportunity cost of interconnection will be higher and the component pricing rules dictates that the LEC charge a higher interconnection price than it would pay for interconnection when it wants to terminate a call on another network.

If, as seems more politically palatable, the interconnection charges were symmetric, then one of the two systems would be paying either too much or too little for interconnections. If the fee were too high, then the network would have incentives to try to attract even more subscribers so that less of its calls required payment of interconnection fees, or undertake other strategies to minimize its payments of the inflated fee. On the other hand, if the fee were too low, the network would not invest sufficiently in strategies or equipment to optimize the use of interconnections.

VII. Organizational structure and innovation

All aspects of the telecommunications industry -- local and long distance -- have been exposed to rapid innovation since the birth of the industry. Indeed, overall telecommunications productivity growth has been about 3% per year since 1948.⁵⁷ In particular, the digital electronics revolution has brought about vast improvements in telecommunication equipment. Much of this innovation was autonomous, or made to be so. That is, it could be integrated into the network so long as it met compatibility standards. In short, one could upgrade one piece without having to abandon the existing investment in the network. Sometimes innovation isn't autonomous but is systemic

⁵⁷ Note that the 3% per year productivity increase is a combination of both long distance and local telephone service.

thereby requiring investment throughout the network, as with Common Channel Interface Switching (CCIS). In the pre-divestiture days, AT&T was able to bring forward such investment, even though not all of the local companies benefited equally. Complex negotiations could be avoided as the administrative apparatus -- an integrated AT&T -- was available to get it done.

Innovation has continued since divestiture, though it is of a different kind. Terminal equipment, switching and non network technology have been beneficiaries of innovation in the post divestiture period. There does not appear to be significant innovation that has required the cooperation of long distance carriers with the LEC's. Indeed, when innovative integrated service offering became compelling, the organizational response has been merger, as with AT&T and McCaw.

Now the opportunity for a new family of innovations is becoming apparent. We refer in particular to interactive TV, multimedia and the information superhighway. The amount of electronic material the superhighway can carry is dizzying compared to the relatively narrow range of broadcast TV and the limited number of cable channels. These new systems, when commercialized, will support a wide range of new services: home shopping, on-line information, classified ads, teleconferencing, movies on demand, video games, travel services, and distance learning. When in place, these new services will be available when needed, and users rather than providers will determine when they are used, thereby putting a greater degree of control back with the user.

At this point the technical barriers to building this platform and loading services upon it have largely been broken. The challenge, it would seem, is to overcome the organizational barriers. The key success factors which are relevant include equipment design, software, programming and network management. The current industrial structure is not as yet well aligned with respect to the compilation of these assets. Telephone

companies have terrific capabilities in network management; cable companies have broadband transmission capabilities. More importantly cable companies often have ownership in programming, and understand how to match programming to markets. Software development skills, with the possible exception of Bell Labs and Bellcore, lie mainly outside the current boundaries of the industry: Microsoft, Apple Computer, and Lotus are among the repositories of such skills.

Colliding technological trajectories in telephony, computers and fiber optics suggest the need for a rich network of alliances as well as possible cross ownership arrangements to bring forward these technologies in a timely and cost effective fashion. The pioneers are likely to need common ownership of key elements of the system in order to speed concerted action. The Bell Atlantic - TCI merger appears to be motivated by these considerations. Once scale economies and installed base economies have been achieved, and the commercial aspects of the technology proven, business routines will emerge which may obviate the need of follower firms to integrate to the same degree. As we note elsewhere:

"Integration facilitates systemic innovations by facilitating information flows, and the coordination of investment plans. It also removes institutional barriers to innovation where the innovation in question requires allocating costs and benefits, or placing specialized investments into several parts of an industry. In the absence of integration, there will be a reluctance on the part of both parties to make the necessary investments in specialized assets, even if this would yield mutual gains. One reason is that both parties know that the exercise of opportunism might yield even greater benefits to one of the parties. Hence, in the absence of common ownership of the parts, there will be reluctance on the part of one or more of the parties to adopt a systemic innovation." (Teece, 1988, p. 269)

While integration may be necessary to create the information superhighway platform, alliances, and partial equity arrangement may suffice to place new products and services on the platform. Indeed, whatever organizational arrangements come into place to build the platform, we expect to see a plethora of alliances and partial equity links

formed in order to organize and deploy services onto these new platforms. As we state elsewhere:

"With rapid learning, colliding technological trajectories and tight selection, one can expect to see incumbent firms becoming enveloped in a dense skein of inter-corporate relationships involving partial equity holdings and joint ventures. Such firms might be called "network" firms." (Teece et al, 1993).

Local telecommunications is thus about to become buried in this rich plethora of new arrangements designed to bring forward the bandwidth hungry technologies of tomorrow. Not only will fiber cause distance to shrink -- making everything "local" -- but telecommunications will itself become transformed. The LECs as we now know them will no longer dominate the local landscape. Cable-CAP amalgamations are already there, and out of town LECs will be in town as the MFJ's interLATA restrictions fold. Radio will bring in new players providing ESMR, PCS or Iridium like services which will compete with some aspects of what we consider local telecommunications. The identity of the players will thus change dramatically as will the nature of local service. Customers will have such a menu of new services available to them that POTS will no longer have a recognizable meaning.

VIII. Conclusions

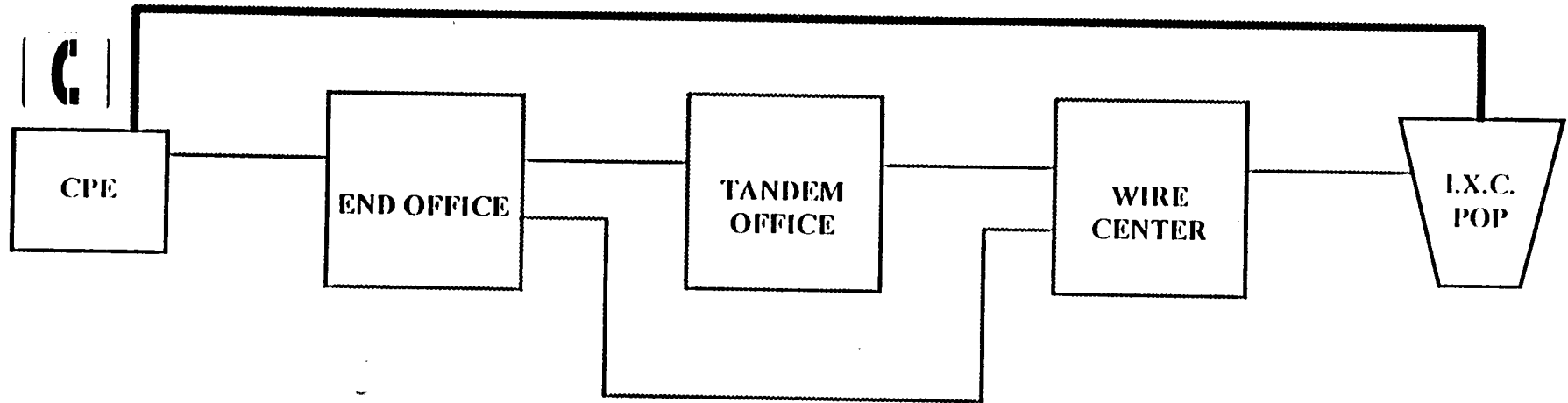
Our brief survey of the history of the industry, and our analysis of technological challenges at work today make it quite clear that the so-called "local" portion of the telephone business is now and likely has always been capable of supporting competition. Regulation and limited interconnection are the main reasons why competition is not more powerful there today. Alternative technologies such as radio and cable remove any shadow of doubt about the fundamental ability of the local exchange to support competition. In many parts of the county, it is already there. However, a forward looking

view makes obvious the ubiquity of actual competition; recognition of the multiple sources of new competition makes the disciplinary effect of potential competition a reality.

Unbundling plans put forward by some incumbent local exchange companies such as Ameritech and Rochester Telephone will sharpen local exchange competition by facilitating or indeed assisting new entry. These unbundling plans represent a bold step and involve some sacrifice of market position; but they make transparent to all -- especially regulators and judges -- that in at least in those parts of country where unbundling is to be implemented, the myth of monopoly has been buried. Just as Theodore Vail embraced regulation, the executives of Ameritech and Rochester Telephone are embracing competition. Unbundling will serve not only to promote entry, but to eliminate the excuse of the MFJ's restrictions on interLATA service, (i.e., the provision of interLATA service is inappropriate for an LEC because of the alleged ability of the LECs to use their monopoly power in the local exchange to deleteriously affect the terms of competition in interLATA services through cross subsidies and discrimination.) With unbundling, the fig leaf is removed. Eventually, the MFJ must collapse.

What lies ahead is a new industry -- the distinction between local and long distance will disappear in their entirety, and the distinction between telephone, computers and television will also evaporate. The future is one where local exchange telephone companies as we know them today will barely be recognizable, even a decade from now, and regulation -- except for antitrust enforcement -- will necessarily be swept to the side. Technology is of course the key driver. It not only is rendering unworkable the organizational and regulatory structures of the past, but will also advance whole new streams of services of great benefit to society.

Figure 1
Current Status of the Local Exchange



LEC

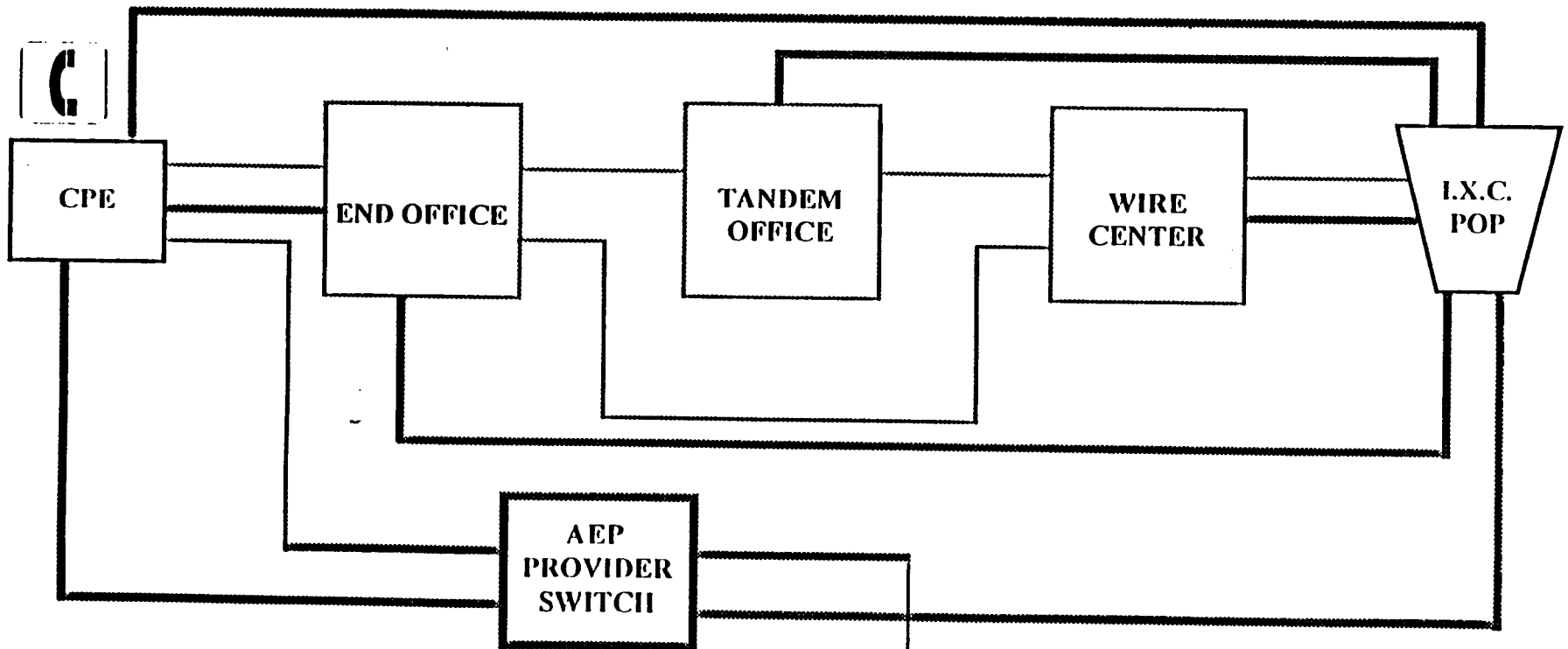


ALTERNATE
EXCHANGE
PROVIDER
("AEP")



Figure 2

The Local Exchange with Unbundling



LEC



ALTERNATE
EXCHANGE
PROVIDER
("AEP")



This represents a potential AEP switching connection with LEC facilities to originate and terminate intral.ATA calls