

cial buildings can, it seems clear, yield truly large energy savings over the next several decades if relatively simple changes in building design and construction practices are brought about through tightened building codes. Although few people are as yet aware of it, some energy specialists now entertain the possibility that it will be feasible, even in colder parts of the country, to build "super-insulated" houses* that are so tight against the weather as not to require a furnace; one or two portable electric heaters could be enough to keep them comfortable on even the coldest days. A number of such houses have already been built in the United States and Canada at a cost said to be roughly com-

*See *Superinsulated Houses and Double-Envelope Houses*, an illustrated monograph by William A. Shurcliff, which examines these new construction methods. Available for \$10 from Shurcliff at 19 Appleton Street, Cambridge, Mass.

parable to that of conventional construction.

A well-studied example is the \$60,000 home built in 1977 in Regina, Saskatchewan, and operated and monitored by the engineering department at the University of Saskatchewan. Besides its supertight construction, this house has two other special features: (i) an air-to-air heat exchanger to keep the air fresh inside the dwelling and prevent excessive humidity and (ii) passive and active solar heating. Experience to date indicates that the house would be quite comfortable even without the active solar system.

Energy consumed in homes and commercial buildings represents about 37 percent of all the energy used in this country. Savings of the magnitude suggested by the superinsulated houses would, of course, be enormous. But experience with such dwellings has been limited,

and one must assume that, for one reason or another, such savings might not be achievable. Yet savings of even half that magnitude would eventually become large as the existing housing stock, which turns over at the rate of 2 percent a year or less, is replaced.

Although some builders have been adopting energy-conserving designs voluntarily, the industry's record in this regard is, as DOE can testify, quite spotty. To a degree, market forces promote adoption of such designs, but they alone are believed to be insufficient because even the most sophisticated home buyer may find it impossible to compare the energy efficiency of different dwellings unless they are built to common standards. This is why conservationists are eager for an early start to be made at having such standards adopted nationwide.

—LUTHER J. CARTER

Ma Bell Losing Grip on Old Markets

Her control over the transmission of long-distance phone calls has gone on hold

The first coast-to-coast telephone line was put into operation between New York and San Francisco in 1915, and from that day forward, American Telephone and Telegraph (AT&T) enjoyed a transcontinental monopoly in the transmission of long-distance phone calls.

Until recently.

In the past 5 years new competitors have snatched an increasingly large share of Ma Bell's long-distance profits. With the aid of microwave towers and geostationary satellites, these entrepreneurs last year rang up \$400 million in revenues—a little less than 2 percent of AT&T's long-distance total. But revenues are rapidly rising because these competitors can undercut Bell's prices by as much as half. All this, however, does not necessarily add up to unmitigated consumer bliss. There have been scattered problems with the new long-distance services, such as signals fading in and out. In addition, the competition could trigger more serious problems. As Bell loses long-distance revenues, it is likely that a nationwide increase in the monthly rates charged for local telephone service will soon follow. This is because Ma Bell subsidizes local service charges with the easy profits made in long-distance services—or did, until the

new entrepreneurs started chipping away at her long-distance empire.

Bell, of course, has been fighting this invasion of her domain for some time, and on occasion the grand old lady of telecommunications has tried to snuff out the upstarts.

Consider the case of MCI Communications Corp., one of Bell's new rivals. According to federal regulations, MCI can hook its long-distance service into Bell's local exchanges, so that Bell phones can send and receive calls transmitted on MCI's microwave towers. In a recent suit, however, MCI charged that AT&T had undercut this federally sanctioned arrangement by filing unfair state tariffs, by cutting prices in violation of federal antitrust law, and by disconnecting MCI lines that were already hooked up. The jury agreed, and awarded MCI \$1.8 billion in damages—an amount that Harold Levy, the general solicitor of AT&T, calls "obscene."

This outcome is expected to encourage new entrants to join the competitive long-distance fray, and to help current AT&T rivals expand their services. MCI, which for 5 years served only the business community, recently launched a major campaign to win residential customers. "Reach out and touch some-

one," reads one of their ads. "But do it for half of what Bell charges." MCI says it is currently adding customers at the rate of 30,000 each month.

The new entrepreneurs can underprice Ma Bell because of AT&T's practice of nationwide price averaging. During the 1950's and 1960's, technological ad-

This is the second of a two-part series on the changing definition of what it means to be AT&T—the world's largest company. The first looked at Bell's expansion into new markets, in particular computers and data processing.

vances reduced the cost of providing long-distance phone service, while the cost of providing local service rose. To prevent sharp rises in the local rates, Bell began subsidizing local service with profits made in the increasingly lucrative long-distance market. As a result, Bell's long-distance rates are priced far above the actual cost of providing long-distance service.

The big question is how much longer. The discount companies are making inroads into the residential market, and

they already have a corner on the impending boom in data communications. This is because the new entrepreneurs use the cutting edge of transmission technology more often than Bell does. A traditional AT&T phone line, for example, can carry computer data at the rate of about 1200 "bits" per second. A satellite can do this at 60 million bits per second—a fact that translates into significant cost reductions.

Problems are also cropping up, however. Customers of the discounters must often put up with poorer service than most AT&T customers get. Because their calls have to go through an extra layer of switching, a bad connection is more likely. In addition, the long-distance rivals of Ma Bell's have been adding customers at such a hectic pace that their circuits are often jammed. In spite of these problems, customers keep lining up, their interest undoubtedly sharpened by the economics of recession.

For Bell, all this means that historically what has been its most profitable market will probably generate less and less income. (Last year, 40 percent or \$23.4 billion of Bell's revenues came from long-distance tolls.) This competition in transmission strikes at the very heart of the Bell empire, and is therefore markedly different from the increasing competition in the provision of telephone-related equipment (*Science*, 8 August), which tends to involve new, computer-oriented markets rather than traditional AT&T services such as transmission.

A nasty by-product of all this for consumers could be a dramatic rise in local telephone service charges. Since the Bell system in the past used long-distance profits to subsidize local service, it is likely that AT&T's loss of long-distance revenues will result in local service charges going up. Partly because of this, Congress is now considering legislation that would overhaul the nation's communications laws and establish a nationwide means of keeping local service charges from rising too high.

The wave of new competition got its start back in 1969 when the Federal Communications Commission (FCC) in a precedent-setting decision said MCI would set up a microwave system between St. Louis and Chicago, one that paralleled AT&T's lines. This outcome for MCI had not been easily achieved. John D. Goeken, founder of the company, spent 6 years and \$400,000 battling the FCC and AT&T before the historic 1969 decision was reached. Within weeks after the decision, however, the FCC was deluged with applications from entrepreneurs who wanted to build some

1900 microwave stations. The FCC conducted a lengthy review, and in 1971 approved the opening of the entire market to companies who wanted to provide special long-distance services for businesses.

In 1976, MCI pushed the issue further by seeking to introduce a new public telephone service called Execunet. With this, any MCI customer could call another MCI-serviced city by using a seven-digit code before dialing the regular number. The system would have made MCI directly competitive with AT&T's residential monopoly. The FCC, however, turned MCI down, in part because the commission realized that such increased long-distance competition would irrevocably alter the system that Bell had used for so many years to hold down basic telephone rates.

Not to be derailed, MCI took the case in 1976 to the U.S. Court of Appeals for the District of Columbia, which reversed the FCC ruling, saying that MCI's expansion into the Execunet system was a logical extension of the FCC's 1971 ruling. In December 1978, the Supreme Court refused to hear the FCC's subsequent appeal, and MCI started gearing up for expanded service.

The timing of MCI's entry into the residential market could not have been more fortuitous. On the same day that the company began test marketing the service in Denver—3 March 1980—AT&T announced a 10.5 percent across-the-board increase in long-distance rates. The media play surrounding the new MCI service was all the greater because of the contrast with AT&T's rate increase.

Today MCI connects 72 metropolitan areas with some 300 microwave towers, and, most recently, the company took in annual revenues of \$144 million, up \$49 million from the previous year. Right on MCI's heels are other microwave transmission companies that are vying for a piece of the long-distance market. These include Southern Pacific Communications Inc., and United States Transmission Systems, a subsidiary of International Telephone and Telegraph Co. Many others are expected, given the potential for growth in the market and MCI's recent victory in the billion-dollar antitrust case against AT&T. "This settlement is going to change the game for everyone involved in the industry," says Richard M. Neustadt, an associate director of the domestic policy staff at the White House. "In the future people are going to have to be awfully circumspect in using monopoly power this way."

Not so fortunate as MCI in the early

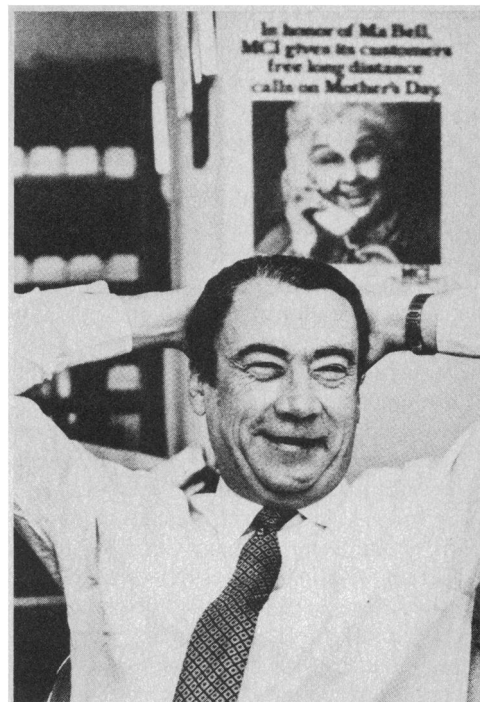


Photo by Gwendolyn Stewart

MCI chairman William G. McGowan in the wake of the \$1.8-billion antitrust award: "This decision says to people that you can fight arrogant corporate power. They can't grind you to death with their deep pockets."

struggle with the monopoly power of Ma Bell was Datran, the Data Transmission Company. Founded in the wake of the 1971 FCC decision, Datran built a nationwide digital microwave system meant primarily for data processing users. After 5 years and an investment of \$100 million, however, Datran filed bankruptcy. It also filed a \$285 million antitrust suit against its chief competitor, Ma Bell. Though AT&T denies that it hampered Datran's expansion, it recently settled out of court with Datran's parent company, the Wyly Corporation, to the tune of \$50 million.

Less hassled by Ma Bell have been companies exploring the use of satellites for long-distance intercity phone service. This may be partially due to the fact that the amount of capital required for the construction of a satellite network is great, and that the companies thus attracted to such ventures tend to have considerable political and economic clout. Examples are the Radio Corporation of America, Fairchild Industries, Western Union, Xerox Corporation, and International Business Machines (IBM). It is also true that by the time these large companies arrived, the regulatory battles of the 1960's had been fought and won by companies such as MCI.

Entry into the domestic satellite busi-

ness was first permitted by the FCC in 1971, when the commission formulated its "open skies" policy. In 1974, Western Union became the first company to launch a domestic communications satellite when it put up Westar I. Quickly, RCA and Fairchild followed suit. Already in geostationary orbit in the mid-1970's, of course, were the Intelsat satellites used by the Communications Satellite Corporation (Comsat), the publicly held, private corporation created by Congress in 1962. These satellites are not for domestic use but are for communication between the United States and other countries—a service area over which Comsat has a legislated monopoly.

In 1975, however, Comsat joined with IBM and Aetna Life and Casualty Co. to set up Satellite Business Systems (SBS), which now hopes to launch its first satellite this October. When plans were first announced, SBS was going to specialize in high-speed data transfer, so that large corporations would not have to go through slow land lines that were originally developed for voice communications. For a variety of reasons, SBS and other satellite companies have lately switched their emphasis from data to voice—a development that will increasingly threaten Bell's eroding monopoly in long-distance voice communications.

The biggest problem for SBS was finding corporations that would buy into the system. After a 4-year marketing blitz carried out among the 300 largest U.S. corporations, the McLean, Virginia, company could come up with only nine customers who were willing to pay the subscription fee of \$108,000 a month. The other companies said they did not know how to effectively use the raw data capacity that the SBS network offered. To sidestep this problem, SBS began to sign contracts with manufacturers to develop products that would help customers use the SBS system. SBS also expanded its marketing effort to include 3000 medium- and smaller-sized companies, and announced that by 1982 it will offer a low-cost interstate telephone service that will link some 150 U.S. cities. "SBS has done a major shift in direction," says Winston E. Himsworth, a vice president of Salomon Brothers, an investment banking firm that specialized in telecommunication stocks. "They're offering a much more voice-oriented, here-and-now communications service."

SBS now predicts that telephone services will account for as much as 40 percent of its projected \$325 million in 1984 revenues, according to an application filed in June with the FCC. Said one FCC official: "SBS is simply doing what other

specialized carriers have done before them. It's going after the MTS and WATS line [discount] long-distance telephone services. After all, that's where the money is." SBS expects that its new telephone service will undercut AT&T by 10 to 30 percent on direct-dialed, long-distance calls.

Congress is concerned with the rapid expansion of such systems. The legislative rewrites of the Communications Act of 1934 that are now mired in fierce debate on Capitol Hill are an attempt to pick a middle path between curbing AT&T's ability to snuff out the competition, and dealing with the need to support Bell's practice of subsidizing the local telephone companies. Bills in both the House and Senate would require Bell's intercity competitors to pay larger access fees to local telephone companies for the right to interconnect with the local systems. The fees would be set high enough to compensate the local companies for the Bell System subsidies they now receive and will probably start to lose. Just what this fee would be is currently under heated debate. AT&T would like the new entrepreneurs to pay about 65 percent more than they currently do for the right to hook into the local telephone facilities. Needless to say, MCI and the other discount companies are lobbying vigorously against such a provision in any telecommunications legislation.

They contend, for instance, that Bell's share of the long-distance market will not diminish because the national market is growing at such a rapid rate. Indeed, Ma Bell's long-distance revenues have been rising at the rate of about 15 percent a year, even with the competition hot on her heels. Questions that legislators must now face are how long the national market will continue to expand, and whether or not the discount companies will grow enough to take a significant share of it.

Such issues illustrate the tricky prognosticating that Congress must attempt as it rewrites the communications laws. Because the stakes for the industries involved are so enormous, and the lobbying so intense, the resolution of these issues has been anything but easy. It is far from certain that Congress will succeed in passing a new law this year. In the meantime, the new entrepreneurs keep chipping away at Bell's long-distance empire, and loving every minute of it. "Dispel any doubt," says MCI chairman William G. McGowan. "We are in the right industry at the right time. The 1980's is the decade of telecommunications." —WILLIAM J. BROAD

AMA's New Ethics Code Is Major Break from Past

The tradition-bound American Medical Association (AMA) recently adopted a new code of ethics that, for the first time, acknowledges a commitment to patients' rights and that allows physicians to advertise their fees and services and refer patients to chiropractors.

At its annual convention in Chicago, the AMA House of Delegates passed the new code by a large majority.

The changes were fueled by legal pressure from the Federal Trade Commission (FTC) and by lawsuits filed by chiropractors against the AMA. Although the code is not binding, it has occasionally been used by licensing boards and courts.

In 1979, the FTC ruled that the AMA's traditional ban on advertising restricted competition among physicians. Since the decision, physicians have been free to solicit patients, but few have done so. Now the AMA's code of ethics states, "A physician shall . . . make relevant information available to patients . . . and the public."

Chiropractors' lawsuits charging physicians with failure to provide them with patient referrals have cost the AMA about \$1 million annually for several years. The expense is especially painful to the AMA because of declining membership. The organization now has about 192,000 members, a little less than half of the nation's physicians.

The new code of seven principles also indicates that physicians are shedding their paternal self-image by explicitly recognizing patients' rights.

The AMA "has come a long way," said medical ethicist, Robert M. Veatch, a professor at the Kennedy Institute of Ethics, Georgetown University.

Principle II, for example, says that a physician "shall deal honestly with patients. . . ." That is a major departure from the old code, which said a physician could withhold information from patients if it was for their own good—for instance, to protect a terminally ill patient from distress.

Principle IV says that "a physician shall respect the rights of patients . . . and shall safeguard patient