

# The Strategy of System-Building

## *Telecommunications and the American South, 1885–1920*

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Competitiveness has been used extensively to describe rivalry between firms for customers, profits, markets, and even survival. More recently, it has been applied to nation-states, as well as larger and smaller geopolitical units such as regions and cities. Thus the United States is said to compete with Japan for the worldwide semiconductor market and with members of the European Economic Community to supply their citizens with agricultural commodities. Places as diverse as Detroit, Brazil, and South Korea may compete with each other for the location of automobile plants.<sup>1</sup> In this sort of competition, technology is one of the chief weapons that firms and nations employ to achieve competitive ends. Businesses engage in research and development (R&D) to gain market share by differentiating their products or achieving scale economies in production. Companies seek through technological innovation new products and services to sell. Technological competitiveness understood in this way is a part of the broader competition between business firms in market economies.

Although this definition of technological competitiveness is a useful and accurate one, there are also other links between technology and competition. Certain industries, for example, are not characterized by market competition. Yet even under monopoly or public ownership, technological competitiveness may arise. In this case, the fight is not between firms or nations but between and among user groups, engineers, and managers. The object of this sort of struggle is not greater market share, higher profits, or sustainable advantages over rival producers, but something more fundamental: the nature, meaning, and purpose of a specific technology.<sup>2</sup> Different groups, whether they be the users or makers of a technology, often have different ideas about how that technology should be employed, what its social purpose should be, and who should benefit from it. Where these goals cannot be expressed

in market competition, they may still come out in the political system, in internal struggles within professional associations, or inside of large, monopolistic firms.

These two types of technological competitiveness are not mutually exclusive. Both often appear in industries characterized by large numbers of firms, as well as those dominated by just a few players. Conflicts between profit-minded managers and technically oriented engineers and scientists are a problem in many organizations.<sup>3</sup> By the same token, few ironclad monopolies exist for long, and even publicly owned firms may be pulled and tugged by demands from both market and nonmarket venues. Perhaps there is no better example of how these two types of technological competitiveness interact than AT&T during its recent transition from monopoly to competition. Political pressures, emerging marketplace exigencies, organized customer protests, sharp-toothed rival firms, and explosive technological changes all buffeted the Bell System between the late 1950s and its breakup in 1984. This combination of market and nonmarket forces helped to redefine telecommunications services and products in the United States.

In this case study of the American South between 1880 and 1920, I hope to show how both of these types of competition affected the technology of telecommunications in that region, and how AT&T responded to these challenges by forging a new national competitive strategy. The implications of this study are, I shall argue, that the definition of technological competitiveness should be broadened to include not only rivalry between firms for markets but conflicts and struggles between many actors involved in the creation of technology. Often what is at stake in such competition is not just a more or less transitory market advantage, but the power to shape and define important technologies for society. Firms and nations that recognize these aspects of technological competitiveness will have to be prepared to enter into market and nonmarket arenas where are found the conflicting interests, values, and passions of many different groups. Strategy formed on this basis can significantly reinforce the strength of a particular technology and enable firms to emerge from competitive struggles with a dominant market position.

The American South in 1880 might seem an inauspicious place to begin a study of either technology or competitiveness. It was the least economically developed part of the United States at that time, with a regional income only 51 percent the national average.<sup>4</sup> Largely rural and agrarian with few universities or technical colleges, it was hardly a likely source of technological innovation. Certainly not in a new industry like telephony, which would soon provide some of the leading examples of the use of science-based knowledge in corporate research and development. Nonetheless, with the help of resources from outside the region, telephone technology was transferred to the South in these early years. Entrepreneurs found that demand for telephones existed in the South, though it was not nearly as large a demand as that of the more economically advanced Northeast. It was sufficient, however, to permit the Bell licensee in the region, Southern Bell Telephone and Telegraph Company, to earn a gross income of over \$300,000 and provide telephone service to over five thousand customers by 1885.<sup>5</sup>

Between 1880 and 1894 the telephone industry in the United States was a monopoly firmly under the control of the American Bell Telephone Company (ABT), which held the key patents on the basic telephone instrument and closely related

apparatus.<sup>6</sup> Yet even under these conditions and from the otherwise undynamic South issued examples of technological competition from nonmarket sources. The nature of this competition was intrafirm, between managers at Southern Bell and executives and engineers at American Bell in Boston. At stake in these conflicts were questions of where telephone service should be extended, how it should be developed, and, most fundamentally, what the technology should do.

These conflicts emerged from the different perceptions of the market held by top ABT executives in Boston, and regional managers in the South. The Boston group saw in the South limited potential for the system of technology they had fostered under their patent monopoly. Seeking the choicest markets, they had concentrated on large urban areas and spent few resources on the rural hinterland or smaller towns and cities.<sup>7</sup> In the mid-1880s, the company began building its first intercity toll lines. Though initially expensive and of poor quality, they opened up a new market among businesses in need of rapid, long-distance communications in what was becoming a truly national economy.

Large cities had the commercial customers who would pay top dollar for this telephone service. Cities also presented some of the most challenging technical problems in telecommunications. For a monopolist seeking monopoly rents, consumers whose demand curves enabled them to pay the highest prices were favored customers indeed. For a strategically minded firm, attacking the technical problems of big city markets—high-capacity switching, efficient underground cables, and effective long-distance lines—also made sense. The monopoly would not last forever, and it was best to be strong in the largest markets when the patents finally expired.

Standardization was another aspect of this early strategy. After the formation of AT&T in 1885 as the Bell long-distance subsidiary, the company saw a great need to standardize service and equipment across markets. Before technological breakthroughs in the early twentieth century, such as the loading coil, repeater, and vacuum tube, substantially lowered the cost and increased the range of long-distance communications, the effectiveness of this premium service was closely tied to the quality of plant, equipment, and maintenance at local exchanges.<sup>8</sup> For these reasons, it made sense to the executives of AT&T and American Bell to set high technical standards across markets; the company was relying on its strength in large urban areas and in interexchange service to keep it on top of the telephone industry.

Bell's early strategic vision of an interlinked system of urban telephone exchanges joined by long-distance lines offered little to customers who neither needed nor could afford this type and quality of service. Many such customers resided in the largely agrarian and underdeveloped South. Under competitive conditions, one might expect rival firms offering different types of products and services to spring up and meet those needs Bell was not meeting. Something along these lines happened after the end of Bell's patent monopoly in 1894, but even earlier demands from those not satisfied with the Bell strategy made their way through the seemingly impervious monopoly. Like hot gasses escaping a volcano, they found their way to the surface, if not by the most direct route as they would in a competitive environment, then through side vents and fissures.

One startling example of this sort of nonmarket conflict can be found in disputes between Southern Bell and ABT over the Law Telephone Switchboard.

Invented in 1878, this device was one of several adopted in the early years of telephony for connecting customers with each other. Early on it was the switchboard of choice for several Bell licensees, who appreciated its speed, low cost, and ease of use and maintenance.<sup>9</sup> The limits of this technology, however, became apparent as telephone demand increased; it could not provide the necessary capacity to serve large, densely populated markets, and so was soon surpassed by the “multiple” switchboard.<sup>10</sup>

In the South, and in regions whose economic conditions resembled the South, the Law Board survived into the 1890s. The reasons for its survival were several: customers in such places were very price sensitive, population density and telephone demand remained low, maintenance of complicated equipment was difficult, and trained technicians were rare. All of these conditions argued that simple, inexpensive, familiar equipment might well be economically more rational than newer, more sophisticated equipment. It was not clear to managers of Southern Bell that the Law equipment was in any sense inferior, particularly since most of the company’s exchanges did not face the capacity constraint that limited employment of the Law board elsewhere. Expected to earn a profit in their territory, Southern Bell managers responded through their choice of equipment to demands for telephone service not met by the technology and business strategy developed at Bell headquarters.

Perhaps it is not surprising that one division of a corporation would seek to use technology that fit the markets it had to serve. What is striking is how the parent company reacted to this “technological independence.” Letter after letter flowed between executives of American Bell and those of Southern Bell over this issue. The parent firm implored its southern licensee to adopt “standard” switchboard technology. ABT’s Thomas Lockwood, who through the 1880s and 1890s had the ear of top Bell executives on matters of technology, and Chief Engineer Hammond Hayes went to great lengths to convince operating companies to abandon the Law board.<sup>11</sup> Deviations from company policy on technology apparently so threatened ABT’s strategic vision that it was willing to sacrifice immediate customer satisfaction in places such as the South for the longer-term goal of building an interconnected system that provided local and long-distance service in major urban markets.

Gradually, stronger top-down management, systemwide conferences on technology, and the creation of substantial R&D capabilities within American Bell allowed the company to take greater control of technology. ABT was forced by internal competitive pressures over technology and its own plans for standardization to abandon its original decentralized structure and become more of a managerial firm.<sup>12</sup> Even stronger pressures on the company would arise in the competitive period that followed 1894, forcing ABT to rethink its whole strategy. In many ways, these market pressures were the continuation of the conflicts over technology that had developed within the company earlier.

Much has been written about the competitive period of the early twentieth century, but little of this literature has focused on the technological differences between competing firms. Some writers have portrayed the so-called independent telephone companies that arose between 1894 and 1920 as small “Bell Systems,” seeking to match their larger rival with their own integrated local and long-distance systems.<sup>13</sup> It is true that some of the larger independents built extensive regional systems, often

controlling both local and long-distance service over wide areas. Others tried with mixed results to enter the crucial big-city markets dominated by Bell. Still others formed associations to coordinate activities and achieve vertical integration between manufacturing and sales and service. Such activity was, however, confined to a few midwestern independents and did not engage the thousands of other non-Bell companies that sprang up in this era. Even among the more ambitious new members of the telephone industry, moreover, there was dissention and division. Many firms were content to cultivate their own markets and eschew the more grandiose (and expensive) scheme of forming an integrated long-distance system in competition with AT&T.<sup>14</sup> In doing so, they developed a different system of telecommunications technology.

Beneath the top layer of the independent companies were numerous small and local firms that filled market niches long ignored by Bell.<sup>15</sup> Such companies were particularly common in the South, which has often been inaccurately characterized as competitively sluggish in this period. In fact, southern independents, though small in absolute numbers, were second only to the aggressive midwestern firms in taking market share from AT&T. (Table I) They did so, however, by developing alternative business strategies and using different systems of technology to serve different groups of customers than their rival. In effect, these firms competed by redefining the uses of and market for telephone service.

The organizations serving farmers were an important segment of the independent telephone industry. Operating in the South's vast rural market, they were often organized, capitalized, and run by farmers themselves, sometimes as mutual companies. Using the most rudimentary technology and setting entry level prices extremely low (at or below \$1.00 per month), they met a type of demand that Bell had found extremely difficult to serve. The cost of extending a line to remote farms and then into the nearest urban exchange, Bell found, was often prohibitively high.<sup>16</sup> Farmers' systems, however, began by providing inexpensive local service. Rather than radiating outward from urban centers, they gradually moved in from the farm. Many eventually gained sufficient customers to bargain for connection with either the Bell or independent companies serving nearby towns and cities.<sup>17</sup>

Many of the next level independents—urban commercial firms—also concentrated on different markets than had Bell. In the South, a few challenged the company in the region's largest cities, such as Atlanta, but like their counterparts elsewhere they enjoyed mixed success in such head-to-head struggles with their larger, wealthier competitor. In the smaller towns and cities that made up much of the South, however, they did significantly better. Since these places contained a preponderance of the region's population, the independents were able to quickly take market share from Bell.

Some of the most successful of these firms arose in North Carolina, a state of many small towns, emerging midsize cities, and modest farms, but no large metropolis. Here local businessmen, dissatisfied with Bell service, founded telephone companies such as North Carolina Interstate. Despite its name, this firm operated on a regional not national level, providing connections between Durham, Raleigh, Goldsboro, Winston-Salem, and Charlottesville, Virginia.<sup>18</sup> Customers in such places were unwilling to pay for Bell's more extensive and integrated service, but were attracted

TABLE I

Region	% Bell 1907	% Independent 1907
<i>New England</i>		
Maine	69.8	30.2
N.H.	77.6	22.4
Vt.	54.9	45.1
Mass.	97.5	2.5
Conn. & R.I.	97.7	2.3
<i>Mid-Atlantic</i>		
N.Y.	73.6	26.4
N.J.	83.6	16.4
Pa.	61.2	38.8
<i>Midwest</i>		
Ohio	37	63
Ind.	25	75
Ill.	48.9	51.1
Mich.	49.5	50.5
Iowa	30.7	84.1
<i>South</i>		
Va.	56.6	43.3
N.C.	44.5	55.5
S.C.	62.4	37.6
Ga.	57.9	42.1
Fla.	36.3	63.7
Ala.	63	37
<i>United States</i>	51.2	48.8

Source: U.S. Bureau of the Census, *Telephones and Telegraphs 1912*, table 24.

by North Carolina Interstate's cheap local service and lines to nearby cities. As Bell's own studies soon showed, this was a strategy it could not match and still earn the profits independents were earning.<sup>19</sup>

The success of southern independent companies hinged on their ability to differentiate their service from that of their chief competitor's. In part, this strategy was grounded in the use of different technology. Farmers' companies deployed multiparty-line service to keep rates down and did not construct their lines to the exacting requirements of long-distance communications. Other non-Bell firms quickly adopted the automatic switching equipment invented by Almon Strowger. Fearful that this new technology would inhibit technical standardization and slow network expansion by limiting capacity and interfering with long-distance service, AT&T refused at first to employ it.<sup>20</sup> But many customers saw distinct advantages in automatic switching. It did not require a full-time human operator, so it offered both greater privacy and lower labor costs. This advantage was especially valued in small towns, where residents recognized that human operators could not only learn everyone's business, but often commanded wages that added substantially to rates in markets where demand for telephones was still small.

Even more significant than the technology that went into independent telephone operations was the business–technological strategy developed by these companies. Since most of them did not seek to compete with Bell head-on, they could concentrate on their local markets without incurring the expenses and technical difficulties of building an integrated local and long-distance system. Most of their patrons had little use for a line between Atlanta and Washington, for example. First and foremost they wanted low-priced local service, and then perhaps a few regional toll connections to the nearest towns and villages.<sup>21</sup> Building from the ground up rather than the top down, independents were able to provide extremely inexpensive (“cut-rate”) local service at rates below those that Bell could offer.<sup>22</sup>

Cultivating their local markets enabled independents to understand the distinctive needs of their customers. Among farmers and small town residents, the telephone was not just the business device that Bell managers had conceived it to be, but was an instrument of cultural and social interchange among isolated men and women in America’s vast hinterland. The independents discovered before Bell did the “sociability” of the telephone.<sup>23</sup> Unlike their larger rival, the independents recognized that ordinary men and women using the telephone for social conversation were as important a group to serve as were businessmen who used it for commercial purposes. Operating outside of the Bell System, these entrepreneurs and their customers stretched the notion of what a telephone was and what it could do to new limits.<sup>24</sup>

The success of independent entrepreneurs also rested on their effective use of the political system. Southern town and city governments were keenly interested in having telephone technology serve what were seen as crucial local needs. In the early twentieth century, Atlanta, for example, used political power to control and shape telephone service in line with larger community objectives. Noted for its progressive, active elite and strong booster tradition, the city enacted a comprehensive regulatory policy on key urban services designed to enhance its economic position. In a 1906 agreement, North Georgia Electric, a power company, cooperated with the locally owned Southern Power and Light Company and the independent Atlanta Telephone and Telegraph Company to bring inexpensive electricity and telephone service to Atlanta by sharing facilities, construction costs, and net profits. The city government participated in and supported this venture, providing the necessary right-of-way franchise for use of municipal thoroughfares. Through this arrangement, Atlanta’s local independent telephone company was able to compete against Southern Bell in what was one of the largest and most strategically important markets in the South.<sup>25</sup>

Other municipalities used their political power in equally effective ways to extract from telephone companies concessions that served local interests. Asheville, North Carolina, and Richmond, Virginia, granted Bell a needed right-of-way franchise only after Bell agreed to set limits on rates. Tampa, Florida, demanded steep discounts on city-owned telephones. Still other places made technology and service their prime concerns, requiring that companies install specific types of equipment and provide valued connections to nearby towns and cities.<sup>26</sup>

Municipal regulation of this sort was the political expression of the same demands that came out of the market after the rise of competition in 1894. In both

cases, groups strove to shape telephone service in line with what were seen as vital local exigencies at a time when AT&T was committed to building a national interconnected system of telecommunications. Resistance to Bell's policy in the form of local independent companies and municipal telephone regulations spoke to the demands of many sections of society not yet a part of the growing national culture and economy. For them, local interests still took precedence over interregional or national ones. They wanted the technology of telephony to serve those interests, and their political and market-based resistance to the Bell System expressed an abiding faith that even as economic growth, technological innovation, and new institutions altered the shape of society, communities could ride the crest of change and emerge not only intact but better off than before.<sup>27</sup>

This localistic vision went well beyond the South, finding expression in the telephone wars of midwestern states such as Iowa, Illinois, Wisconsin, and Michigan.<sup>28</sup> There too numerous small independents penetrated market after market on the fringes of urban America. There too municipal interests vied with AT&T for greater local control of telecommunications. As in the South, competition and localistic strategies dramatically increased telephone distribution among the very customers Bell managers had believed could not be widely served—farmers and other rural residents. Even as AT&T was building longer toll lines and mapping out a national system of communications, the humble efforts of non-Bell firms in Iowa gave that state the highest number of telephones per population by 1912 (see Table II).

**TABLE II** Comparative Telephone Use and Distribution, 1902, 1912, All Systems<sup>a</sup>

Region	Telephones/1000
<i>New England</i>	
1912	27
1902	9
<i>Mid-Atlantic</i>	
1912	90
1902	29
<i>Midwest</i>	
1912	135
1902	50
<i>South</i>	
1912	32
1902	11
<i>U.S.</i>	
1912	91
1902	30

<sup>a</sup>Regional totals are simple average for 1902, weighted average for 1912

Source: U.S. Bureau of the Census, *Telephones and Telegraphs 1912*, table 5, table 20.



It was hardly clear at this time which vision of telecommunications would triumph in America. Since only 3 percent of all calls were toll calls, a significant percentage of the U.S. population likely saw the telephone as a local service, rather than as part of a vast interregional system of communications. But localism interfered with the plans of the architects of the Bell System. In their view, local service had to comport with the requirements of long-distance service. The prime telephone customers were businessmen, professionals, and the wealthy of large cities, who would pay for such a system, not the local merchants, farmers, and ordinary consumers of small towns. It was a vision that initially provided little room for those who would not accept these values. As many communities eventually learned, the company was dedicated to its vision of telephony, and possessed substantial resources to bring it to fruition. As AT&T learned, however, it would have to modify its original strategy to accommodate some of those other groups.

As AT&T joined the competitive fray in earnest, it made good use of its strengths. These included a substantial head start, size, organizational capability, and, what seemed to many informed observers, the most logical and rational approach to telephone service. Certainly, it could be argued, a universal interconnected network in which any user could communicate with any other user was superior to several smaller regional or local networks. Although this idea had great appeal to members of the urban and industrial Northeast, it was, as we have seen, much less warmly received in other places. Convincing the public that universal, interconnected service was inherently the best means of using telephone technology was the key to AT&T's success. Once it sold a majority of telephone patrons and key politicians on this idea, it gained the capacity to determine the path of telephone development in America, a prerogative in other nations enjoyed only by governments.

The reasons for AT&T's success lay in four areas: control of capital, a shift in regulatory policy, compromise with independent companies and state authorities, and, most importantly, a revised national strategy for telephony.<sup>29</sup> As critics of AT&T have often lamented, size and wealth gave the company formidable economic and political power. Its enormous cash flow and access to capital enabled it to buy outright many of its struggling competitors, or else surreptitiously gain control of them through loans and stock purchases.<sup>30</sup> The large number of acquisitions made by Southern Bell certainly helped it regain top position in the telephone industry in the South.

AT&T also benefited from a sudden change in public policy, which brought state and federal authorities into telephone regulation after 1910. These officials were much less sympathetic to local needs than were municipal governments. They regarded competition as inefficient and viewed locally based communications systems as inherently inferior to a single national system. Many states began to prohibit or discourage competition; others made it difficult for municipal governments to favor local telephone firms over AT&T.<sup>31</sup>

While AT&T profited from both its market power and the new regulatory regime, it also made effective use of skillful compromises. In the South and similar areas still affected by the economics and politics of localism, astute Bell company managers came to realize that existing patterns of demand and traditional sentiment against large, outside corporations did not favor service predicated on an

interconnected national network. Even if a nationwide network might eventually become attractive in these markets, the here and now often favored more modest, less expensive, indigenously owned operations. Theoretical efficiency and future benefits did not always win customers.

Southern Bell enacted several types of compromise to meet these conditions. The least dramatic involved little more than “selling” the concept of the system. Until recently, the idea of marketing telephone service may have seemed absurd, but since the reintroduction of competition, and with it the emergence of many new technologies of telecommunications, it has again become apparent that there are many different ways of using telephones and configuring telephone systems. Modern-day telephone company managers have had to relearn the value of marketing, something well understood by their predecessors.

In the early competitive era, marketing Bell service involved going into towns and cities, contacting members of the business class—who would most likely support Bell’s long-distance network—and getting their assistance in fights with municipal officials and independent firms. At a time when the number of telephone subscribers was small, especially in the South, gaining just a few adherents to the system was often enough to capture the entire market. Many times, in fact, these negotiations took place with people who were simultaneously the economic elite, the political leadership, and the promoters of competing companies. In Asheville, North Carolina, for example, Southern Bell gave the owners of a competing exchange a windfall \$85,000 in preferred stock for their interests, and then came to terms with the city government by agreeing to keep rates to a yearly maximum of \$40.00 for businesses and \$24.00 for individuals. In Richmond in the early 1890s, Southern Bell at first encountered a hostile city government and business elite determined to revoke the company’s franchise. Yet through negotiation, Southern Bell obtained a new franchise—on more favorable terms for the city, of course—and in 1901 bought out the competing company.<sup>32</sup>

Many markets were secured through the policy of sublicensing competitors. Using this tactic, Bell let its opposition have certain markets that it believed it could not effectively serve, but it tied these firms into its system through sublicense contracts that offered capital and technical assistance in exchange for conformity with Bell System policy and technical requirements. The purposes of the contracts were clear: to limit competition—generally Bell withdrew from the independent’s market with the understanding that the independent would not try to expand or to build its own toll lines—and they were designed “to control [the opposition] and have [it] operated to our benefit,” by ensuring that AT&T retained final say over matters of policy, technological choice, and long-distance system configuration.<sup>33</sup> In the South between 1900 and 1911, the percentage of sublicensed stations increased from 5 to 43 percent.<sup>34</sup>

Over and above all of these important activities, however, was the new national strategy for AT&T articulated by Theodore Vail. Appointed president of AT&T in 1907, he designed a far-reaching set of policies that set the Bell System on its successful course for the next 70 years. Under Vail, AT&T embraced the concept of universal service, which he defined as the fullest possible extension of telephone service to the citizens of the United States. Universal service preserved what had been Bell’s

**TABLE III** Percentage of Independent Telephones Connected with the Bell System

1900	3.8
1905	13.3
1910	52.6
1915	71

Source: Bell System Statistical Manual.

traditional strategy—an interconnected, national network based in the nation's largest cities—but added to it an even more ambitious plan: AT&T would assure that all customers had access to all parts of the network at all times. The company thereby committed itself to serving customer groups it had earlier been either unable or unwilling to reach.<sup>35</sup>

Vail's new order involved revolutions in both the strategy and structure of the Bell System. Structurally, the company balanced the advantages of central control with the flexibility of decentralized operations. Vail put into place a three-column functional management plan that gave top executives greater control over their sprawling organization.<sup>36</sup> Yet this centralization of authority was matched by an equally important devolution of control down the line, to regional operating companies, individual city exchanges, and sublicensed non-Bell companies. As AT&T vice president E. J. Hall, one of the most perceptive students of telephony, realized, centralization as a "method of organization could not be expanded indefinitely." Instead, AT&T had to "find an effective method of administration through subcompany organizations, controlled by a general staff."<sup>37</sup> Thus AT&T would perform research and development, engineering, and manufacturing using a vertically integrated structure and centralized management, but regional Bell companies would retain considerable latitude on more routine engineering, construction, and maintenance matters, as well as the day-to-day operations in their individual markets.

Decentralization also involved increased sublicensing, which grew rapidly under Vail (Table III). Rather than try to dominate every market with the same technology, Bell would concentrate on key urban areas and the interexchange business, leaving many of the numerous, differentiated local markets in the hands of non-Bell firms. Tied to the main part of the system by sublicense contracts, their service to their customers would increase the universality of the system. The link between the corporation and its constituent parts would be in large part technological; non-Bell firms and individual operating companies would accede to the engineering and research expertise of the central company in all matters that could affect overall system performance.

Over time Vail expanded on the strategic implications of universal service, implications both for his firm and for the industry as a whole. He realized that to succeed against independents he had to engage head-on the alternative concepts of telephone service that had arisen since the end of the Bell monopoly. He also saw that such a fight would of necessity take his company beyond the market into politics

and into the shadowy realm of cultural values. Universal service was the conceptual means to attack all of these fronts.

As defined in Vail's exceptionally frank and detailed annual reports, as well as numerous published writings and speeches, universal service meant immediate, comprehensive, high-quality, interconnected local and long-distance service. The first part of the concept—the broad extension of telephone service to all who wanted it—in many ways was not a Bell but an independent innovation. They, after all, had been the ones to bring down prices and penetrate the numerous markets beyond urban and industrial America.<sup>38</sup> But in Vail's hands, this market-driven activity was modified by the second part of the concept, the one that stressed quality and interconnection of local and long-distance service. Universal service now meant not simply the extension of telephony to every place and market, but the ability of any customer to call any other customer anywhere in the United States at any time. And to call them quickly, with minimal delay and minimal effort on the customer's part. Gone were the alternative technologies embraced in farmers' lines, mutual companies, and regional systems. As Vail noted, "a national service, a comprehensive universal service requires that the plant and equipment of the system be of the very highest."<sup>39</sup> Multiparty lines, experimental technologies such as automatic switching, equipment, and construction designed to provide basic local service first and interchange connections second would not find much favor in this system.

A system predicated on providing the "best" service to all the nation could not afford the inevitable price/quality trade-offs of competitive markets. Universal service implied, therefore, the end of competition; in Vail's own words, "one system, one policy." Competition not only encouraged deviations from standard technology, it resulted in fierce price wars for market share that starved companies of the capital they needed for expensive, long-term construction.<sup>40</sup> To some extent, therefore, the universal system served as a justification for the anticompetitive moves that Bell had been making: buying competitors, driving them from key markets, and sublicensing those that could not be brought to heel otherwise. It also permitted Vail to launch his boldest move—the embrace of government regulation.

Since the market could not be counted on to foster universal service, it was necessary for the government to step in and separate competitors. State regulatory agencies had been doing some of this since 1910. They reduced head-to-head competition, oversaw the quality of service, standardized technology, and limited the power of locally minded municipalities over telephony. But Vail wanted the government to go further and help set rates. It was clearly more expensive to engineer an interconnected than a local system.<sup>41</sup> Appealing to a public authority would shield AT&T from the inevitable customer complaints that would result as rates stabilized or even rose from their extremely low competitive levels. Strong faith in science and technology convinced Vail that once the universal system was secured, research and development would generate price-lowering improvements in efficiency and productivity. But it was crucial that the hand of the government stay crafty competitors from entering the business by what would later be called "creamskimming"—underpricing some part of the whole bundle of services offered by the Bell System.<sup>42</sup> Limiting destructive competition would encourage regular, orderly growth of the universal

system. Market rivalry would give way to what Vail preferred to call “participation” among firms, which was conducted on the basis of “fair rates” to maintain high quality in the industry.<sup>43</sup>

Vail’s canny proposals have to be understood more as a vision of what telephone service should be than a description of what it was. When he took the helm of AT&T in 1907 competitors still had half the market and the government was not looking to assist the company but to bring it to trial in an antitrust suit. The universal system, if it existed at all at this time, was confined to the largest urban markets. In the rest of the nation Bell’s competitive tactics and sublicensing were bringing places in line. For the new order to last, however, a revolution in thought among the actors with the most power over telephony would be required—government officials, important customers, competing firms, and even members of the Bell System.<sup>44</sup>

A sophisticated interpretation of history enabled Vail to argue persuasively for his vision of the future of telephony. As he repeated over and over again, the advance of civilization depended on the progress of transportation and “intercommunication.” “Intercommunication, of which the telephone is the latest exponent,” he explained to the members of the National Geographic Society, “binds this world together.”<sup>45</sup> Human progress followed as isolated groups came into contact with each other. An interconnected system of communication was clearly the most refined means yet for carrying the banner of civilization to remote parts of the world. Seen in this way, locally based communications systems were primitive, backward, and out of step with history. Extensive, comprehensive, interconnected systems, on the other hand, represented progress, enlightenment, and the future of mankind. Only the most audacious competitor could counter this rhetorical onslaught.

Although proposed as an inevitability, Vail’s interpretation of human history was part of his vision of what society should be and how communications should help it get there. If, after all, intercommunication was inevitable, then why worry about rates, competition, and alternative technologies? All of those things should fade away with time. But experience had already shown they did not fade away; people clung to their local sentiments, ignored the import of universal service, and placed the immediate gratification of low prices over the value of a well-organized, interconnected network. As America’s railroad experience also showed, the path to rationality could be long, arduous, and costly. Vail’s experience with railroads throughout his career convinced him that small, isolated systems had to grow into larger, interconnected ones. But there were plenty of examples from the history of railroading of unscrupulous competitors, avaricious financiers, and misguided shippers wrecking railroad systems.<sup>46</sup> Indeed, for Vail and for like-minded businessmen and government regulators, railroads offered a cautionary tale as to what could go wrong if unchecked market forces had free rein with a system technology. For those afraid that telephony would recapitulate the railroad experience, Vail’s beneficent vision likely struck a responsive chord.

Although Vail’s interpretation of history did not by itself settle any of the pressing matters AT&T confronted, it did provide a rationale for the important steps he was taking. “Society has never allowed that which is crucial to existence to be entirely controlled by private interest,” he noted.<sup>47</sup> Intercommunication, as he described it,

was certainly crucial, so here was a justification for government intervention into the telephone industry. Here, too, was a strong argument for central control of telephone service by AT&T. Intercommunication brought with it specialization—an important force for progress in society—and in turn the need for coordination among numerous specialized activities. The hierarchical organization of the Bell System could provide that order. It coordinated the many parts of telephone service, furnished centralized R&D to advance the technology of communications, and carried out the planning required in such pivotal social technology.<sup>48</sup>

Vail's vision also suggested several new functions for AT&T to undertake. In a complex, specialized, interdependent society, few people could understand more than a fraction of the forces and institutions that impinged on their lives.<sup>49</sup> This situation, of course, necessitated control of telephony by expert engineers and managers, but it also warranted a role for education. Education overcame the ignorance that resulted from specialization, and reinforced cooperation among members of society. Vail himself was keenly interested and personally involved in public education, but his most important endeavor in this regard was the large investment he made in the new science of public relations. To Vail public relations was public education—explaining to the populace the value, indeed the inevitability, of universal service. AT&T became one of the pioneering companies in the field of corporate image making.<sup>50</sup> Under Vail public relations became a permanent department, a continuous function of the corporate hierarchy.<sup>51</sup>

The new strategy had two final implications, which completed the structure of the Bell System. One was the importance of political influence throughout the nation. Help from the government would not come through political appointees and “demagogues” in southern and western cities or from traditional party hacks. The company had to overstep these antiquated institutions and appeal to the new class of independent experts in charge of regulatory commissions. Even more important were direct appeals to the public. Once people were convinced of the superiority and rationality of the Bell System, the proper public policies would follow. Besides extensive public relations campaigns, the public could be reached through the many operating companies that made up the Bell System and the growing number of stockholders who held shares in AT&T.<sup>52</sup>

Broad distribution of stock ownership was Vail's final innovation. It comported with both his political and his competitive strategy. Politically, broad ownership gave a substantial portion of the most influential members of the public a stake in the Bell System. By 1920 this group included entrepreneurs who had founded competing companies as well as small town business and political leaders. They had to embrace universal service if it was to succeed. Broad ownership also permitted AT&T to undertake the long-term investments required of the universal system. If short-sighted investors controlled the company, they would have the same effect as marketplace rivals, forcing AT&T to place immediate profitability ahead of long-term development.

Vail's carefully conceived, interrelated steps for completing the Bell System were more than business tactics to defeat rival firms. They served that purpose too, of course, though the actual competitive policies evolved more from the day-to-day experiences of managers in regions like the South. Vail went one step further, how-

ever, and engaged the issues that lay behind marketplace competition. He sought to define the technology of telephony—what the telephone should do, who should have it, how it should be controlled—in a way that met the challenges posed by the independent firms' alternative systems. In doing so, he moved telephony away from the marketplace—where Bell was enjoying mixed results—into another space somewhere between the market and the public sector. This space was distinctly non-market, though it was still capitalist and private.<sup>53</sup> The competitive pressures that remained in the industry would not be market-based, but intraorganizational—between and among members of the extensive Bell System. In fighting these battles, AT&T had enjoyed much more success than it had in the marketplace, so there was every reason to expect it would succeed against what opposition remained to its strategy.

In less than a decade, AT&T experienced a dramatic turnaround, both in the market and in the political realm. It is tempting to see this change as Vail saw it—the inevitable results of human progress. After all, large integrated systems do offer more connections than small ones; centralized R&D was impressive at AT&T; natural monopolies can limit market competition in industries like telecommunications. Add to these forces the more traditional competitive tactics pursued by Bell—predatory pricing and the acquisition of rivals—and you may have most of the explanation of how the Bell System arose. But these forces are not enough.

The shift from localism to cosmopolitanism, although a theme in modern industrial societies, was not an inevitability. One of the forces that made this shift possible was the completion of an integrated national system of communications. The Bell System was as much a cause as an effect of the broad historical forces Vail identified. In 1907 customers in small southern towns and midwestern cities did not just wake up and change their preferences to comport with the requirements of universal service. In the day-to-day activities of individual Bell companies and in the policies and vision of Theodore Vail AT&T consciously sought to change customers' conception of telephony. Bell's victory was not secured by market share alone; as had happened before the competitive period, it was always possible for the intraorganizational consensus to break down and for alternative technological visions to seep up from individual parts of the Bell System. Sustaining victory on technological competitiveness required a strong conception of what the technology of telephony should be and why it should be that way.

Theodore Vail recognized that technological competitiveness extended beyond the search for profits and markets, and beyond the marketplace itself. In a telling early statement, he wrote, "public action is based on opinion which is often controlled by promises or misunderstanding."<sup>54</sup> He could have been referring to either the market or politics. Promises offered by both competitors and politicians seduced the public with false notions of telephony, and generated a misunderstanding of the complex, specialized, but vital technology of communications. By changing the structure of the industry, reorganizing his firm, appealing to new political institutions, and reasserting the Bell definition of technology, Vail was able to control these forces.

The willingness of AT&T's president to engage the basic issue of defining technology helped assure the success of the Bell System for the next 70 years. It did not, however, end technological competitiveness. The history of the Bell System that

followed is one of more and less successful efforts to deal with demands from the political world, from consumers, from would-be rival firms, and from members of the organization itself to pursue different avenues and develop alternative technologies. Most of these pressures were contained, particularly the organizational ones. Vail and his successor were extremely successful at building an organization and a firm culture dedicated to a coherent vision of telephone technology. It took many years to replace the Bell System, but its demise was brought about in large part when these contained pressures and an alternate concept of technology worked their way to the surface.

### Notes

1. Michael Porter, *Competitive Strategy* (New York: The Free Press, 1980); and *The Competitive Advantage of Nations* (New York: The Free Press, 1990).
2. The fight may be said to be over "core design concepts." See William Abernathy and James Utterbeck, "Innovation," *Technol. Rev.*, June/July 1978, pp. 41–47; also Rebecca Henderson and Kim Clark, "Architectural innovation: The reconfiguration of existing product technologies and the failure of established firms," *Adm. Sci. Q.*, Vol. 35, 1990, pp. 9–30.
3. Margaret Graham, "Corporate research and development: The latest transformation," *Technol. Soc.*, Vol. 7, 1985, pp. 179–195; also Robert Harris and David Mowrey, "Strategies for innovation: An overview," *Calif. Manag. Rev.*, Spring 1990, pp. 7–16.
4. Richard Easterlin, "Regional income trends, 1840–1950," in eds. Robert Fogel and Stanley Engerman, *The Reinterpretation of American Economic History* (New York: Harper & Row, 1971).
5. Southern Bell Telephone and Telegraph Company (SBT&T), Annual Reports.
6. Up to 1899, ABT was the parent organization of all the regional Bell companies; beginning in 1900 that role was taken over by AT&T. In this chapter, the name ABT will be used until that date, while AT&T will designate the Bell long-distance organization, the original function of AT&T.
7. Bell's early strategy is discussed in Gerald Brock, *The Telecommunications Industry: The Dynamics of Market Structure* (Cambridge, Mass.: Harvard Univ. Press, 1981), pp. 110–14; John Langdale, "The growth of long distance telephony in the Bell System, 1875–1907," *J. Hist. Geogr.*, Vol. 4, No. 2, 1978, pp. 150–52; and Richard Gabel, "The early competitive era in telephone communications, 1893–1920," *Law Contemp. Prob.*, Vol. 34, Spring 1969, p. 342.
8. Robert Garnet, *The Telephone Enterprise: The Evolution of the Bell System's Horizontal Structure* (Baltimore Md.: The Johns Hopkins Univ. Press, 1985), pp. 78–83, discusses the early realization of this problem at AT&T.
9. The advantages of this technology are described in American Telephone and Telegraph Company Archives (ATT), box 1236, Law System Advantages and Disadvantages. See also box 1236, Law System, Use by East Tennessee Telephone Company, and box 1236, Mann (Law) System.
10. ATT box 1055, Law System v. Multiple Board. The multiple was the answer to capacity limits in exchanges. Morton D. Fagen, ed., *A History of Engineering and Science in the Bell System, I: The Early Years, 1875–1925* (Bell Labs, 1975), pp. 484, 489–96.



11. ATT box 1236, Law System Advantages, op. cit. ATT box 1240, Southern Bell, Infringement of Western Electric Patents, Hayes-Davis, July 11, 1895; ———, Hayes-French, June 14, 1895.
12. See John J. Carty, "The new era in telephony," ATT National Telephone Exchange Managers Meeting, 1889; also Garnet, *The Telephone Enterprise*, op. cit., pp. 90–108.
13. Robert Bornholz and David Evans, "The early history of competition in the telephone industry," in eds. R. Bornholz and D. Evans, *Breaking Up Bell: Essays on Industrial Organization and Regulation* (New York: North Holland, 1983), pp. 7–40; David Gabel, "What was the loser doing? A reappraisal of the role of the *Visible Hand* in the telephone industry," unpublished manuscript, 1989.
14. ATT box 1337, Interstate Independent Telephone Association Convention, 1902; box 1277, Inter-state Local Telephone Association, 1896; ATT box 177 10 01 01, Independent Telephony, Interstate, 1898–1902. ATT Archives, 46 02 02 27, Allen Report on Telephone Competition.
15. ATT box 1375, Effects of Competition on Development and Rates, 1909–1910. This study shows that independents were strongest in places of less than 25,000 people, and that only 15 percent of the public had to subscribe to the services of two different companies. This lack of overlap and duplication suggests that at this time the nation was composed of distinct, nonconnecting markets.
16. "To the farmer," Bell agent W. S. Allen noted, "the quality of service is distinctly subordinate to cheapness." ATT box 46 02 01 01, Allen-Fish, November 6, 1902. See also ATT box 46 02 01 02, Allen-Fish, February 16, 1903. On low rates, see ATT box 1337, Interstate Independent Telephone Association, 1902, Allen-Fish, December 30, 1902.
17. ATT box 46 02 01 02, Allen-Fish, April 6, 1903; April 9, 1903. Claude Fisher, "The revolution in rural telephony," *J. Soc. Hist.*, Vol. 12, No. 1, 1989, pp. 1–26.
18. ATT box 1163, North Carolina Interstate Telephone Company, 1900.
19. ATT box 1348, Sub-Licensing, Advantages to Operating Companies, 1903, Hall-Fish, July 31, 1903.
20. For more information on this episode, see Kenneth Lipartito, "Corporate strategy and technology choice: The early history of automatic switching in the American telephone industry, 1889–1925," paper presented at the Society for the History of Technology Meeting, Madison, Wis., 1991; also, M. D. Fagen, ed., *A History of Science and Engineering*, pp. 544–554; Milton Mueller, "The switchboard problem: Scale, signalling, and organization in manual telephone switching, 1877–1897," *Technol. Cult.*, Vol. 30, No. 3, 1989, pp. 544–545, 558–559.
21. See, for example, *Huntsville Mercury*, January 31, 1900.
22. On the rapid decline in telephone rates during competition, see Richard Gabel, "The early competitive era," pp. 345–346; and Gerald Brock, *The Telecommunications Industry*, op. cit. Bell managers began to realize that these firms and the farmers' companies responded to "actual needs of smaller communities," and met "a real need of modern life." ATT box 46 02 01 02, Allen-Fish, op. cit.
23. Claude Fisher, "Touch someone: The telephone discovers sociability," *Technol. Cult.*, Vol. 29, No. 1, 1988, pp. 32–61.
24. Carolyn Marvin, *When Old Technologies Were New: Thinking About Communications in the Late Nineteenth Century* (New York: Oxford Univ. Press, 1988).
25. ATT Box 1148, Atlanta, Georgia Franchise, Meany-Fish, September 6, 1902; also General Manager's Letterbooks (GMLB) 923, 1907, pp. 78–112.

26. See Kenneth Lipartito, *The Bell System and Regional Business: The Telephone in the South, 1877–1920* (Baltimore, Md.: The Johns Hopkins Univ. Press, 1989), pp. 175–207 for more examples.
27. John L. Larson, *Bonds of Enterprise: John Murray Forbes and Western Development in America's Railway Age* (Cambridge, Mass.: Harvard Univ. Press, 1984) discusses localism and the railroad.
28. In rural New England, upstate New York, and western Pennsylvania, independents found the same types of customers as did their southern counterparts—those whose main concerns were affordable local service and perhaps a few regional interexchange connections.
29. Noobar T. Danielian, *AT&T: The Story of Industrial Conquest* (New York: The Vanguard Press, 1939); Gabel, "The Early Competitive Era," op. cit.
30. ATT box 1263, Sub-License Contracts, 1898–99, Easterlin-Wilson, September 26, 1898. For more examples, see SBT&T Minutes of the Board of Directors, June 4, 1903; November 9, 1903; November 8, 1906; May 9, 1907; April 4, 1907; and January 10, 1907.
31. These episodes are recounted in greater detail in Lipartito, *The Bell System and Regional Business*, op. cit. 175–207.
32. ATT box 1340, Acquisition and Sale of Exchanges in North Carolina, 1903, Agreement with Asheville Telephone and Telegraph, June 5, 1903; also ATT box 1340, Acquisition of Independent Companies, 1897–1901, Hall-Hudson, February 21, 1898; November 10, 1899; May 29, 1899; also ATT box 1033, Richmond, Virginia, "The Telephone In Virginia," *Richmond News Leader*, December 31, 1925.
33. ATT box 1263, Interconnection with Southern States Telephone and Telegraph, Easterlin-Carson, April 5, 1897.
34. SBT&T, Annual Reports.
35. Louis Galambos, "Theodore N. Vail and the Role of Innovation in the Modern Bell System," *Bus. Hist. Rev.*, forthcoming, deals with Vail's impact on technological innovation in the Bell organization.
36. Garnet, *The Telephone Enterprise*, op. cit. 128–154; Lipartito, *The Bell System and Regional Business*, op. cit. 113–148.
37. ATT box 2029, Development of Functional Organization in the Bell System, Hall-Vail, September 27, 1909.
38. Milton Mueller, "Universal service as a product of competitive struggle," paper presented at the International Communications Association Meeting, Chicago, Ill., 1991.
39. ATT box 49, Bell System, Policy, Organization, Functions, T. N. Vail, "The Policy of the Bell System," 1919.
40. ATT box 1081, T. N. Vail Articles, 1909–1919, "Public Utilities and Public Policy," 1913.
41. ATT box 49, Bell System, Policy, Organization, Functions, T. N. Vail, 1919.
42. ATT box 1081, T. N. Vail Articles, 1909–1919, "Mutual Relations and Interests of the Bell System and the Public," 1913; also, ATT box 5, Toll Line Connections with Independent Companies, memorandum of February 5, 1915.
43. ATT box 1081, T. N. Vail Articles, 1909–1919, 1913.
44. ATT box 49, Bell System, Policy, Organization, Functions, T. N. Vail, "Lest we Forget," 1919.
45. ATT box 1081, T. N. Vail Articles, 1909–1919, "Intercommunication, Commerce, and Civilization," 1917; also Box 1080, T. N. Vail Speeches, 1913–1919, Address at Annual Banquet of the National Geographic Society, 1916.

46. ATT box 1081, T. N. Vail Articles, 1909–1919, “Vermont, An Address by Theodore Vail before the Greater Vermont Association,” 1915.
47. ATT box 1081, T. N. Vail Articles, 1909–1919, “Some Observations on Modern Tendencies,” 1915.
48. ATT box 49, Bell System, Policy, Organization, Functions, T. N. Vail, “The Policy of the Bell System,” 1919.
49. ATT box 1080, T. N. Vail Speeches, 1913–1919, “Some Truths and Some Conclusions,”
50. Richard Tedlow, *Keeping the Corporate Image: Public Relations and Business, 1900–50* (Greenwich, Conn.: JAI Press, 1979), pp. 11–13.
51. ATT box 2027, Vail, Public Relations Policy, 1919.
52. ATT box 49, Bell System, Policy, Organization, Functions, T. N. Vail, “Lest we Forget,” 1919.
53. ATT box 1081, T. N. Vail Articles, 1909–1919, “Mutual Relations and Interests of the Bell System and the Public.” Vail carefully distinguished between government participation and government control and ownership, which would have been in Vail’s mind disastrous. See ATT box 1081, T. N. Vail Articles, 1909–1919, “Some Observations on Modern Tendencies,” 1913.
54. ATT box 1080, T. N. Vail Speeches, 1913–1919, Address at President’s Dinner, Metropolitan Club, 1916.