

The American Telephone and Telegraph Company (AT&T).*

Sheldon Hochheiser, AT&T Archives
Published 1989

I. Introduction

The American Telephone and Telegraph Company is the largest telecommunications company in the United States, and a world-wide leader in information technology. Its main businesses include long-distance telephone service (for which purpose it maintains an advanced telephone network); integrated communications and computer solutions; telephone network switching and transmission equipment; and customer premises equipment. It is increasingly becoming a global participant in these areas. Its subsidiaries include AT&T Bell Laboratories, widely considered the preeminent industrial research laboratory (see separate article). Until divestiture, January 1, 1984, AT&T was the parent company of the Bell System (see separate article), the regulated enterprise that formerly provided the bulk of telecommunications in the United States. Numerous other articles in this encyclopedia discuss technologies, individuals, and institutions associated with AT&T and its former and present subsidiaries and associates.

AT&T was incorporated on March 3, 1885 in New York as a wholly owned subsidiary of the American Bell Telephone Company. Its original purpose was to manage, and expand the burgeoning toll, or long distance, business of American Bell and its licensees. AT&T continued as the "long distance company" until December 30, 1899 when in a corporate reorganization it assumed the business and property of American Bell and became the parent company of the Bell System.

* Essay to be published in Fritz Froehlich, ed., *The Encyclopedia of Telecommunications*, vol. 1 (New York: Marcel Dekker Inc., 1990).

II. Activities beyond domestic telephone service.

In the first part of the century, AT&T engaged in businesses that ranged well beyond the national telephone system. Through the Western Electric Company, its manufacturing subsidiary, AT&T affiliated and allied companies around the world manufactured equipment to meet the needs of the world's telephone companies. These firms also sold equipment imported from the United States. By 1914, International Western Electric Company locations included Antwerp, London, Berlin, Milan, Paris, Vienna, Petrograd, Budapest, Tokyo, Montreal, Buenos Aires, and Sydney. In 1925, Walter Gifford, newly elevated to the presidency of AT&T, decided that AT&T and the Bell System should concentrate on its stated goal of universal telephone service in the United States. He therefore sold the International Western Electric Company to the newly formed International Telephone and Telegraph Company (ITT) for \$33 million in 1925, retaining only AT&T's interests in Canada.

Gifford also divested other AT&T operations, including those in radio broadcasting (1926) and electrical equipment distribution (1928). However, in 1924 AT&T undertook a new venture in sound motion pictures, using a complex of technologies that were outgrowths of telephone related research. Through Electrical Research Products Inc., a subsidiary established in 1927, AT&T provided most of the equipment for the transition from silent to sound films to for the studios and the theaters.

Although AT&T retreated from international manufacture, it retained an international presence through its drive to provide global telephone service to the American people. AT&T engineers first experimentally transmitted the human voice across the Atlantic Ocean via radio in 1915. In 1927 AT&T inaugurated commercial transatlantic telephone service to London using two-way radio. Initially, these calls cost seventy-five dollars each (for five minutes). Service spread to other countries, both via London and through direct radio links. Radio-telephone service to Hawaii began in 1931, and to Tokyo in 1934. Telephone service via available radio technology was far from ideal: it was subject to fading and interference, and had strictly limited capacity. In 1956, service to Europe moved to the first transatlantic submarine telephone cable, TAT-1. Seven additional cables with ever greater capacity followed over the next thirty-three years. Transpacific cable service began in 1964.

III. The Background to Divestiture

For much of its history, AT&T and the Bell System functioned as a legally sanctioned, regulated monopoly. The fundamental principle, formulated by AT&T president Theodore Vail in the AT&T annual report for 1907, was that the telephone, by the nature of its technology, would operate most efficiently as a monopoly providing universal service. Government regulation, "provided it is independent, intelligent, considerate, thorough and just," was an appropriate and acceptable substitute for the competitive marketplace. The United States government accepted this principle, first informally and then legislatively. At several later points, as political philosophy evolved, federal administrations investigated the telephone monopoly in light of general antitrust

law and alleged company abuses. One notable result was an anti-trust suit filed in 1949, which led in 1956 to a consent decree signed by AT&T and Department of Justice, and filed in court, whereby AT&T agreed to restrict its activities to the regulated business of the national telephone system and government work (for additional detail, see the article on the Bell System).

After World War II, new technologies appeared that provided alternatives to copper wires for long distance telephone transmission. AT&T opened its first microwave relay system between New York and Chicago in 1950, and over the succeeding three decades added considerable microwave capacity to its nationwide long-distance network. In 1962, AT&T placed the first commercial communications satellite, Telstar I, in orbit, offering an additional alternative especially suited to international communications. Technological changes elsewhere in the system offered parallel alternatives. The transition from electromechanical to electronic components permitted new, more powerful, and eventually less expensive customer premises and network equipment. The point of these new technologies for the present article is that they eventually lowered the technological barriers to entry by would-be competitors to the Bell System. Slowly, over several decades, the Federal Communications Commission (FCC), the regulatory agency which oversees telecommunications, allowed some competition using these technologies at the edges of the network. By the mid-1970s, competition had advanced to general long distance service.

The growth of another technology, computing, gradually blurred the distinction between voice and data transmission, and between data transmission and data processing. The FCC investigations known as Computer Inquiries I and II (1979-1980) studied the ramifications of electronic data processing for AT&T and the Bell System. In April 1980, The FCC concluded that AT&T could offer "enhanced services," but it would have to do so through a fully separated subsidiary. AT&T chartered American Bell Inc. in June 1982 to meet this FCC requirement. American Bell began operations on January 1, 1983 with two divisions. One sold customer premises equipment and the other advanced information systems.

The changes in telecommunications during these years led to a general governmental reopening of policy questions long considered closed. Of greatest import was the decision of the Department of Justice on November 20, 1974 to file a new antitrust suit seeking the breakup of AT&T. Congress subsequently held hearings of its own, and proposed legislation.

The suit progressed slowly for four years while AT&T found itself increasingly torn between its role as a regulated utility and the pull of a newly competitive market. Major activity began only in 1978 when the case was reassigned to Judge Harold H. Greene, a new appointee to the United States District Court for the District of Columbia. Judge Greene established and largely stuck to a schedule for action in the suit. Still further change followed the arrival of the Reagan administration in January 1981 as it brought into the Justice Department officials, such as Assistant Attorney General for Antitrust William Baxter, who opposed regulated monopolies on philosophical grounds. The trial began in January 1981, and by the end of the year had advanced through the

government's presentation of its case and the appearance of several witnesses on behalf of AT&T. With the trial proceeding to an uncertain conclusion, AT&T Chairman and Chief Executive Officer Charles L. Brown agreed on January 8, 1982 on terms for settlement and dismissal of the suit. AT&T agreed to divest itself of the wholly owned Bell operating companies that provided local exchange service. In return, the Department of Justice agreed to lift the constraints of the 1956 consent decree, leaving AT&T free to participate in the competitive marketplace in areas such as computers. The proposed agreement was presented to Judge Greene, who held extensive public hearings on it. After incorporation of several changes suggested at these hearings and required by Judge Greene, the agreement was entered by the court as a Modification of Final Judgment (MFJ) replacing the 1956 Consent Decree. Divestiture took place, as called for in the MFJ, on January 1, 1984. The Bell System was dead. In its place was a new AT&T and seven regional telephone holding companies.

IV. The New AT&T: January 1, 1984

America woke up on January 1, 1984 to discover that its telephones worked just as they had the day before. But AT&T started the day a new company. Of the \$149.5 billion in assets it had the day before, it retained \$34 billion. Of its 1,009,000 employees it retained 373,000. Gone even was the famous Bell logo and name; Judge Greene had given them to the regional telephone companies, excepting only the name's use in Bell Labs. In its place was a stylized globe and the monogram "AT&T." What AT&T had won, its officials believed, was release from former legal shackles, from the increasing conflicts between the way things had been done and a new information age. AT&T now had the freedom to pursue the technology developed at AT&T Bell Laboratories wherever it led; it could compete in the global marketplace. AT&T was not, however, free from its legal heritage of regulation. Interstate long distance telecommunications remained under the purview and regulation of the FCC. January 1, 1984 was a time to look towards the future.

If the opportunity was great, then so was the challenge. Success would require no less than the most drastic change in corporate culture ever undertaken by a major American corporation. The old AT&T--the Bell System--as a regulated monopoly had been largely insulated from market pressures for most of its history. Its culture venerated service, technological excellence, reliability, and innovation within a non-competitive internally-driven framework of taking however much time and money it took to get things done right. The new AT&T had to learn how to find out and deliver what its customers wanted, when its customers wanted it, in competition with others who sought to fill the same customers' needs. AT&T had great technological and personnel strengths upon which to build, but the transition proved far more complex than anyone imagined in 1984. Though the company traveled far down this road in the five years following divestiture, cultural change remained in 1989 an ongoing process.

AT&T began its new life with an inheritance of three major business units from the old Bell System: long distance service (the old Long Lines department), equipment manufacture and supply (the old Western Electric Company), and research and

development (Bell Laboratories). It also began with a newly designed organization; one that the company hoped would be more suited to its new circumstances. Underneath the corporate offices were two subsidiaries. AT&T Communications Inc. was the new entity for the regulated long distance business. AT&T Technologies Inc. contained most everything else. Technologies assumed the old corporate charter and responsibilities of Western Electric. It combined Western Electric's manufacturing expertise with a new structure that was market rather than functionally oriented. The major subdivisions included units in Consumer Products, Network Systems, International business, and Technology Systems (which in turn was subdivided into Components and Electronic Supplies, Computers, and Federal Systems). Technologies also included the former American Bell Inc., now renamed AT&T Information Systems, the fully-separated subsidiary required by the FCC for the sale of customer premises equipment and advanced information services. AT&T Bell Laboratories was little changed, although it lost 3,000 employees to Bell Communications Research (Bellcore), the new central research consortium for the Bell Companies. Some critics pointed out that while AT&T Technologies was now structured in a way appropriate to the competitive marketplace, most of the individuals in senior management positions had Western Electric backgrounds in production, and not in marketing. Learning how to market products would not be easy. AT&T reorganized several more times over the next five years as it sought a structure that would combine its historic strengths with the needs of the marketplace.

Within AT&T Technologies were two new businesses on which the company placed much of its hopes for the future, international operations and computers. AT&T had over the previous few years cautiously reentered the international marketplace for telephone network equipment with sales to the national telephone companies of Saudi Arabia and Iran. It thus had reason to believe that it had leading-edge technology salable to telephone companies overseas. By the 1980s, most telephone switches were large special purpose computers, controlled by sophisticated software programs. In designing telephone switches and software, Bell Laboratories demonstrated a capability in computing that many, both inside and outside the company, believed would lead AT&T, now that it had government permission, to emerge as a rival to IBM, the company that dominated the computer industry. Moreover, the UNIX® computer operating system, first developed at Bell Labs in 1969, was a widely respected hardware-independent software system.

V. Long Distance Communications.

Long-distance service is AT&T's largest business. Over the five years following divestiture, it consistently brought in over half of the company's revenues and profits. Divestiture brought changes, and plans for even greater future changes, to this business. The old AT&T Long Lines department had handled interstate calls only, intrastate toll calls being handled by the operating companies. The MFJ divided the country into 161 Local Access and Transport Areas (LATAs). Intrastate inter-LATA calls moved from the operating companies to AT&T. Such calls accounted for an estimated 25% of total AT&T long distance revenues in 1985. AT&T therefore established direct relations with each

state's regulatory commission, and began to file intrastate tariffs.

Long distance telephony requires the cooperation of three companies: the local telephone companies on the originating and receiving ends and the long distance carrier. In the Bell System, long distance charges had been set and revenue split internally so that a share of the revenue from long distance service paid to the operating companies subsidized local service. This subsidy helped keep basic residential telephone service universally affordable. After divestiture, AT&T paid access charges to the local telephone companies for origination and completion of long distance calls. These access charges continued the long distance subsidy to local service. Alternative long distance carriers, such as MCI, paid lower access charges, but received a different type of connection to the local network. The MFJ required the local phone companies to phase in equal access (dial-1 service) to all long distance carriers. Under equal access, customers reached whatever carrier they selected for their long-distance service by dialing a 1. The FCC required that this be done with a concurrent reduction and leveling of the access charges the several companies paid. The FCC proposed that the revenue lost to the local companies in the process be replaced by a subscriber line charge levied on every telephone subscriber. The subscriber line charge for residential customers began amid political controversy at \$1.00/month on June, 1985, and reached \$3.50 four years later.

Customer long-distance carrier selection began in Charleston, West Virginia in July 1984. The initial selection process proceeded telephone exchange by telephone exchange across the Bell Company territories (and that of some independents) over the next twenty six months. Three out of four customers chose to remain with AT&T; a showing far better than analysts had predicted. AT&T won particular plaudits for its new-found skill in competitive marketing to consumers. Among the techniques employed were innovative programs such as Opportunity Calling (which gave consumer product discounts for use of AT&T long distance) and Reach-out-America (which sold off-peak long distance service in hourly blocks), as well as an extensive advertising campaign featuring Cliff Robertson as the AT&T spokesman.

As the subsidies paid by AT&T's long distance service dwindled, the company reduced its rates. In the five years following divestiture, AT&T rates declined an average of close to 40% in a series of reductions. Equal access also brought an inevitable decline in AT&T's market share in long distance. Between 1984 and 1989, AT&T's share dropped from 90% to 68%. But both the total volume and total revenue from long distance service increased as this business continued to grow.

The equal access process went only part way to leveling the playing field between AT&T and its competitors in long distance service. While MCI, Sprint and smaller companies were basically unregulated, AT&T's rates and services remained subject to pervasive FCC regulation as the "dominant carrier." The FCC limited the rate of return allowed to AT&T long distance service to 12.75% (reduced to 12.2% in January 1987). Earnings in excess of this mandated price cuts. Rate-of-return limitations was how the FCC traditionally had regulated the interstate profits of the Bell System. AT&T consistently argued that rate of return limits went against the spirit of the MFJ and the realities of the now-competitive market, which in itself provided ample incentives to

control costs. After extensive debate, the FCC replaced this limit on profits with a "price-cap" system that put ceilings on prices on July 1, 1989. Under price-caps, the FCC set limits on the rates AT&T could charge for its services. If the company could become more efficient, and reduce its costs, it could reap the benefits that accrued.

FCC regulation was (and continues to be) most problematical for AT&T's business with its largest, mainly corporate, long distance customers. Competition for these high-volume users of telecommunications was fierce, and AT&T's market share declined somewhat more than in other segments of the market. AT&T and its competitors introduced a wide variety of offerings to major telephone users, and the users in turn developed an increased sophistication in defining their own telecommunications needs. The FCC required AT&T, as a dominant carrier, to file every proposed new long distance service and every change of rate as a tariff. AT&T proposals thereby became available for inspection and comment by other long distance carriers, and faced possible rejection by the FCC. This hindered AT&T's abilities to meet customer requirements in a timely fashion. For example, AT&T's first attempt at a discount plan for moderate sized business users of long distance service, its 1985 Pro America plan, was suspended and then denied by the FCC on the grounds that it was not adequately cost justified. The FCC accepted a revised Pro America plan the following year. AT&T filed, and put into place a variety of new long-distance plans such as MEGACOM® and MEGACOM 800®, both introduced in November 1985. MEGACOM services provided the largest customers with direct access to AT&T's network. AT&T also adjusted and generally lowered the prices and increased the variations available in other longer standing plans such as WATS and 800 service both to meet competitive conditions and in response to declining costs.

The increased competition brought on by divestiture has had the intended effect of accelerating the rate of innovation in the telecommunications marketplace. Innovation has been particularly prominent in service to the largest, and therefore potentially most profitable, telephone accounts. Software Defined Networks, for example, introduced by AT&T in late 1985, permitted large companies to use parts of AT&T's public switched network as the virtual equivalent of dedicated private line service, and as an alternative to the customer running his own private internal communications system among facilities.

The most serious hindrance to AT&T's relationships with large business customers in 1984-1986 may well have been the separation between AT&T Information Systems and AT&T Communications mandated by the FCC in its Computer Inquiry II decision. AT&T was forced to have two separate, and non-communicating, national sales forces. Neither could handle all the customer's AT&T business nor offer integrated solutions. The FCC eased these restrictions in several stages in 1985, finally dropping the separation requirement on September 18. In February 1986, AT&T created a single national sales force for major business customers, and in September merged AT&T Communications and AT&T Information Systems into a single structure. AT&T was now set to work with customers to provide integrated communications solutions.

Some of AT&T's most innovative solutions for large customers were embodied in

the controversial Tariff 12. Tariff 12 covered large networks that were, in effect, custom-designed to meet the requirements of individual customers. It was originally filed with the FCC in 1985 for application to government systems. In 1987, AT&T filed a Tariff 12 offering to cover a custom-designed voice and data communications network for the General Electric Corporation. Despite objections from competitors and others, the FCC allowed both the specific General Electric system on August 20, 1987 and at least twelve additional Tariff 12 proposals by mid-1989. AT&T often provided non-regulated components to these customers to complement their custom networks. Tariff 12 offerings gave AT&T a way to use all its expertise to serve a customer's communications needs.

Another filing before the FCC, Tariff 15, allowed AT&T to offer special pricing to a customer in response to a specific offer from a competitor. As of mid-1989, the FCC had allowed a single Tariff 15 filing, for service to the Holiday Corporation, while it studied the general principle behind the tariff. The services described in these tariffs are examples of how AT&T learned to listen to its customers in a competitive marketplace, and offer responsive solutions

VI. The Network

It is AT&T's extensive network of long distance facilities for transmission and switching--which AT&T has since 1987 called its Worldwide Intelligent Network--that makes the above services possible. The 1980s have been an era of transition in the network for both technological and marketplace reasons. The traditional telephone network had relied on analog transmission and switching. At divestiture, the AT&T network was 80% digitally switched over AT&T 4ESS® toll switches, but it was still largely analog transmitted by a mixture of coaxial cable, microwave radio, and satellite, with a smaller amount of newer digital radio and digital fiber-optics light-guide capacity. Digital transmission had major advantages in signal quality, cost, maintenance, and the ability to carry voice, data, and signaling information on the same line using a standards known as ISDN (Integrated Services Digital Network). In 1984, AT&T had in place a plan for a decade-long, orderly transition to an all-digital, primarily fiber-optic network. In December 1988, the company announced the last of several accelerations of this program to achieve 95% digital switched traffic by mid-1989, and 100% by the end of 1990. AT&T took a write-down of \$6.7 billion, most of which went to cover the costs of accelerating the replacement of obsolete analog equipment. This led to AT&T announcing the first annual loss in its history. The investment community widely hailed the action as evidence of AT&T's commitment to technical excellence and long-term cost savings. AT&T's commitment to digital technology encompassed its growing international services as well. It held the largest share (34.1 percent), and laid most of the cable for TAT-8, the first transatlantic fiber-optic cable. TAT-8 opened on December 14, 1988. A transpacific digital fiber-optic cable followed in 1989.

AT&T replaced its remaining twenty percent of older analog switching capacity within a few years of divestiture. The company updated the control and muting functions of the network in 1987 when it redesigned and upgraded its central network operations

center (or NOC) at Bedminster, New Jersey. The reopened center featured a new network management system, dynamic routing, to speed call completion by non-hierarchical selection of alternate routes.

VII. Customer Premises Equipment.

At divestiture, AT&T assumed ownership of the leased customer premises equipment (CPE) formerly owned by the Bell operating companies. The FCC deregulated this part of the industry in 1983 after AT&T offered to sell consumers the leased phones in their homes. This embedded equipment base included approximately 90% of the residential telephones attached to the Bell System, as well as a broad variety of business equipment. This leased base, while profitable, declined as customers increasingly chose to own their telephone equipment. AT&T's rental revenues declined from \$7.2 billion in 1984 to 3.0 billion in 1988.

The transformation of the residential telephone business in the five years following divestiture was striking. In 1984, large numbers of consumers chose to turn in their leased AT&T phones, and instead purchased equipment. But many consumers purchased inexpensive and poorly made phones which failed to give satisfactory service. The telephones AT&T initially offered for sale were the models designed for lease in the integrated Bell System. A main characteristic of these electromechanical phones was their rugged durability; they were designed for decades of reliable service. But this made the phones more expensive, as well as bereft of features such as the ability to store frequently-called numbers, offered in many of competitive products.

With leases declining, and product sales at best flat, some analysts speculated that AT&T might withdraw from the consumer equipment market. The company decided instead to fight back. It began aggressively marketing its products through major retailers, in addition to its own phone center stores. Starting in late 1985, it exploited a growing consumer reaction against low quality "throw away" phones with a series of clever commercials that sang of the problems of "second class phones." Meanwhile, telephone design went back to the AT&T Bell Laboratories drawing board. The labs found out what the consumer wanted, and designed high quality, but less costly, products to meet the needs. AT&T moved residential phone production overseas to meet competitive costs, beginning with a plant in Singapore in early 1986. The company entered the growing market for cordless phones, and achieved success with its 5000 series, introduced in January 1987. These phones offered superior sound quality. AT&T began to regularly release new models, with new features; a strategy responsive to the competitive sale market, but a major change from the Bell System. AT&T recaptured market leadership in the residential telephone marketplace.

AT&T's post-divestiture performance in business communications systems, such as PBXs (private branch exchanges) and key systems, was more uneven. As with consumer equipment, AT&T took over the installed leased equipment base from the Bell operating companies at divestiture on a de-tariffed basis. But competition and innovative customer-owned equipment had come to business systems before 1984. AT&T had lost

the dominant position before divestiture, and its market share was in continued decline. The market was (and continues to be) divided among many vendors, and at best flat with supply exceeding demand. In the years following divestiture, AT&T first halted and then reversed its decline but the PBX market remained divided among a number of companies, none of whom could claim dominance.

One important element in AT&T's revival of its business communications business was an updating of its product line from analog to digital equipment, similar to the transition in other portions of its business. It introduced its first digital PBX, the System 85® (400 lines and up) in 1983, and the smaller System 75® in 1984. Initially, these were separate systems. Customers had to replace most of their equipment in order to expand their systems but this provided an opening to AT&T's competitors. In 1987, AT&T introduced Universal Modules that served to merge the two product lines so the customers could retain much of their installed equipment while enlarging and updating their systems. In systems aimed at smaller users, the traditional "key-set" market, AT&T offered a series of products including the Merlin® system (1983) and its replacement Merlin II® and Merlin Plus® (1987), System 25® (1986), and Spirit® (1987). AT&T continued to offer its older Horizon® analog system until 1986.

The merger of AT&T's Communications and Information Systems business sales forces in February 1986 improved AT&T's position. Not only was the former sales force better established with a wide range of customers, but the company now offered single source solutions encompassing hardware, software, and services, integrated solutions to meet the information movement and management requirements of the information age. It had a wide range of pieces from which to build a solution. For example, in 1988 AT&T built a new private network for the Boeing company, based not on PBX's but on four 5ESS® switches, digital equipment originally designed for use in telephone company offices.

The problems AT&T encountered in business communications equipment were minor compared to those it encountered in computers. The expected emergence of AT&T as a major competitor to IBM did not happen. The company tried several strategies, but accumulated losses estimated by outsiders as high as \$1 billion in 1986 alone. In 1987 AT&T refocused its strategy from stand-alone computers in direct competition with IBM to emphasizing computers as part of integrated data network solutions. Networking was a traditional AT&T strength. A second part of AT&T's late-1980s computer strategy was encouraging the adoption of the UNIX operating system as a hardware-independent technical standard. Several different versions of the UNIX system came into widespread use. The popularity of UNIX software helped produce the company's largest single computer hardware sale in 1988 when it won a United States Department of Defense order for up to 20,000 of UNIX-based 3B2 minicomputers. AT&T computer operations still had not become profitable by 1989.

VIII. Telephone Network Equipment.

In the old Bell System, the Bell operating companies purchased network equipment

largely from AT&T's Western Electric subsidiary. After divestiture, the Bell companies had to purchase this equipment from outside suppliers, because the MFJ barred the divested Bell companies from manufacturing their own equipment. At least one competitor of AT&T, Northern Telecom Ltd. of Canada, had made inroads into the Bell operating company market even before 1984 by beating AT&T to market with a digital switch for local telephone offices. AT&T's competitive product, the 5ESS® digital switch, was first installed and cut over in an Illinois Bell office in Seneca, Illinois on March 25, 1982, but only a small number, totaling 180,000 lines capacity, were shipped before divestiture.

AT&T Network Systems won plaudits from analysts in 1984 for the speed with which it built up 5ESS® production and delivery schedules. The company shipped over 2 million lines in 1984 alone, and a total of 25 million lines by the end of 1988. The installed digital switch base helped generate additional sales of related equipment, such as remote digital switching modules and new generations of software. In 1988, AT&T agreed to acquire in stages over 15 years, GTE's Communications Systems Corporation, the chief supplier of switches to GTE's telephone companies. This acquisition complemented AT&T's post-divestiture efforts at broadening its customer base by selling network equipment to non-Bell telephone companies.

Network Systems also manufactured a wide range of transmission products for both sale and internal use. Products ran the span of technologies in use in the national telephone network from traditional copper wire and cable to the most modern FT series G fiber-optic light-guides capable of carrying 1.7 Gigabits of information per second. In addition to such transmission media, AT&T was the leading supplier of fiber-optic electronics. AT&T continued to manufacture the broadest range of products for use with the many types of equipment found in the network. Another part of AT&T, Component and Electronic Systems, renamed AT&T Microelectronics in 1986, manufactured many of the electronic components used in Network System products. AT&T Microelectronics supplied external markets as well.

Northern Telecom was far from AT&T's sole competitor in equipment sales to American telephone companies. Most of the world's telephone equipment manufacturers sought shares in this market. The penetration of these European and Asian firms was frequently cited as an unexpected negative result of divestiture, especially as many European and Asian markets remained relatively closed to American companies (chiefly AT&T).

IX. International

The great expectations AT&T had in 1984 for expansion into international equipment markets were still largely unfulfilled five years later. 1989, however, brought definite signs that AT&T International had turned a corner. AT&T had begun a modest reentry into international markets in the 1970s, but intensified its efforts after the MFJ. The company sought local partners in several countries, hoping thereby to combine its technical and research strengths with local political and social savvy. In 1983, AT&T and

N.V. Philips, the giant Dutch electrical equipment company, formed an equally owned joint venture in the Netherlands, AT&T and Philips Telecommunications B. V. (APT) to manufacture and market telephone network equipment. In five years, APT sold only a few switches in the Netherlands, Great Britain, and Saudi Arabia in competition with the established European manufacturers that had long been favored by the continent's government controlled telephone systems. The most notable and best publicized disappointment to APT was a 1986 last-minute French political decision not to allow an APT-led consortium acquire CGCT (Compagnie Generale des Constructions Telephoniques), a company that controlled 16 percent of the French switching market. AT&T had worked long and hard to win this contract. AT&T increased its share of APT to 60 percent in January 1988 and 85 percent the following April. APT became AT&T Network Systems International.

Another AT&T partnership, where it acquired a 25 percent share of Italy's Ing C. Olivetti S.p.A. and the two companies agreed to sell each other's products, also fell short of expectations. In 1989, AT&T traded its interest in Olivetti for shares in Olivetti's parent, C1R. Expected synergies between Olivetti's computers and AT&T's telecommunications products had not developed. In Spain, AT&T Microelectronica, a joint venture eighty percent owned by AT&T and twenty percent owned by Telefonica, Spain's national telephone company, opened that country's first semi-conductor plant in 1987. That same year, Telefonica announced it planned to add AT&T as a third supplier of telephone equipment.

AT&T entered Pacific markets through several joint ventures. It formed two separate operations in Korea with Lucky-Goldstar to manufacture fiber-optic cable and switching equipment and market AT&T transmission equipment and microcircuits. Total sales of 5ESS and earlier switches exceeded 1 million lines by 1988. AT&T formed a similar joint venture in Taiwan, and several marketing and manufacturing ventures in Japan. The company established plants in Singapore and Thailand to manufacture consumer telephone equipment for the domestic American market, and sold Singapore the first 5ESS switch configured as an international gateway.

The European breakthrough for which the company had been striving came in February 1989 when Italy chose AT&T as partner for the state-owned manufacturer Italtel as part of that nation's estimated \$30 billion dollar planned upgrade of its telephone network. The wide-ranging agreement between AT&T and Italtel called for joint development of products for European and third world countries, a joint marketing company for countries where neither firm was well established, and an exchange of equity between Italtel and AT&T Network Systems International. This agreement, AT&T officials and outside analysts agreed, gave AT&T the base it needed to be a major player in the single market scheduled for Europe in 1992.

X. Structure, Organization, and Strategy

In the five years following divestiture, AT&T has had three chief executive officers. Each contributed to the still-ongoing transition of the company to a market-driven

competitive one. Charles L. Brown, elected chairman in 1979, continued in office until August, 1986. James E. Olson succeeded him, and served until his unexpected death from cancer on April 18, 1988. Robert E. Allen succeeded Olson the next day.

Brown had won widespread acclaim for the skill with which he oversaw the transformation of the Bell System from one enterprise to eight independent companies without disrupting service. Afterwards, Brown attempted to execute the strategies he had formulated during divestiture for the new AT&T. The task proved far more difficult than almost anyone had expected. Senior management had definite ideas of where it wanted AT&T to go, but transforming the lifelong habits and work patterns of 373,000 employees in an entrenched bureaucracy was no easy task. That the company had to change its orientation was clearly expressed in dozens of AT&T publications and forums. How to do this proved less clear. The workforce had understood the old Bell System guiding mission of universal service. AT&T was no longer the telephone company, but a corporation in the competitive information movement and management business. But no comparable mission to universal service could be articulated. Management well recognized the need for cost cutting. Among these cuts were several major job reductions. AT&T earnings fell short of the company's own predictions.

Brown was successful in winning relief from the strictures of the FCC's Computer Inquiry II and led AT&T in responsive step-by-step reorganizations. First AT&T moved several manufacturing operations from other segments of AT&T Technologies into customer-oriented units at AT&T Information Systems. Then AT&T merged Technologies and Information Systems. Finally, in May 1986, AT&T began to merge Information Systems with AT&T Communications, and reorganize the merged organization into four customer-group oriented units: Business Markets, General Markets, Special Markets, and Network Operations. Management believed that this would end customer confusion by giving accounts a single integrated marketing team for all AT&T products and services. The company expected also that this would lend some of the success of the Communications sales force to Information Systems products. This unification was a firm foundation that Brown bequeathed his successor, James E. Olson,

Olson described his outlook in AT&T's 1986 annual report with the comment that "the company was on the right road but in the wrong lane." What was needed was a focusing of effort and an acceleration of the commitment to change. He termed his plan a "single enterprise strategy" where continued strength in the company's core businesses of long distance service and telephone equipment would provide the basis for growth in the two target areas of data networking and international business. Olson continued (but accelerated) Brown's plans to reduce and redeploy the workforce, to shift company focus from internal questions to customer needs, and to seek relief from regulation. Olson also pushed to create new synergies and bring greater order to the organization of the company. For example, he united many of AT&T's separate financial systems groups and established company-wide accounting and payroll systems. Performance improved, although results were tempered by Olson's willingness to take write-offs of equipment and systems made obsolete by competition. Olson's leadership won plaudits from analysts. The Wall Street Journal noted on November 12, 1987, that "for the first time since the breakup of the Bell System, AT&T is presenting coherent

strategies that, if executed well, could make it into the technical powerhouse it always thought it could be." Business Week featured Olson on its cover on January 18, 1988, and titled its story "AT&T: The Making of a Comeback."

Robert E. Allen, in the first year after his sudden elevation to CEO, pursued the strategies formulated by Olson while adding some new, and in some ways tougher, ideas. He further defined the work force in July 1988 by coupling a company-wide hiring freeze with programs that shifted over two thousand staff managers into sales positions. He sponsored acquisitions of companies and other assets, such as GTE's switching business and the Paradyne Corporation, makers of data communications equipment, where such moves made strategic sense. Acquisitions such as Paradyne showed that AT&T would now complement internally-developed technology with technology developed elsewhere.

In February 1989, AT&T began an additional restructuring. The company reorganized the four major business units within AT&T Communications and Information Systems into a number of smaller business units, so that accountability and decision making would be pushed down the organization, closer to the customer. Many staff positions were placed in the units they supported.

AT&T evolved considerably in the five years following the breakup of the Bell System. It competed aggressively in the marketplace, albeit more successfully in some areas than other. It listened to customers, and designed systems to meet their expectations. It learned, above all, how difficult a corporate transformation it had agreed to undertake. In late 1989, as this is written, the transition continues as an ongoing process.

For further study:

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