

# The Bell System

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On March 10, 1876, when Alexander Graham Bell spoke into the transmitting instrument, "Mr. Watson, come here, I want to see you," he could envision already a great national telephone system. As he wrote to his father that same evening, "I feel that I have at last found the solution of a great problem, and the day is coming when telegraph wires will be laid on to houses just like water or gas is, and friends will converse with each other without leaving homes." Bell later expanded upon his expectations:

It is conceivable that cables of telephone wires could be laid underground, or suspended overhead, communicating by branch wires with private dwellings, country houses, shops, manufacturers, etc., etc., uniting them through the main cable with a central office where the wire could be connected as desired, establishing direct communication between any two places in the city. Such a plan as this will, I firmly believe, be the outcome of the introduction of the telephone to the public. Not only so, but I believe in the future wires will unite the head offices of the Telephone Company in different cities, and a man in one part of the country may communicate with another in a different place. (1)

All of this and more would come true, of course, but even the optimistic inventor could not have predicted what would grow to be an association of companies that bore his name, the Bell System. By the time of its breakup nearly 108 years later, the Bell System would have assets of \$150 billion and over one million employees. It would be the largest private business enterprise in the world.

Ever the inventor, Alexander Graham Bell was not interested in the business of converting an invention into a successful enterprise. Apart from public talks to publicize his invention, and later appearances as a witness in the extensive litigation over his patents, Alexander Graham Bell became simply a Stockholder whose primary interests were in other scientific and humanitarian endeavors.

## Origins and Early Corporate Development (Table 1)

Actually, the first business venture had begun before the invention with an agreement between Thomas Sanders, Gardiner G. Hubbard, and Bell dated February 27, 1875. Formed as a basis for financing Bell's experiments, the agreement came to be called the Bell Patent Association. The only tangible assets of this association were an early Bell patent, "Improvements in Transmitters and Receivers for Electric Telegraph," his basic telephone patent, No. 174,465, an "Improvement in Telegraphy" (March 7, 1876), and two additional patents that followed. With his efforts successful, Bell married Mabel Hubbard, his partner's daughter, in July of 1877, and as they prepared to leave for Europe, the three members of the patent agreement formed the Bell Telephone Company, a Massachusetts association. At

first, the company had only one full-time employee, Thomas Watson, but a few days later, R. W. Devonshire was hired - to keep the books. The company's 5,000 shares of stock were distributed as follows:

Alexander Graham Bell - 10 shares

Mabel Bell - 1497 shares

Gardiner Hubbard - 1387 shares

Gertrude Hubbard (née Mercer) - 100 shares

Thomas Sanders - 1497 shares

Thomas Watson - 499 shares

C. E. Hubbard (Gardiner's brother) - 10 shares

The enterprise's prospects were poor. Shortly after the Bells left for Europe, Gardiner Hubbard offered to sell all the Bell patents to William Orton, president of the giant Western Union Company, for \$100,000. Seeing no way that the "electrical toy" could benefit his business, Orton refused the offer. Rejected, Hubbard set out again to turn Bell's invention into a successful business. His first and most important decision was to lease the telephone instruments instead of selling them. A similar strategy had been adopted by the Gordon-McKay Shoe Machinery Company, for which Hubbard had been an attorney. Although leasing would enable the Bell interests to protect their patent rights, it actually increased the enterprise's needs for funds to move the business forward.

When the Bell Telephone Company was formed on August 1, 1877, only 778 telephones were in use and the firm desperately needed additional capital. Hubbard's second strategic decision was to solve that problem by using agents to develop the business in other regions and in promising local markets. Thomas Sanders managed to convince a group of men from Massachusetts and Rhode Island to invest in a firm to develop the telephone in New England. On February 12, 1878, they formed the New England Telephone Company (this firm has no direct relationship with the present-day New England Telephone and Telegraph Co.) and set about the task of leasing the telephones to customers in the urban Northeast. Still, the Bell interests were short of funds, and to bring in new investors and the much needed capital, they incorporated a reorganized Bell Telephone Company in Massachusetts on June 30, 1878. The next month, Hubbard persuaded Theodore N. Vail, then superintendent of the government's Railway Mail Service, to join the new company as general manager. Along with O. E. Madden (who was recruited from the Domestic Sewing Machine Company and placed in charge of agency operations), Vail brought professional management to the Bell enterprise for the first time.

One of the other hallmarks of the American telephone system - rapid technological progress - also became evident during these early years. At first, each pair of telephones was connected by a single line-an expensive and ineffective arrangement. The solution to this problem was the telephone switch and central office or exchange (and with it, the first operators). At the exchange, all of the local telephones were connected to a switch, very

simple at first, but growing increasingly complex as more and more lines were added. The switch became the switchboard, and the first telephone exchange opened on January 28, 1878, in New Haven, Connecticut.

The Bell Company soon was able to demonstrate that the telephone worked, that it was useful, and that large numbers of urban Americans would pay to have this service. Indeed, only a few months after turning down Hubbard's offer, Western Union realized that it had made a mistake: customers for the telegraph company's stock ticker service were busily ordering telephones. In 1878, Western Union bought Elisha Gray's telephone patents, commissioned Thomas Edison to work on improvements, and organized the American Speaking Telephone Company. This set the stage for a major corporate battle with the fledgling Bell Company (2).

Vail, the new Bell general manager, took up the battle. Vail sent a copy of the Bell patent to every agent, along with a letter asking each of them to keep fighting. "We have the original telephone patents," he wrote. "We have organized and introduced the business and do not propose to have it taken from us by any corporation." He tried to bolster the agencies so they would have "sufficient vitality to carry on a fight . . ." (2). At this point, however, the situation looked bleak. Edison had developed a much better transmitter. Western Union was using its superior resources to gather in new subscribers in the nation's largest cities and had penetrated even the Bell stronghold in Massachusetts. Hubbard and Vail responded with a patent infringement suit, but that legal skirmish threatened to drag on for many months. It was thought that the Bell firm might well go under before the courts could decide the matter.

Determined to best the telegraph company, Bell's investors decided to strengthen and reorganize their undertaking in late 1878. They brought William Forbes, a Boston financier, onto the board of directors. Forbes had considerable business experience and a keen appreciation of the problems of running a large, complex company. He submitted a reorganization plan that the board accepted early in 1879. Under this plan, authority was centralized in a new executive committee. Hubbard and Sanders were no longer in charge. Forbes became president of the revamped and recapitalized National Bell Telephone Company, an organization that consolidated the New England Company and the old Bell Company. Theodore Vail continued to serve as chief operating officer for the consolidated operations.

Revitalized, National Bell intensified the competition throughout the country, and Western Union, concerned that the courts might uphold the Bell patents, decided to negotiate a peace treaty. Western Union agreed on November 10, 1879, to a settlement of the infringement suit and withdrew from the telephone business for the duration of the Bell patents. It sold its 56,000 telephones to National Bell. In return, Bell agreed to refrain from entering the telegraph business and to pay Western Union 20070 of all royalties paid under its former license contracts. The agreement reflected the fact that, in 1879, telephone and telegraph technologies were essentially complementary: the telephone could not be used over long distances, but it was more practical than the telegraph for local communications.

Before many years had passed, however, technological progress undercut the agreement. The Bell Company could now raise the capital it needed to promote the toll

business between exchanges, to acquire new patents covering all aspects of telephone equipment and operations, and to defend the original patents. (During the 17 years of the patent monopoly, the Bell companies filed over 600 infringement suits and won all of them.) Their resources were now up to the task of encouraging technical development and rapid growth. When a new Massachusetts corporation, American Bell Telephone Company, was organized in April 1880, it was capitalized at \$10 million. American Bell could afford to press forward with the toll business, gradually extending the distance over which long distance transmission was possible. When the local exchanges hesitated to comply, American Bell began to consolidate them into larger units. An 1891 annual report commented:

As methods are devised for making the telephone commercially useful over long lines, the advantages of the centralization of management will be more apparent, as well as the importance to the public of having the business done in large territories under one responsible head, with far-reaching connections throughout the whole country. (3)

In addition to consolidating the licensees, American Bell acquired a larger, more productive manufacturing installation. Initially, all of its telephone equipment was manufactured at Charles Williams's electrical shop in Boston, where Watson and Bell had conducted their early experiments. However, the demand for the telephone apparatus soon became too large for this shop and manufacturing was contracted out to several independently owned and managed electrical manufacturing firms. But the problems of enforcing contractual agreements, maintaining quality, and adhering to patent specifications ultimately forced Vail and Forbes to decide that American Bell should exercise direct managerial control of this function. In February 1882, American Bell acquired the Chicago-based electrical manufacturing firm, Western Electric, and gave it exclusive rights to manufacture Bell telephone equipment.

Other changes followed. In December 1883, the company split its small Electrical and Patent Department into two, more specialized units. Originally, it had organized this unit primarily to evaluate patents and devices developed by independent inventors. Now it organized a Mechanical and Testing Department responsible for "experimental work relating to circuit design and equipment inspection" (4). The staff of the two departments grew from 2 to 20 and the Mechanical and Testing Department became the nascent research arm for the Bell Company. Vertical integration along these lines would be another hallmark of the Bell System for the next century. By 1884, when the 5-year license contracts had been replaced with perpetual contracts allowing American Bell to take equity positions in the licensees, the Bell enterprise was a far different entity than the loosely coordinated set of interests established in 1880.

Despite its reorganization and recapitalization, American Bell was having trouble developing long-distance service between the exchanges. By early 1885, the limits of its approach to the regional toll business were evident. The Southern New England Telephone Company announced it was abandoning its 200-mile segment of the experimental toll line between Boston and New York City, even though the line was a technical success. For the most part, transmission problems had been solved, but the line turned out to be more costly than anticipated and the regional company was not interested in bearing the additional expenses.

These complications prompted Theodore Vail to devise a new way of organizing the long-distance service. With the blessings of his Boston superiors, Vail developed a separate, wholly-owned long-distance subsidiary. He recruited Edward J. Hall from the Buffalo, New York, exchange as general manager and Angus S. Hibbard from the Wisconsin Telephone Company as general superintendent (5). Vail, who became president of the new company, instructed Hall to incorporate the subsidiary, named the American Telephone and Telegraph Company (AT&T), in New York State, which had far less restrictive incorporation laws than Massachusetts. The charter would allow AT&T to increase its financing to "an unlimited amount." "Make the powers of this Company to build, buy, own, operate, lease, etc. . . . lines extending from any city in the state to each and every other city in the United States, Canada, and Mexico and to be connected by cable with the rest of the known world," Vail told Hall (6). The 1885 AT&T charter of incorporation contained these exact words. With the formation of AT&T, all of the basic functions-long-distance service, local operations, manufacturing, and research and development -that would comprise the Bell System were now in place and, with the addition of network manager responsibilities, American Bell's role as parent company became more complex.

Hall recognized that AT&T's commercial success depended upon its ability to use all of the existing exchange and toll facilities belonging to Bell licensees as "feeders" into its inter-city network. But it was no simple matter to persuade the licensees to cooperate. They had their own business to tend to and their own interests to serve. AT&T found itself embroiled in such disputes as the one that arose over the building of a trunk line between New York and Philadelphia; American Bell, the Metropolitan Telephone and Telegraph Company of New York, and the Bell Telephone Company of Philadelphia could not agree on the terms of interconnection. This dispute held up construction of the line until January 1886. Some officials in American Bell thought the answer was to make all the associated companies wholly-owned subsidiaries. But Hall cautioned that a more gradual restructuring was needed. American Bell, he thought, should avoid a conspicuous move toward establishing a national telephone monopoly. His view won out, although American Bell did increase its equity position in the licensees. Ten years later, a complete consolidation of the associated companies was again considered and rejected for the same reasons.

During these years, the Bell System experienced only modest growth in the number of exchanges, but the pace of technical advancement was very rapid. Circuit capacity was increased; grounded iron wire was replaced by new metallic circuits; and the common battery system was improved. As long-distance operations reached into more and more local areas, American Bell pressed the local companies to standardize their equipment. These efforts often were rebuffed by the local companies. Bell officials found that they had to proceed gradually, developing new specifications by consensus and leaving compliance to be monitored by the local firms in the System. American Bell also recognized that a standardized accounting system was needed to report results throughout the System, but attempts to introduce one ran into many of the same problems of implementation. In fact, it was 1891 before a compromise plan, reflecting an emphasis on operations as the main source of revenue rather than patent-based royalties derived from equipment rentals, could be introduced (5).

Although American Bell was making progress in spreading the telephone and

integrating the System's technology, Vail was not satisfied. He thought the Boston investors were too interested in large dividends and wanted those funds to be pumped back into the long-distance network. Disgruntled over the firm's shortsighted policies, he left the telephone business in 1887. When the Bell patents expired in 1893 and 1894, American Bell would have to face a new era without Vail.

### **Competition and Consolidation-The National Network Emerges**

On the eve of that new age in 1892, there were nearly 240,000 telephones in use in the United States, most of them in urban areas, largely in the eastern part of the country. Within 6 years after the patents expired, over 6000 independent telephone companies had entered the business, quickly extending service into rural areas and small communities. Some cities found themselves with two or even three competing firms offering services, usually at rates lower than the local Bell Company. Competition forced the Bell companies to cut prices and seek new ways to enhance operating and managerial efficiency.

As the competition intensified, American Bell's need for capital to finance growth became enormous. After reaching an accommodation with the state of Massachusetts, the firm issued 5000 new shares in late 1894, followed by another block of 10,000 in 1895, and another of 21,500 a year later. In 1898, American Bell took advantage of a recovering economy to issue \$10 million in 10-year bonds, launching a new phase in the company's financing. Even though the Bell System was continuing thus to grow, its managers decided that the corporate climate of Massachusetts was too restrictive, and on December 31, 1899, they made the New York-based American Telephone and Telegraph Company the parent company of the System. At this point the Bell System-the name now appearing on the company's new seal-was organized institutionally much as it would be some 83 years later (Fig. 1).

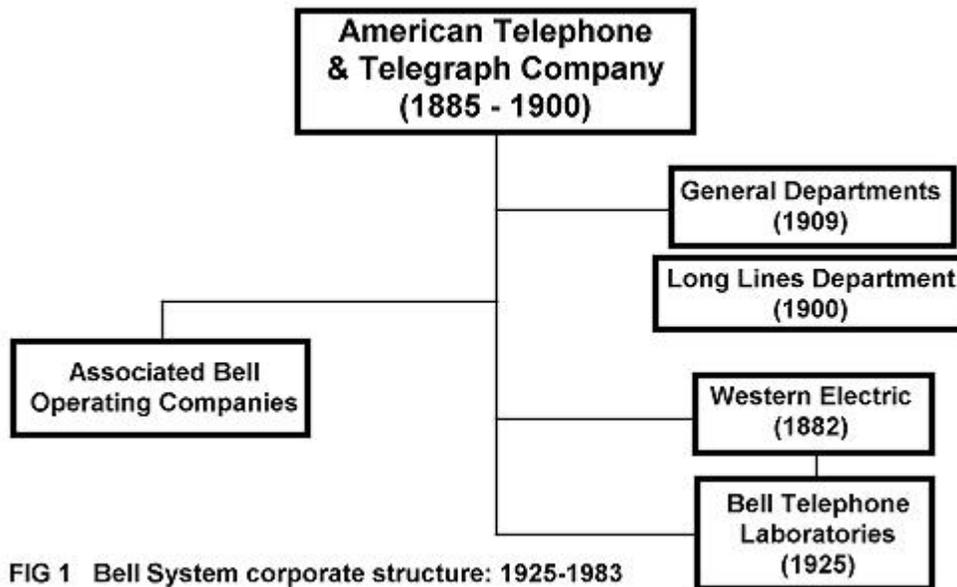


FIG 1 Bell System corporate structure: 1925-1983

Fierce competition forced the Bell company to develop a variety of new policies: for instance, it began sublicensing of some independent exchanges, in effect bringing them into the System; it began to extend greater financial aid to Bell exchanges; it continued to push the expansion of the long-distance lines; it acquired strategically located independent exchanges, and it launched patent infringement suits. Clearly, its long-distance network was the single most significant edge the company had (just as Vail had predicted). The independent companies made several attempts-some individually and others collectively through their association, the Independent Telephone Association-to develop competing networks, but all of these efforts failed. Nevertheless, the competitive battle continued to accelerate telephone development: by 1907, there were about 3,132,000 Bell telephones and 2,987,000 independent telephones in use.

Other important changes took place in the Bell System during these years, but they were obscured by the furor over competition. The company's precarious financial situation allowed the J. P. Morgan banking interests to gain a strong voice in the company's affairs, and in 1901, Morgan tried to entice Vail to return to Bell's management. He refused, but did become a member of AT&T's board of directors. Efforts at administrative centralization and standardization also continued. The AT&T Engineers Department had by this time become the focal point for developing specifications and encouraging technical progress throughout the System. By this time, too, Western Electric had become more than just a manufacturer of equipment; it provided purchasing services, warehousing, and distribution for the various Bell companies. In 1908, these arrangements were institutionalized with the introduction of the "standard supply contract" between Western and each of the licensees (5).

Under President Frederick Fish (1901-1906) the company made great strides, taking on the characteristics of an integrated (albeit somewhat loosely organized) system. But competition became even more fierce. By 1906-1907, AT&T had run out of funds essentially

and was forced to curtail virtually all licensee capital expenditure programs. The bankers were worried understandably, and they finally enticed Vail to return to active management. In 1907, he became president of AT&T.

Although 62 years old, Vail dug into the System's problems with unusual vigor. He kept investors and the general public well informed about the problems and the solutions he was developing. The AT&T annual reports for the years 1907 through 1915, reportedly written by Vail himself, directly addressed the company's difficulties and clearly spelled out Vail's policies and strategies. He clearly articulated the company's central mission - universal service - in the 1909 Annual Report:

The value of a telephone system is measured by the possibility of reaching through its connection anyone-at any possible place.... It must be a system that will afford communication with anyone that may possibly be wanted, at any time. To do this, the system must offer a connection of some kind, and at such rates, as will correspond to the value of the system to each and every user.

As Vail explained, the Bell network was "one system telephonically interconnected, intercommunicating, and interdependent" (7). Vail made "One System, One Policy, Universal Service" the Bell System credo. Government regulation also played a role in Vail's plans. He clearly recognized that the System he proposed a universal, integrated monopoly - would not meet with public approval without some form of public control. Wanting to avoid municipal ownership and the ever-present specter of nationalization, Vail embraced state regulation.

Although he liberalized AT&T's policy on interconnection with the independent companies, Vail continued an active policy of acquiring other firms. Consistent with his vision of a single integrated national system was AT&T's acquisition of a 30% interest in Western Union. For a short time, the telegraph company was operated in conjunction with AT&T.

Meanwhile, Vail moved to strengthen the company internally. He shifted the AT&T Engineering Department from Boston to New York and consolidated it with the Western Electric research staff. In 1907, he launched a major reorganization of operations, changing a territorial organization into a functional one with three major operating departments-plant, commercial, and traffic. First, he reorganized the Long Lines Department. It proved more difficult to persuade the associated Bell companies to adopt the new structure, and Vail accepted a reasonable amount of latitude where they were concerned. But no longer would he allow the operating companies to direct Western Electric to manufacture equipment to their own specifications. AT&T now standardized the equipment and began to set standards for operating procedures as well throughout the Bell System.

By 1911, the Bell System was gaining the upper hand in the national marketplace for telephone service. Independent company growth had stopped and the number of independent company stations in service declined as Vail's aggressive policies took effect. The independents fought back by protesting to the U.S. Department of Justice, which began monitoring AT&T for potential antitrust violations. Under this pressure from the independent companies, the government filed a suit in July 1913. The complaint focused on AT&T's interconnection and acquisition policies in Oregon and sought divestiture of the acquired

properties. With antitrust sentiment strong throughout the nation and the Postmaster General advocating nationalization of the telephone system, AT&T decided to settle the case. AT&T vice president Nathan C. Kingsbury sent the government a letter of agreement that became known as the Kingsbury Commitment. In it, AT&T agreed: (1) to dispose of its Western Union holdings; (2) to permit the independent companies limited interconnection with its long-distance network; and (3) to refrain from purchasing additional independent properties without approval from the U.S. Interstate Commerce Commission.

Although the Kingsbury Commitment settled the antitrust issue for a time, the government took over the telephone and telegraph systems for a short period during World War I. After the war, there was some interest again in nationalization, but the government returned the System to private operation as of August 1, 1919. Congress endorsed this arrangement-including the Kingsbury understanding-by the passage of the Willis-Graham Act in 1921.

One of the strongest arguments for private ownership and operation was the Bell System's record of technological progress. Vail clearly had improved the technical performance of the network. Bell engineers had risen to Vail's challenge to complete a transcontinental line in time for the Panama-Pacific Exposition. The line formally opened on January 25, 1915, with a ceremonial call between Alexander Graham Bell in New York, Thomas Watson in San Francisco, and Theodore Vail in Jekyll Island, Georgia. On October 21 of the same year, Bell engineers conquered the Atlantic, when one engineer atop the Eiffel Tower in Paris listened to another in Arlington, Virginia, via radio transmission. Such accomplishments as these highlighted the heavy investment AT&T was now making in research and engineering. The new, more important, position of research and development in the Bell System was institutionalized in 1925 with the founding of Bell Telephone Laboratories.

### **Refocusing in the Interwar Years**

By the time Vail retired as president in 1919, the Bell System had achieved its modern structure and mode of operations. The vertically integrated System was centralized technologically and dedicated to ongoing technical innovation. The operating companies still had considerable discretion in financial and political matters so that they could adapt to local conditions. This decentralization became increasingly important as state regulatory commissions strengthened their statutory authority.

During the 1920s, with Harry Thayer and then Walter Gifford (1925) at the helm, the Bell System continued to expand service despite the financial problems of operating a regulated network in an inflationary era. In an effort to strengthen investor confidence, management set the annual dividend at \$9 in 1921. But it was not easy to maintain this standard. The Bell System had a 46% debt ratio, and its costs were climbing faster than its revenues. Improved earnings were needed, so the Bell System vigorously and successfully pursued a round of rate cases through the state commissions. These state agencies had considerable latitude in determining the rate base and the rate of return, but their commissioners were often unsure how far their authority extended. There was great variation

among the commissions and, therefore, among the Bell companies both in the rates they charged and in the levels of earnings they allowed. Nevertheless, the commissions and Bell management were committed to achieving satisfactory and efficient universal service, and they functioned in relative harmony through the 1920s.

During this period, Walter S. Gifford provided the Bell System with decisive and innovative leadership. For a while, AT&T had followed its research and development successes into new fields. It launched a commercial radio station, WEAJ, in August 1922, and in October 1923, it established the Red Network. Adventures in the world of Hollywood with sound motion pictures began with *Don Juan* in 1926. Management organized a Western Electric subsidiary, Electrical Research Products, Inc. (ERPI) to market its new sound-equipment products. But Gifford decided the Bell System should concentrate on one business, providing communications services in the United States. He began to spin off or license many of these by-products of Bell research to others. He sold radio broadcasting to the National Broadcasting Company in 1926. Western Electric sold its extensive and well-established international equipment business, International Western Electric Co., to International Telephone and Telegraph Company (ITT) in 1925; 3 years later Western sold the Graybar Electric Co., an electrical supply subsidiary, to its employees. ERPI was allowed to continue, but it became a low-key, low-priority part of Western's business. As Gifford explained to the National Association of Railroad and Utility Commissioners in 1927, the Bell System had an unusual obligation "to provide the most telephone service and the best, at least cost consistent with financial safety" (8). Anything that threatened to interfere with the fulfillment of that "obligation" had to be changed or eliminated.

Although the Depression hit the Bell System hard, AT&T was able to maintain the \$9 dividend and, along with it, investor confidence. The number of telephones in service actually declined and did not regain the 1930 peak until 1937, but Gifford was able to sustain public faith in the Bell System, which was particularly difficult since Congress was considering new legislation to regulate the telephone, telegraph, and broadcasting industries. In 1934, the legislature passed the Communications Act, which created a new independent regulatory agency, the Federal Communications Commission (FCC). The FCC quickly initiated the first comprehensive government investigation of the telephone industry. AT&T cooperated by turning over voluminous company files to the special investigation, but Bell management strongly criticized the fact that the FCC refused to allow the company to bring its own witnesses or cross-examine those called by the Commission. AT&T had cause to be concerned: Commissioner Paul Walker's report (1938) was a full-swinging attack on the Bell System, with particular emphasis on the ties to and the operation of Western Electric. AT&T replied in detail, and in 1939, the FCC approved a substitute for the Walker Report, retaining the data but toning down the criticisms of the Bell System. Still, the investigation and report drew lines of battle between the government and the Bell System, whose structure and monopoly status would be challenged again and again in the following years.

During the next few years, however, the government was more interested in economic performance than in antitrust. World War II tested the Bell System's organizational and technological abilities to the utmost. Almost 70,000 Bell System employees went into the armed services, while on the homefront Bell Labs and Western Electric virtually stopped developing civilian telephone equipment in order to provide telephone facilities for army

camps, airplane warning nets, arsenals, and munitions plants. AT&T discouraged unnecessary long-distance calls so that the network could remain free for military and service personnel use. Bell Labs worked on some 1200 government projects, including the electrical anti-aircraft gun director and radar. Specialized training in communications was given to military personnel.

### **A Mature Bell System Achieves Its Goals**

At war's end, pent-up demand created a backlog of almost two million unfilled orders. Financially, the Bell System emerged from its war efforts in a weakened condition, and AT&T again had to pay the \$9 dividend from surplus. Once more, the Bell System turned to the regulatory agencies for rate relief, but this time the problem was compounded by the need to modernize facilities and to meet the increased demands for service. Also, for the first time in its history, the Bell System had a major struggle with organized labor, when the National Federation of Telephone Workers went on strike. This was the first nationwide strike in telephone history. The central issue was local versus nationwide bargaining, and the strike, which lasted from April 7 to May 20, 1947, had a traumatic impact. Long-distance service was cut to about 20% of normal capacity; local service was nearly normal for 16.5 million dial telephones but virtually nonexistent for about 6 of the 9 million manual telephones. AT&T was the nominal victor this time both on the issue of wages and on nationwide bargaining, but the firm's managers were left with doubts about the continued feasibility of holding out for local bargaining in future negotiations (9).

In 1948, Walter Gifford retired, to be succeeded by Leroy Wilson as AT&T president. Wilson mounted a tough and unpopular campaign to cut expenses and increase AT&T earnings. AT&T's debt-to-equity ratio had soared to over 50%, and the firm was in danger of having the quality of its bonds downgraded. Bell companies filed more rate cases, but it was well into the 1950s before rate activity coupled with technological improvements enabled the System to achieve acceptable earnings levels again. Wilson died suddenly in 1951, and Cleo Craig, the new president, followed through on Wilson's initiatives so that by 1955, the debt ratio was down to 35%. The System's financial crisis had passed.

These postwar years were trying but ultimately rewarding for the Bell System. Service improvements often were not prompt, but the backlogs were overcome eventually. By 1956, the nation had over 60 million telephones in service, 51 million in the Bell System (an addition of 24 million since 1946); 89% of all Bell System telephones were dial operated; and 11 million customers could dial nearby cities and 2.7 million could dial directly to 20 million telephones all across the nation (10). The transistor, invented at Bell Laboratories in 1947, was beginning to have an impact in telephone equipment; coaxial cable and microwave systems were rapidly reducing the cost of long-distance calling; and AT&T completed the first transatlantic telephone cable in 1956. The Bell System, building on its war experience at Bell Laboratories and Western Electric, was engaged in major defense communications and guidance systems projects for the U.S. government, notably Nike, "White Alice," and DEW line. At the government's request, Western Electric had begun management of the U.S. Sandia atomic energy lab in 1949.

By the mid-1950s, the System had weathered its second antitrust challenge also. In 1949, the U.S. Department of Justice had filed an antitrust suit asking for the divestiture of Western Electric Co. The suit was settled in 1956 before going to trial. By the terms of the consent decree, the Bell System confined its business activities to common-carrier communications service, agreed to license its inventions to all interested parties, and limited Western Electric to the manufacture of equipment of the type used by Bell operating companies. In return, the government accepted the integrated corporate relationship between AT&T, Western Electric, Bell Labs, and the associated operating companies.

Frederick Kappel, who succeeded Cleo Craig as AT&T president in 1956, made "vitality" the System's byword. Changes in AT&T's financing were an embodiment of Kappel's strategy. Rights were offered to existing shareowners as the authorized stock of the company was increased from 60 to 100 million shares. In 1958, AT&T issued \$718 million in convertible debentures and offered 7 million shares to Bell System employees; the next year, the AT&T Board approved a 3-for-1 stock split, along with the first dividend increase since 1921. The Board increased the dividend again in 1961, 1963, 1965, and 1967, and split the stock again - this time 2-for-1 - in 1964. Investors began to look at AT&T stock as a "growth" issue.

The object of these and other financial maneuvers in the 1960s and 1970s was the enhancement and expansion of the national switched network, the real system in the Bell System. By the mid-1970s, the network represented about 93% of the Bell System's net investment and produced 95% of its revenues. At the base of this network were some 25,000 local Bell and independent company switching offices. These offices served from just a few subscribers up to 10,000 lines. There were as well four additional levels of switching offices, called tandem offices, and this complex network was extended through cables and then satellites to the entire world (2). Satellite communications came of age in the early 1960s. In 1962, Congress established Communications Satellite Corporation (Comsat) by statute to develop an international communications system. Also in 1962, the Bell System launched its first experimental communications satellite, Telstar, which was followed quickly by the higher altitude Telstar II and RCA's Relay satellites.

Other technological breakthroughs had a decisive impact on Bell System operations: electronic switching systems (ESS); Touch-Tone dialing; new, higher capacity coaxial cable and microwave transmissions systems; micro-miniaturization for data- and voice-transmission equipment; higher capacity transatlantic cable; and the first transpacific cable. Earnings were up and investor confidence was at an all-time high. Prices for long-distance service continued to decline and local service prices remained stable, largely as a result of increasing revenue support from long-distance to local service through the separations process (11, 12). Roughly 90% of U.S. households had a telephone, and the structure of the Bell System, in effect, had been ratified by the federal government with the 1956 Consent Decree. These were golden years for the Bell System.

## **Regulatory Change, Political Conflict, and Market Competition**

Soon, however, new challenges, as well as some old ones, began to materialize. Buoyed by the relatively easy availability of new technology and spotting economic opportunity inherent in regulatory pricing, other firms sought some of the Bell System's traditional business. The first attempts at entry into heretofore closed markets occurred in the comparatively small private-line business; this took place when the FCC decided to allow other companies to build their own systems using the radio frequency spectrum above 890 megacycles (now megaHertz). Soon after, a small start-up venture, Microwave Communications, Inc. (MCI), petitioned the FCC to offer private-line service between St. Louis and Chicago. The FCC, which in 1965 had inaugurated a major formal investigation into the Bell System's long-distance rates, opened the door a crack by approving MCI's application. In 1968, another traditional Bell System and regulatory policy was changed by the FCC in its Carterfone decision, which struck down the "foreign attachment" tariffs; now the FCC would allow private equipment to be interconnected with the Bell network, modifying Bell's end-to-end responsibility.

By the end of the 1960s, the Bell System was encountering other serious problems. The rate of inflation had been increasing since the middle of the decade, and the Bell System's earnings were eroding. Unable to keep up by productivity improvement alone, the System again turned to the regulatory agencies for rate increases. Compounding this difficult task was a decline in service quality that reached crisis proportions in New York and a few other cities.

H. I. Romnes, who had replaced Kappel as AT&T chairman in 1967, struggled to get the System back on course. He was able to get service back to normal levels; quality service, after all, was the core value of the Bell System. He achieved this goal in spite of a major strike by the Communications Workers of America (CWA) and the International Brotherhood of Electrical Workers (IBEW) -a strike that lasted for up to 137 days in some areas.

While Romnes was attempting to deal with the changing market environment, the FCC continued its policy of fostering more competition. In 1971, it opened up the entire private-line market to all comers with its Specialized Common Carrier decision. It also started a new large-scale investigation into the Bell System's rate of return, probing deeply into the company's costs and internal structure, particularly its relationship with Western Electric.

When Romnes retired in 1972, he was succeeded by John D. deButts, who moved quickly to shore up a sagging employee morale as well as the company's lagging earnings. deButts spoke out forcefully against competition, pointing out that he felt it would lead ultimately to drastic changes in the way telephone service was provided and priced. He warned that allowing others to siphon revenues away from long-distance services jeopardized the regulatory price structure that covered a significant part of the costs of exchange-service. He criticized the policies that were undercutting the Bell System's end-to-end responsibility for service. Threatened, he believed, was the integrity and quality of the whole system. As deButts's close assistant, Alvin von Auw, observed, "The fundamental basis of our business is under attack on a broad scale" (9).

At this time, the Bell System was still organized basically in Vail's three-column form-plant, commercial, and traffic. This functional structure had proven successful in a system dominated by operations and engineering. But deButts, realizing that a change was in order, began by reorganizing along the lines of service markets-customer services, operator services, and network services, and organized a new marketing department in mid-1973. But even though he was changing the System, deButts wanted to do all that he could to keep intact those aspects of the System that he felt were essential to good telephone service. In September of that year, he made an important speech before the National Association of Regulatory and Utility Commissioners convention. Calling for a "moratorium on further experiments in economics," he took to the public the Bell System's case for the common-carrier principle and "thereby, by implication, to oppose competition [and] espouse monopoly" for the industry. The FCC's decisions, he said, created "contrived competition." If competition was to be the order of the day, he observed, AT&T would compete vigorously. But to do so, it had to be free to maneuver (13). deButts hoped that his forceful words would arouse a public debate, and he was confident that the Bell System, which had served the nation well, would prevail.

But the FCC continued down the "slippery slope" it had stepped onto a decade earlier. Its registration decisions in 1975 and 1976 in effect allowed customers to provide their own telephones, private branch exchanges (PBXs), and other terminal equipment without connection by a telephone company and without any interface requirement (so long as the manufacturers registered the equipment with the FCC). This decision brought an end to the responsibility that the telephone companies had long held to furnish service from one end of the call to the other and to maintain it.

The courts became involved in these issues as the new competitors filed private antitrust suits against the Bell System, alleging a variety of anti-competitive acts. They claimed damages because the Bell System had obtained most of its equipment from its own manufacturing arm, Western Electric Co.; because various regulatory orders and Bell System procedures made it difficult for them to sell their products and services; and because of the Bell pricing responses to the newly authorized competition. The new competitors took unfavorable regulatory decisions to the courts as well, hoping that they would be sustained. One such decision, on MCI's Execunet long-distance service, reversed an FCC ruling and opened up the entire long-distance market to competition for the first time.

In November 1974, the US. Department of Justice filed against the Bell System, charging monopolization and conspiracy to monopolize the supply of both telecommunications service and equipment. The government requested divestiture of various parts of the integrated enterprise. The Bell System denied that it had violated the antitrust laws and vowed to fight the case through the legal system.

Hoping to elicit a clear statement of public policy for telecommunications, AT&T asked Congress to enter the debates. Holding hearings over 5 years on several bills (introduced beginning in 1976) to modify the Communications Act, Congress generated reams of paper and seemingly endless testimony. But a consensus could not be reached and no changes were made in the law. The Communications Act still stands essentially as passed in 1934.

When John deButts retired as chairman of AT&T in 1979, he left behind a paradox. He had successfully brought the Bell System back—earnings were good, service was better than ever, and facilities were being modernized rapidly with the new technology generated by Bell Labs and Western Electric. It was a strong, viable, growing business. But the business was deeply mired in political and legal confrontations. John deButts had not been able to slow the tide of change coming from new competitors, their political supporters, the courts, and the regulators.

This was the situation inherited in 1979 by deButts's successor, Charles L. Brown, the author of this article. My first years at the head of the Bell System presented a difficult managerial challenge. Distracted by repeated legal, legislative, and regulatory problems from the complex job of running the world's largest corporation, the Bell System's managers had to find a way out of the public-policy dilemmas or risk losing control of the company's destiny. It was becoming increasingly clear that unless something was done quickly, the Bell System would miss the opportunities that were arising in the new information-age marketplace, and, in fact, have constant difficulties using its own newly developed technologies. We had a responsibility to our shareowners, our customers, and our employees not to let the business be legislated, regulated, or competed into a position of deterioration. We faced the following problems: (1) the trial in the US. antitrust case, in which an unfavorable decision appeared a strong possibility; (2) a Congress that was considering complex regulatory legislation so The Bell System that would have made it difficult for the Bell System to operate effectively; (3) a regulatory system that essentially had abandoned both the common-carrier principle and the concept of a unified, managed network; and (4) unregulated competitors who had exacerbated our problems with government agencies and were quickly moving into Bell System markets and picking off new-product markets that AT&T was not allowed to enter. The monopoly pricing plan of having long-distance revenues support local-service prices made it simple to undercut AT&T's long-distance rates by those competitors whose revenues did not, for the most part, support the local service.

## **Divestiture and Restructuring-The End of the Bell System**

In December 1981, after 2 years of attempts to rid ourselves of the antitrust case and to get appropriate legislation, we started discussions with US. Assistant Attorney General William F. Baxter about settling the lawsuit. The negotiations went quickly. Our positions were clear, and we both knew that regardless of the result, we had to maintain a strong and viable communications industry for the United States. On January 8, 1982, we jointly announced that the Justice Department's lawsuit had been resolved through the Bell System's agreement to divest itself of the local exchange portions of its 22 operating telephone companies. The Justice Department agreed to dissolve the previous (1956) consent decree and replace it with a new agreement, thereby freeing AT&T from restrictions on the businesses and the markets it could enter. I had evaluated the situation in the following way:

- ✓ A major duty of corporate management is to make certain the business conforms to public policy. If not, in the long run, it will not survive. Public policy at that time, however arrived at, was searching for a change.

- ✓ The Bell System was perceived by some part of the public as too big, too powerful, or too pervasive.
- ✓ The new public policy was intended to make competition in long-distance services the rule, not the exception.
- ✓ Time was not in the Bell System's favor - opportunities would be missed and it was impossible to plan for the future until legal, legislative, and regulatory problems were resolved.
- ✓ To gain access to new markets and retain access to current markets, the Bell System would have to agree to radical restructuring.
- ✓ Acceptance of the Justice Department's major demand, the divestiture of local operations via a relatively simple, broad decree, would leave AT&T free to reorganize on a business basis as opposed to reorganization detailed by a court or a legislative body.
- ✓ Of the three options-continuing litigation, agreeing to crippling legislation or an injunctive decree, or accepting divestiture of our local telephone companies - the last was the best course to follow for the public and the stockholders (14,15).

The Justice Department's goal was to separate the Bell System's competitive operations from those that were in the realm of natural monopoly, that is, the local-exchange businesses. This was a clean but painful procedure. To retain its vertical structure and gain freedom to compete and follow its technology into new markets, AT&T would have to give up its nationwide partnership of companies providing total, end-to-end communications service. Only then could we lift the cloud of uncertainty that had hung over the business for most of the past decade.

AT&T thus having agreed to divest three-fourths of its assets, the Bell System set about the task of restructuring. Seven regional companies, as shown in Table 3, were organized to take over the local exchange operations. A central services organization, later named Bell Communications Research, or Bellcore, was created. Owned and operated by the regional companies, it would provide technical and support services and coordination for national defense purposes. I set four basic principles to guide the restructuring:

To the extent humanly possible, our service to all segments of the public will be provided at the same high levels which have been the hallmark of the Bell System service.

The integrity of the investment of the 3,200,000 owners of the business will be preserved.

The reorganization will be carried out in such a way as to ensure that the people of the Bell System will have as much employment security and continued career opportunity as possible.

The divested companies will be launched with all the management, financial, technical and physical resources necessary to make them flourishing enterprises in the regions

in which they will operate. (14)

I believe we honored all four principles.

At divestiture, which took place January 1, 1984, the date the Bell System ceased to exist, the seven regional companies handled all local calling, some intrastate long-distance business, customer access to long-distance networks, as well as directory advertising. They were permitted also to compete in the provision of new customer premise equipment. The regional Bell companies were restrained from manufacturing telephone equipment and entering the bulk of the long-distance business and some "information" services, but they could, with the permission of the court, enter other businesses. The "new" AT&T's business consisted of long-distance services, services for all customer-terminal equipment then in place, research and development, and the Western Electric manufacturing company. AT&T was in competition with every company that chose to enter its markets, and it was free to enter nearly any new markets it desired.

Each stockholder received one new share in each of the seven regional holding companies for every ten shares of AT&T stock held. All of the eight companies listed their shares on stock exchanges, where they could be bought and sold freely.

At this writing, each of the new companies, divested with a common heritage and common culture, is finding its own way in the new and exciting age of information. Over time they will establish individual cultures and heritages while continuing as a part of the network of communications services for the entire United States. The agreements, business and personal relationships, and standardized procedures built up over a century under the integrated Bell System have been replaced by new, arms-length business contracts.

Some changes have occurred at both levels of the telecommunications regulatory scheme: states have deregulated certain services either partially or wholly; the FCC has eliminated the difficult business separation requirements placed on AT&T in the early 1980s and moved to replace the unwieldy rate-of-return constraints with price caps. However, federal and state regulation is still pervasive and is applied to the telephone companies' monopoly local exchange business and to AT&T's competitive telecommunications services but not to its long-distance rivals.

Moreover, the federal judge who presided over the trial and the consent agreement regularly makes major decisions pertaining to compliance with the decree. These decisions sometimes affect the structure and performance of the industry and the services the American public receives.

In the relatively short period since the new companies emerged, many changes in company organization, markets, and products have taken place. New technologies are being employed to provide new products and still better service. Change and adaptation - long-standing characteristics of the Bell System - continue to be central aspects of the telecommunications industry today.

My vision of the future in this age of information is strong and positive, much as Alexander Graham Bell's vision for his new invention was in 1876. Today, Theodore Vail

would perhaps be upset about the stark differences between our industry and the Bell System he helped to create nearly 100 years ago. He would have lamented the Bell System at its end but applauded the ability of the business to adapt to current demands, the new products and services, the global extent of AT&T's operations, and the new technologies that comprise our vision of the future of telecommunications.

**TABLE 1 Corporate Establishment of the Bell System**

<b>Name</b>	<b>Date</b>
Bell Patent Association	February 27, 1875
Bell Telephone Company (of Massachusetts)	July 9, 1877
New England Telephone Company	February 12, 1878
Bell Telephone Company	July 30, 1878
National Bell Telephone Company	March 13, 1879
American Bell Telephone Company	April 17, 1880
Western Electric Company, Inc.	February 6, 1882 (acquired)
American Telephone and Telegraph Company (subsidiary)	March 3, 1885
American Telephone and Telegraph Company (parent)	December 31, 1899
Bell Telephone Laboratories	January 1, 1925
22 Associated Bell operating telephone companies	Various dates
Divestiture	January 1, 1984

**TABLE 2 Growth of the Bell System**

<b>Year</b>	<b>Telephones in Service</b>	<b>Assets</b>	<b>Employees</b>	<b>Revenues</b>
1877	778	NA	2	NA
1900	801,000	\$122 million	33,000	\$5.5 million
1920	8.7 million	\$1.4 billion	269,000	\$442 million
1940	18.3 million	\$4.1 billion	324,000	\$1.2 billion
1960	63 million	\$22.6 billion	736,000	\$7.9 billion
1983	150 million	\$150 billion	1,009,000	\$70 billion

From Bell System Statistical Manual and AT&T annual reports.  
Note: NA not available.

**TABLE 3 The Bell Operating Telephone Companies: 1891-1984**

1891 <sup>1</sup>	1923 <sup>1</sup>	1983 <sup>2</sup>	1984 <sup>2</sup>
New England Telephone and Telegraph Company	New England Telephone and Telegraph Company	New England Telephone and Telegraph Company	NYNEX
Providence Telephone Company	The Southern New England Telephone Company	New York Telephone Company	
The Southern New England Telephone Company	New York Telephone Company	New Jersey Bell Telephone Company	Bell Atlantic
New York Telephone Company	Bell Telephone of Pennsylvania	Bell of Pennsylvania	
The New York and New Jersey Telephone Company	The Delaware and Atlantic Telephone and Telegraph Company	Diamond State Telephone Company	
Hudson River Telephone Company	Diamond State Telephone Company	Chesapeake and Potomac Bell Telephone Companies (MD, VA, WV, DC)	
Central New York Telephone and Telegraph Company	The Chesapeake and Potomac Company of Baltimore City	Southern Bell Telephone and Telegraph Company	BellSouth
Empire State Telephone Company	The Chesapeake and Potomac Telephone Company (DC)	South Central Bell Telephone Company	Ameritech
Bell Telephone Company of Buffalo	The Chesapeake and Potomac Telephone Company of Virginia	Ohio Bell Telephone Company	
New York and Pennsylvania Telephone and Telegraph Company	Southern Bell Telephone and Telegraph Company	Indiana Bell Telephone Company	Southwestern Bell
Bell Telephone Company of Pennsylvania	Cincinnati and Suburban Bell Telephone Company	Michigan Bell Telephone Company	
The Delaware and Atlantic Telephone and Telegraph Company	The Ohio Bell Telephone Company	Illinois Bell Telephone Company	U S West
Chesapeake and Potomac Telephone Company	Indiana Bell Telephone Company	Wisconsin Telephone Company	
The Central District and Printing Telegraph Company	Michigan State Telephone Company	Southwestern Bell Telephone Company	Pacific Telesis
Southern Bell Telephone and Telegraph Company	Illinois Bell Telephone Company	Northwestern Bell Telephone Company	
Cumberland Telephone and Telegraph Company	Wisconsin Telephone Company	Mountain States Bell Telephone Company	Minority interest sold by AT&T
Cleveland Telephone Company	Northwestern Bell Telephone Company	Pacific Northwest Bell Telephone Company	
Cincinnati and Suburban Bell Telephone Company	Southwestern Bell Telephone Company	Pacific Bell	Pacific Telesis
Central Union Telephone Company	The Mountain States Telephone and Telegraph Company	Nevada Bell	
Michigan State Telephone Company	Bell Telephone Company of Nevada	Southern New England Telephone Company <sup>3</sup>	Minority interest sold by AT&T
Chicago Telephone Company	The Pacific Telephone and Telegraph Company	Cincinnati Bell Telephone Company <sup>4</sup>	
Freeport Telephone Exchange Company	The Home Telephone and Telegraph Company of Spokane		
Wisconsin Telephone Company			
Duluth Telephone Company			
Iowa Telephone Company			
The Bell Telephone Company of Missouri			
The Northwestern Telephone Exchange Company			
Nebraska Telephone Company			
The Missouri and Kansas Telephone Company			
Pioneer Telephone and Telegraph Company			
The Southwestern Telegraph and Telephone Company			
Rocky Mountain Bell Telephone Company			
Colorado Telephone Company			
The Pacific Telephone and Telegraph Company			

<sup>1</sup>From Ref. 4.

<sup>2</sup>From AT&T annual reports.

<sup>3</sup>Affiliated Bell operating companies.

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