

FIBER OPTICS: CATV'S FRIEND OR FOE

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ABSTRACT

Serving the business consumer's voice, data, and video telecommunications needs through fiber optics represents a significant revenue opportunity for cable companies. The AT&T divestiture, rising local loop phone costs, and general deregulatory philosophy of the Reagan administration have fueled the growth of competition for the telecommunications dollar. Cable operators together with the phone companies, find themselves having to decide between ambitiously pursuing the high speed communications markets or passively standing by to watch one of the new fiber competitors steal the opportunity away and perhaps even threaten their existing business.

This paper begins to examine the cable companies' telecommunications opportunity and the market advantages and threats fiber optic technology represents.

THE OPPORTUNITY

U.S. consumers will spend \$50 billion on long distance communications this year and additional billions for local service. Some experts estimate well over half this figure will go for local loop distribution currently provided by the phone company. In a recent study AT&T, the largest long distance carrier, discovered that in excess of 80% of its intrastate toll revenues went to the local phone companies for last mile distribution and connections. While total long distance revenues will grow about 6% a year, the local access revenue portion will grow at a much faster rate. One consultant predicts a 60 to 80% increase over just the next year or two. While local costs climb, accelerating competition will restrain revenue growth somewhat. By 1995, total long distance traffic will exceed \$87 billion with intra state calling accounting for better than 40% of the total as referenced in

Figure 1

FORECAST OF TOLLS RESIDENTIAL, BUSINESS, AND GOVERNMENT

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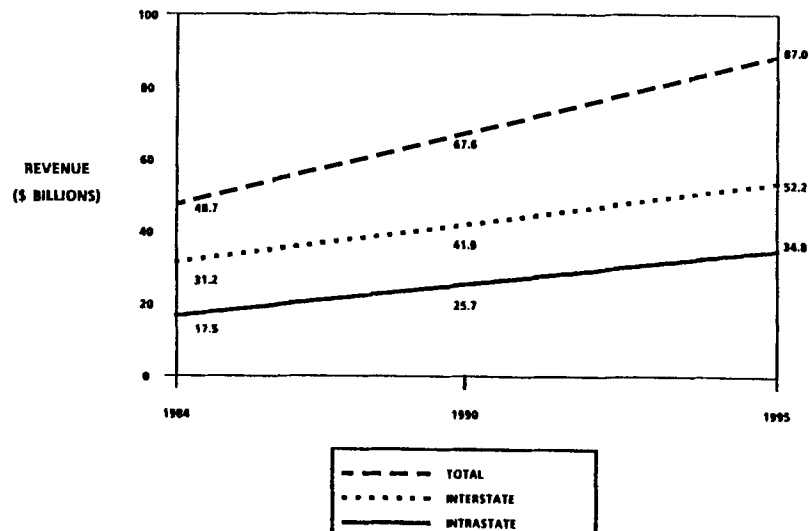


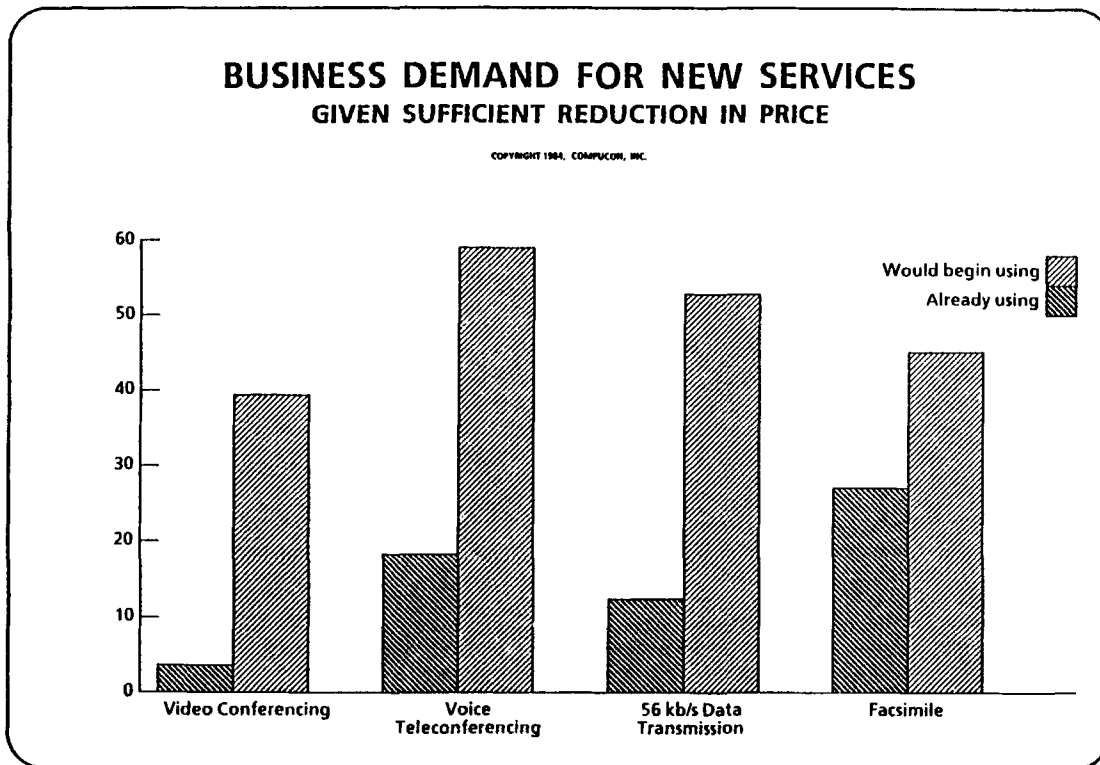
Figure 1. A study done by Ameritech, one of the seven Regional Bell Operating Companies, indicates that in the Midwest competitors could successfully service up to 60% of this revenue.

A recent report examines the distribution of both toll revenue potential and growth for different regions throughout the country. California and Nevada account for better than 15% of the total long distance market with an explosive revenue growth of 60% from 1979 through 1983. Other regions of the country with high toll growth rates include the District of Columbia, Virginia, the Mountain states (i.e., AZ, CO, ID, MT, NM, UT, and WY) and Connecticut, all of which experienced growth in excess of 55% during this four year period. Collectively, they account for about 11% of the long distance market. Indiana and Illinois fall out at the bottom of this list with a four year growth of less than 25%, substantially below the U.S. average of 44.5%. But their significant business base still makes them attractive long distance markets, generating almost 5% of the country's total revenue. In fact, after reviewing this distribution and growth profile nationwide, most states and regions offer viable telecommunications opportunities.

Of course, cable systems can provide not only last mile connections for long distance service, but a variety of other local communications services as well. Businesses spent millions last year connecting local facilities and branch offices together with their own communications links. Links that the cable operator could have provided. Local area networks, now numbering in the tens of thousands, continue looking for ways to expand beyond the confines of building walls or office park boundaries, to increase network utility and value through connecting with other locations a few blocks or miles away.

Whether the communications needed involve long distance or strictly local services, voice dominates telecommunications today with a better than 85% revenue share. Various forecasts show voice growing at 5-7% per year with little growth acceleration expected, even if telephone rates drop substantially. Video and, more importantly, data offer a much higher growth profile with annual rates in excess of 15%. The wide bandwidth and high transmission speeds required often exceed existing phone company plant capacities, so customers often find themselves forced to look outside of the phone company for this service.

Figure 2



These higher transmission rates are needed by some 4,000 plus computer installations throughout the country that could use 45 mbps links between remote and central facilities. They are also needed by the growing number of firms installing full motion, full color, videoconferencing facilities. In a recent Compucon survey, over 40% of the businesses interviewed indicated they would start using videoconferencing if costs came down (as referenced in Figure 2).

Whether it be voice, data, or video, last mile connections for long distance service as well as strictly local point to point communications represent a real opportunity for cable companies. Business customers need links for tying together their decentralized facilities, for directly connecting with their long distance carriers, and for obtaining the higher speed circuits currently unavailable or uneconomical. While this market represents a business versus residential consumer for the cable operator, the operator's local area knowledge, facilities, and trained personnel all coupled with the advantages of fiber optic technology, give him an edge over most competitors in pursuing this opportunity.

THE MARKET SEGMENTS

The three key market segments cable operators should consider targeting include: end users, long distance companies, and other communications system operators.

The end user segment consists primarily of businesses with large communications requirements resulting from their numerous branch offices or remote facilities, from their heavy data processing orientation, or from simply the nature of their industry. Companies in the service, financial, insurance, and real estate industries generally have higher than average communications needs. Larger companies, regardless of industry, typically spend more on communications than smaller ones, and some cable operators have discovered that servicing a few key accounts captures a large portion of the telecommunications dollar. According to Bill Woods of AT&T, four percent of the businesses in California pay approximately 83% of the total local access fees, or almost one billion dollars. In Ohio and Georgia, half a percent of the businesses generate 45 to 50% of the long distance revenues, and similar relationships exist elsewhere in the country. Many of these larger firms spend hundreds of thousands of dollars each month on communications transmission.

Even numerous medium size companies expend tens of thousands of dollars monthly on transmission costs.

The residential end user represents a future market for fiber communications as well. With the PC explosion, increasing popularity of electronic mail and home security/banking/shopping, and slowly growing interest in videotext, automated meter reading, and remote medical diagnosis, homes will need fiber optic communications someday. The justification does not exist yet, but some futurist now predict the day that a single company will carry power, TV, phone, and various other services into the home all over a single cable. The rapidly improving fiber electronics, repeater requirements, drop and insert techniques, and overall maintenance characteristics make the economics for consolidating services on one cable quite attractive.

Another customer type, the long distance carrier, offers a potentially attractive revenue source since it currently relies upon the local phone company for connection between its point of presence (POP) and end customer locations. These carriers don't have the capital or right-of-ways required to tie directly into their customers' facilities and find themselves saddled with some extremely high local distribution charges. One carrier estimates that out of an average 30 cents per minute revenue it receives from its customer, better than 20 cents of that goes for local distribution costs. Most of these carriers such as MCI and Sprint have expressed real interest in circumventing these excessive charges and trying alternatives offered by the local cable company and others.

Private microwave operators, teleports, local area network providers, and cellular system companies all fall into the third customer class.

Private microwave operators currently maintain their own communications systems and find the newer technologies obsoleting their existing networks. Their ten year old analog radios don't offer the needed capacity or speed to handle new data requirements or the increased voice traffic. Furthermore, the FCC may have recently imposed stricter technical standards on their microwave equipment, and they may no longer be able to buy radios compatible with their existing network.

Teleport developers offer tenants of their office buildings shared communications facilities often including satellite gateways, state-of-the-art PBXs,

and "wired" walls and floors. They have discovered that many companies near their real estate development don't want to move into it, but would like access to their satellite gateway. The local cable company's fiber optic system may provide an attractive means for connecting prospective customers to the teleport.

Local area network providers need right-of-ways or alternatives for connecting their LAN nodes together and cellular system companies need to tie their cell sites back into the central switch. Leased phone lines represent a considerable expense and radio frequency congestion often prohibits the use of microwave for interconnection. Fiber optics offers one of the few viable alternatives.

One exciting characteristic about all these customer types: many companies in each category will want to secure enough capacity for their peak communications load. This will obviously free cable companies from having to meter customers' communications and generate a usage-based bill. Fees can simply be based on the number of dedicated, leased circuits.

MAJOR COMPETITORS

The local phone company may represent the most troublesome competitor. They understand the business, have the right-of-ways and have probably installed some fiber already. Most importantly, they operate under the protective regulatory umbrella. This protection may force cable companies currently operating in an unregulated environment to file as regulated common carriers before offering phone company like services. Manhattan Cable's data transmission services battle with the New York Commission looks like it will result in their ultimate regulation. The State of New Mexico recently passed legislation requiring cable operators to file for common carrier status if they want to offer communications services. And the outcome regarding Cox Cable's ongoing fight in Omaha remains uncertain. Clearly, regulation could eliminate many of cable's competitive advantages as well as greatly restrict the types of services to be offered.

Fortunately, this regulatory environment also creates the phone companies' biggest competitive weaknesses. It restricts them to only providing service within their exchange boundaries and to providing service to all customers under a regulated rate structure. It also saddles them with a lot of antiquated, yet not fully depreciated equipment, that they

must continue to use. Some of this equipment, like the twisted pair wire and analog switches, can not provide the new services and higher speeds demanded by their customers. The regulated rate structure has forced the phone companies to average costs over all customers. For example, in California, some businesses leasing WATS lines end up paying seven times the actual cost for local access while some remote residential customers only pay a fraction of their true cost. Recently, phone companies have started a campaign to de-average prices for selective business customers, in an effort to combat growing competition from bypassers and retain their key accounts. It is unclear at this point that regulators will allow de-averaging given the resulting increases it would force on smaller customers.

Many of cables other competitors such as the long distance companies, fiber optic carriers, large businesses with their own private systems, and local area network providers, are also potential customers. While these companies may compete with the cable company for the same end user, they probably don't have the pole attachments, right-of-way, or local cable crews necessary to connect with each customer location. So they would probably prefer to negotiate a joint arrangement with the cable company rather than try to build their own local distribution network.

Regardless of the competition, cable operators will have to brave the regulatory battles and aggressively pursue telecommunications customers to take advantage of the existing market turmoil. Competitors canvassing the marketplace frequently sign up large potential voice and data users to long term contracts. Within a year or two, they will have gobbled up most of the really lucrative local distribution telecommunications opportunities.

Cable companies also need to protect their existing CATV business from competitors leveraging their larger size and fiber optics superiority over coaxial cable. Phone companies continue to eye the attractive home entertainment cable market, and talk about the day their fiber will supplant cable. Dick Snelling of Southern Bell recently discussed how the two companies will have consolidated together in many markets by 1990. And one consultant predicts that the cable operator and phone company will both be relegated to fairly minor roles as the power company provides power, phone, and TV into the home over a single cable.

THE TECHNOLOGY

The basic transmission media today include twisted pair wire, coaxial cable, satellite, analog and digital microwave, and fiber optics. Fiber optics offers a number of advantages over some or all of the other alternatives. A single fiber offers the same capacity theoretically as many coaxial cables. The size and weight of fiber makes it easier to install through crowded conduits than coax. Since it doesn't radiate or absorb energy, it avoids:

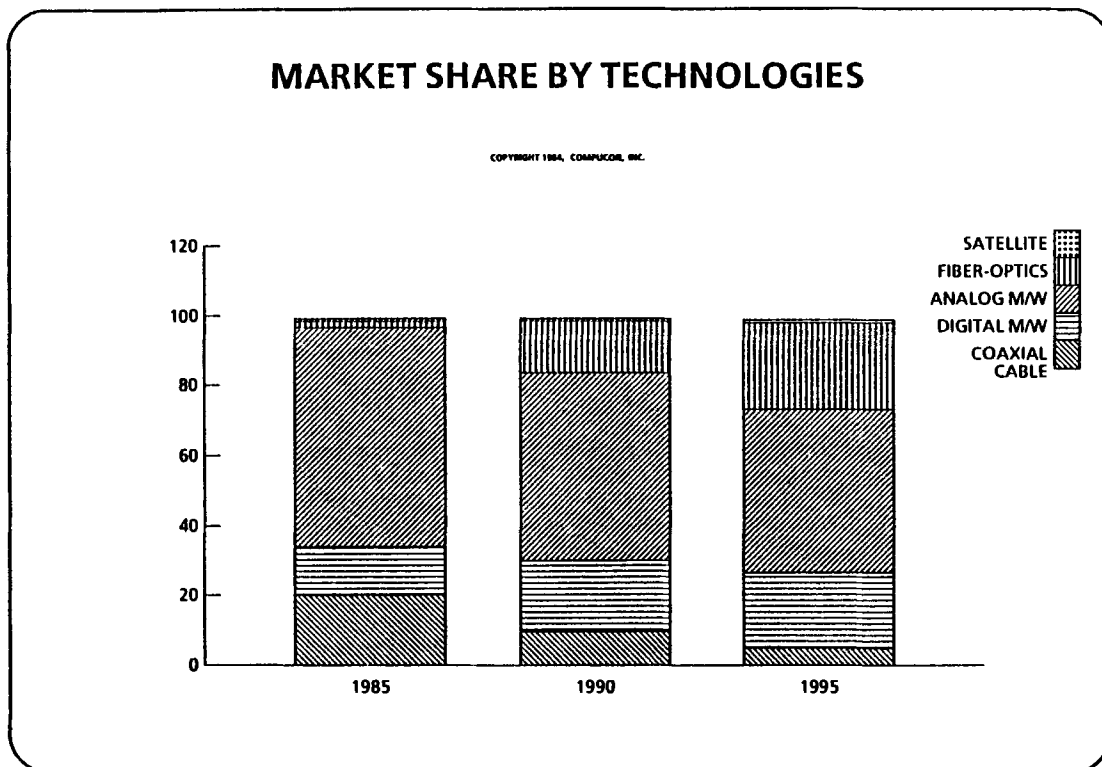
- electromagnetic and radio frequency interference;
- attracting lightning;
- degradation from co-location with high voltage lines;
- crosstalk from laying fibers side by side.

Fiber is insensitive to temperature and humidity when compared to coaxial and is insensitive to heavy rain and other adverse weather when compared to microwave or satellite. Also, since transmitting through fiber results in less signal distortion and attenuation than cable, repeaters/equalizers are spaced farther apart and fewer are therefore required.

Fiber provides basically error free, high capacity, relatively secure communications. Its maintenance costs seem lower than other terrestrial technologies and its capacity can be greatly increased through simply changing out the electronics and perhaps adding a few more repeaters. Some feel this extra capacity will become particularly important as HDTV and stereo audio gain popularity in the entertainment market, while videoconferencing and data transmission gain popularity from the business side.

Fiber offers digital communications, or cleaner, higher quality communications than that provided through analog transmissions. Transmitting digitally allows for easier and more economical integration and switching of voice, data, and video signals. While other technologies also offer digital transmission, they have other problems. Complaints about satellite communications include annoying delays and echos, frequency congestion, weather, and transmit/receive earth station costs. Terrestrial microwave offers a viable, low capacity transmission medium, if frequency congestion and weather don't pose problems.

Figure 3



Fiber has its shortcomings too. The three most noticeable include obtaining right-of-way, optically switching voice and data traffic and loading the fiber to break-even capacity. Right-of-way costs currently range from a few hundred dollars per year per mile to over \$10,000/year per mile. True optical switching still seems a few years away, although progress continues in the area. And several recent analyses show loading fiber to a 50% fill level with moderate capacity electronics results in satisfactory rates of return. Thus, in spite of these shortcomings, experts predict fiber will carry almost one-fourth of the long-haul traffic by 1995 (as highlighted in Figure 3).

MARKET ENTRY STRATEGIES

The divestiture has tarnished the phone companies' reputations. Service problems, confusion regarding responsibilities and policies, and long delays with new circuit orders have created discontent in the marketplace. While customers do use MCI, Sprint and other alternative carriers for long distance service, these companies have their share of problems with poor circuit quality, disconnects during the middle of a conversation, and billing errors. Given this discontent, prospective customers would consider using a cable system's service. Some of the features they would look for include:

- 15 to 25% discount off their current communications rates;
- turn-key phone service providing end-to-end connectivity;
- guaranteed maintenance and response times, error rates, grade of service, electronics redundancy, and in some cases, route diversity.

To effectively offer these features, cable operators will either need to form a consortium with neighboring cable systems, or participate in some type of joint venture with a long distance carrier, local area network provider, cellular system operator, or other communications company.

If the cable company prefers to avoid entering the end-user phone business, another alternative appears viable. The company could offer service as a carrier's carrier, simply hauling other carrier's traffic throughout the market, but not pursuing any end user business directly. This arrangement could take the form of a simple lease, where the carrier leases the needed capacity from the cable company, a condominium style agreement where the carrier owns the fiber but the cable

operator maintains it, or a joint venture where ownership and maintenance responsibilities are shared.

PUTTING IT ALL INTO PERSPECTIVE

Competition for the television viewer continues to intensify with increased aggressiveness from LPTV, ITFS, MCTV, SMATV, VCR's, as well as traditional UHF and VHF broadcasters. Cable penetration still stagnates in many markets at 50% to 60% of the homes passed. Pay-per-view growth remains disappointing as does consumer interactive two-way services. Cable operators constantly seek additional revenue sources which utilize their pole attachment agreements, ubiquitous local market presence, experience in cable installation and maintenance, and other strengths.

Long distance and local telecommunications represent a sizable opportunity for the cable operators while leveraging their competitive strengths. Cable companies can install and maintain fiber less expensively than most telecommunications companies. Fiber offers significant technological and capacity advantages over coaxial and other transmission mediums. Furthermore, it is just beginning to enter the learning curve of rapidly decreasing component costs, whereas most competing technologies have already passed through the curve. Costs for terminal equipment, splicing gear, and many other components will continue to drop making fiber more economical than coax in the future for all but the lowest capacity applications.

The regulatory environment poses the biggest obstacle between cable companies and telecommunications profits. Warner Amex and Manhattan Cable have successfully pursued voice and data communications, but Cox and others have found state commissions stifling their progress. The long term trend clearly points to deregulation, but savvy attorneys predict a fairly rocky road over the next couple of years.

While competition also presents an obstacle, the wide gap existing between current "retail" communications rates and anticipated fiber optic costs, will allow plenty of room for mark-up while still staying competitive. Cable companies offer an alternative to the fastest growing communications cost component, local last mile distribution. Most of the fiber installed or announced to be installed is along major backbone routes or between phone company central offices, leaving the local distribution network largely "unfibered". Rapid growth

characterizes the data portion of this market, which is the portion existing phone systems have the toughest time servicing, but that fiber is ideally suited for. Potential key customers are interested in considering alternatives to their existing suppliers and find fiber

offered as an end-to-end service an attractive alternative. Lastly, the size of this market in most urban areas climbs well into the multi-million's of dollars. Securing even a small share of this market still represents a sizable business opportunity.