

# The Telephone Takes Command

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## FOUNDING THE TELEPHONE INDUSTRY

... Alexander Graham Bell had been trying to improve the telegraph when he constructed the first telephone in March of 1876. That month he filed his patent claim, later to be a matter of legal dispute, and in May he showed the primitive device at the Centennial Exposition in Philadelphia. Alexander Graham Bell and his associates spent much of the next year or so giving demonstrations around the country of this "wonder," sometimes borrowing telegraph wires for long-distance calls (and sometimes failing). Watson would, for example, sing over the telephone to an audience gathered elsewhere in town. In 1877 a New York poster announced "An Entertainment of the Sunday School of Old John St. M. E. Church," including recitations, singing, and an exhibition of "Prof. Bell's Speaking and Singing Telephone." Admission was 25 cents.<sup>1</sup> These stunts garnered considerable publicity and awe as journalists relayed the news around the world.

Making a business of what was a novelty was more difficult. The backers of Alexander Graham Bell's telegraph work were his father-in-law, Gardiner Hubbard, and the father of one of his speech students, Thomas Sanders. In July 1877 the three men reorganized as the Bell Telephone Company, with Hubbard as trustee, and began seriously marketing the device. Initially, they leased pairs of telephones for simple two-point communications, commonly between two buildings of a business or

between a businessman's home and office. The opening of the first telephone exchange, or switchboard, in New Haven in January 1878 was a profound step. Any subscriber could now be connected to any other.

The key financial decision, one of great long-term import, was Hubbard's determination that the company, as the exclusive builder of telephones, would lease the instruments and license local providers of telephone service. Bell thus controlled both the service and the consumers' equipment. (It is as if gas companies exclusively leased stoves and furnaces or electric utilities were the sole lessors of lamps.<sup>2</sup>) In this way Hubbard attracted franchisees around the country who used their own capital to rent telephones, string wires, build switchboards, and sell interconnections. Bell provided the instruments and technical advice and, in turn, collected rental fees. Over the years the company used its leverage on license renewals to set rates and to dictate technical and other features of the service. This close supervision allowed the company to convert a confederation of local franchisees into a "system" of local "Bell Operating Companies" acting in concert. Eventually, AT&T replaced the rents it charged with stock ownership in the local companies and, using this leverage, set common nationwide policies. But in the earliest years perhaps dozens of entrepreneurs in towns across America—some rounded up by Watson himself on marketing trips—made individual licensing agreements with Hubbard.<sup>3</sup>

By mid-1878 the telephone business was in ferment. About 10,000 Bell instruments were in use throughout the nation, but Bell now had serious competition. Western Union, already located in telegraph offices almost everywhere, adopted telephones designed by Thomas Edison and Elisha Gray to offer a competing service. Bell sued Western Union for patent infringement and hurriedly founded exchanges around the country to preempt markets. At the end of 1879 the contestants settled: Western Union conceded Bell all patent rights and instruments. In return, Bell agreed to renounce telegraph service, to pay Western Union 20 percent of gross receipts for a time, and to grant the telegraph company partial interest in a few local Bell companies. [The resolution left Bell in early 1880 with about 60,000 subscribers in exchanges scattered about the country and a monopoly on the telephone business. (About 30 years later, Bell briefly absorbed Western Union until pressured by the federal government to sell it off.)

### THE ERA OF MONOPOLY: 1880–1893

The typical telephone system of the 1880s was a cumbersome affair. . . . The instrument itself was a set of three boxes. The top box held a magneto generator, a crank, and a bell. The middle box had a speaker tube protruding forward and a receiver tube hanging from the side. The third box contained a wet-cell battery that needed to be refilled periodically and occasionally leaked. [A caller turned the crank to signal the switchboard operator; the signal mechanically released a shutter on the switchboard in the central office, showing the origin of the call. The operator plugged her headset into the designated socket and asked the caller whom he or she was seeking. Then the operator rang the desired party and connected the two by wires and plugs in the switchboard. The two parties talked, usually loudly and with accompanying static, and then hung up. In some systems the caller cranked again to signal the end of the conversation. In others the operator listened in periodically to

find out when the conversation was over so that she could disconnect the plugs.

The race to build exchanges, rapid adoption by businessmen, and other changes raised some technical problems in the 1880s. Edward J. Hall, considered “the most far-seeing, all around competent and efficient telephone man of his day,” complained from his franchise in Buffalo as early as February 1880 of too much business and too many calls to provide subscribers adequate service.<sup>4</sup> One consequence of growth was increasing congestion at the switchboards. Spaghetti-like masses of wires crisscrossed the boards, which in turn grew in number, size, and complexity beyond the capacities of the operators struggling to reach around one another. Temporary solutions did not solve the problem, especially in the large urban centers, until the late 1890s.<sup>5</sup> [In some places new electric and streetcar power lines created intolerable interference on the adjacent telephone lines. Some observers believe that this problem stunted telephone development in the late 1880s. (This nuisance recurred in rural America with the construction of power lines by the Rural Electrification Administration in the 1930s.)

Bell responded to the challenges by rebuilding its hardware. It eventually replaced single iron or steel wires (a system in which the electrical circuit was completed through the ground) with pairs of copper wires that returned the current. Bell also replaced wet batteries with a common-system battery; the power for all telephones on a line now came from the central exchange. In addition, Bell eventually developed new switchboards and procedures to alleviate switchboard congestion. These and other technical developments completely revamped much of Bell’s telephone system by the early 1900s. Company leaders sought to develop high-quality service—clear sound, instant access, and the like—for the urban business customers they courted. To this end they rounded up as many telephone patents as possible, sponsored further research, and pooled the practical experience of their franchisees. Theodore N. Vail, as general manager and then president until 1887, used Bell’s temporary patent

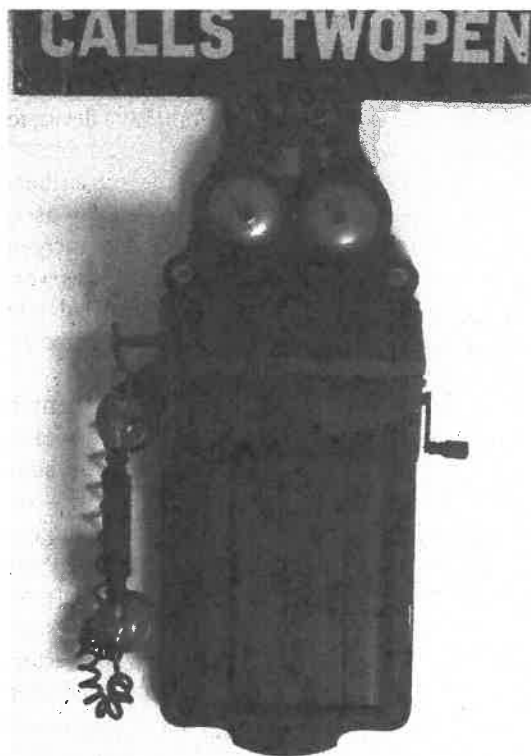
monopoly to secure a technical and organizational edge over all future competitors, especially by developing long-distance service.

Although not favored, like Alexander Graham Bell, by a Hollywood biography, Theodore N. Vail is a figure of mythic stature in the telephone industry and in American corporate history. Beginning as a lowly telegrapher, Vail deployed his organizational skills and modern methods to rise to superintendent of the federal Railway Mail Service. Hubbard lured Vail, then 33, away to manage the fledgling Bell company in 1878. For several years Vail pressed aggressive expansion, patent protection, and business reorganization. In 1887, by then president, Vail resigned after conflicts with a more cautious board of financial officers. He succeeded in several business ventures around the world, but kept

abreast of the telephone industry. Vail would come back.<sup>6</sup>

Vail's policy of establishing high-quality service meant that costs were high, especially in the larger cities where the complexities of switching were most difficult. The minimum flat rate in central Los Angeles in 1888, for example, was \$4 per month plus two cents a connection after the fortieth call. This rate equaled about 10 percent of the average nonfarm employee's wages. That same year Boston subscribers paid a minimum flat rate of \$6 a month.<sup>7</sup> In addition, Bell's affiliates took every advantage of their monopoly to levy what the market could bear. For example, when the competing telephone exchange closed in San Francisco in 1880, the Bell local raised its charges from \$40 to \$60 a year. The local manager justified the move: "The increase was made because the public always expects to be 'cinched' when opposing corporations consolidate and it was too good an opportunity to lose. (Moreover, it would have been wrong to disappoint the confiding public.)"<sup>8</sup> Conflicts with irate customers arose, the most famous of which was an 18-month boycott of telephones organized in Rochester, New York, in 1886.<sup>9</sup> Bell's rates began to drop as 1894 approached, probably because of the competition it anticipated when its patents expired, although Bell claimed that improved technology explained the drop in charges. By 1895 the Los Angeles rate was down by 38 percent to \$2.50 a month—7 percent of wages—plus two cents a call. Even then, telephone service remained expensive.<sup>10</sup>

The common practice during this era and beyond was to charge customers a flat-rate for the telephone service, allowing unlimited calls. During the 1880s local Bell companies repeatedly debated and experimented with a message-rate formula, charging by the call. One argument in favor of this approach was that it would permit the basic rental fee to be lowered and thereby encourage small users, such as families, to subscribe. Edward J. Hall was a leading proponent, labeled by some the "father of the message-rate system." Another reason



An early public telephone, Western Australia, nd.  
 Photograph by Gngarra, CC by wikimedia.org  
 <<http://wikimedia.org>>.

for a pricing change, more favored by Vail and others, was that ending flat-rate service would discourage use, and thus "cut off all the superfluous business that tends to make the operation of the business so unremunerative." Existing customers, however, resisted the change by complaining, by petitioning the town officials who issued permits for telephone poles, or, as in Rochester, by boycotting the telephone service. Not until after the era of monopoly did message-rate service become common, although still not universal, in Bell's largest exchanges.<sup>11</sup>

Vail's agenda went beyond securing a technical monopoly. Through various devices he centralized control of the Bell System and its affiliates. Doing so was complex, since local situations varied widely. Each regional operating company had to deal with many governments to secure permits, to fend off complaints about the unsightliness of the wires, and sometimes to negotiate rates. Still, standardized policies, as well as a superior technology, helped brace the Bell system against challenge. Vail's successors after 1887 were, in retrospect, more interested in extracting monopoly profits from the system than in securing its future. That shift in priorities would become evident when the patents expired.

Strategic disagreements about pricing policy arose inside Bell, in part from different visions of the telephone's potential. It was not at all obvious whom the telephone would serve and how. As Sidney Aronson has noted, "[T]he inventor and his backers . . . faced the formidable task of inventing uses for the telephone and impressing them on others."<sup>12</sup> During the first few decades of telephony, industry marketers devised a variety of applications, including transmitting sermons, broadcasting news, providing wake-up calls, and many other experiments. As late as the 1910s, the trade journal *Telephony* had an index entry under "Telephone, novel uses of."\* The industry spent

\*Included under that entry in volume 71, for example, are "degree conferred by telephone, dispatching tugs in harbor service, gauging water by telephone, telephoning in an aeroplane."

considerable time, especially in the nineteenth century, simply introducing the public to the instrument and dispelling suspicions about it. . . .

Industry leaders approached telephony from their experiences with telegraphy. Alexander Graham Bell and his backers were initially trying to improve the telegraph. Theodore Vail came from a family involved in telegraphy and had been a telegrapher. Many local telephone entrepreneurs had started out selling telegraph service. An important exception was Edward J. Hall, the message-rate enthusiast, who started in his family's brick business after earning a degree in metallurgy. Hall established the first Buffalo telephone exchange, left the telephone business a few years later, and was lured back by Vail to manage long-distance development in 1885 and then Southern Bell for over 10 years.<sup>13</sup> Because telegraphy defined the background of most executives,<sup>14</sup> and because Americans in the nineteenth century used the telegraph almost exclusively as a business tool, it was logical that Bell used the telegraph model to define the telephone as a device for business as well.

Who were the first telephone subscribers? Physicians were notable among the early users. The telephone allowed them to hear of emergencies quickly and to check in at their offices when they were away. Druggists typically had telephones, as well.<sup>15</sup> But businessmen formed the primary market.

Bell found some businessmen hesitant to replace the telegraph with the telephone because they valued a written record. Nevertheless, some manufacturers, lawyers, bankers, and the like—and later small shopkeepers—adopted the technology. In 1891 the New York and New Jersey Telephone Company served 937 physicians and hospitals, 401 drug stores, 363 liquor stores, 315 livery stables, 162 metalworking plants, 146 lawyers, 126 contractors, 100 printing shops—7322 commercial customers all told—but only 1442 residences. Residences with telephones were typically those of doctors or of business owners or managers.<sup>16</sup>

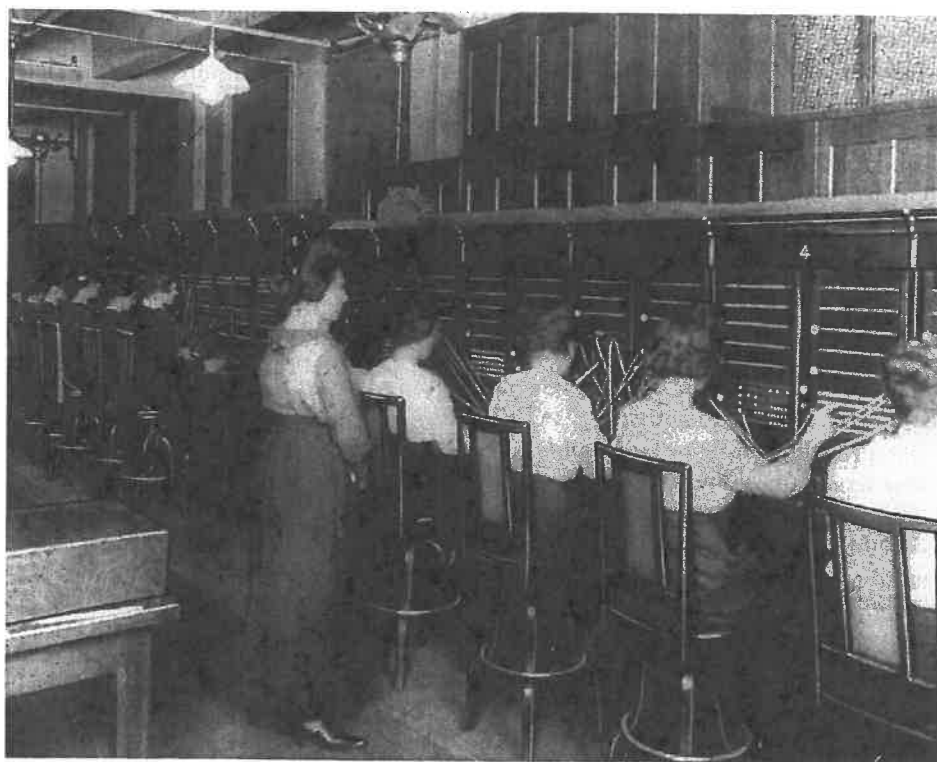
One issue for Bell was whether it could fruitfully expand into the general residential market

(that is, beyond the households of the business elite). In late 1883, noting that "the Telephone business has passed its experimental stage," Vail surveyed affiliates around the country, asking, among other questions: "Is it desirable and what would be the most practical way, to provide a service which would be in the reach of families, etc.?" His aide summarized the responses:

There would seem to be but one opinion on this query and that is, that it is *most desirable*. The difficulty which presents itself is the manner in which the desired end should be reached. It is admitted that a great increase in the business would occur by the introduction of a rate and system, whereby the Telephone would be made universal so to speak, amongst families, and several modes [are] suggested . . . [including more pay-telephone

stations, party lines, and lower residential rates]. It would appear from many of the answers to this query, "that a reduction in royalty" would be a necessity. . . .<sup>17</sup>

There was the rub: Locals would have to reduce their rates, and to ease that reduction Bell would have to lower its charges on the locals. Except for a handful of populists in this era—notably Edward Hall of Buffalo; John I. Sabin, later president of Pacific Telephone; and Angus Hibbard of Chicago—the consensus was that any increased business would not make up for the profits lost by reducing rates, even in a measured-rate system. At the time many also believed that operating costs per subscriber increased as the number of customers increased because of the technical complications of interconnection.<sup>18</sup> Only later



The early urban telephone system required large numbers of telephone operators whose job was to connect the sender and receiver of a call through exchanges like this one. *National Archives of Canada.*

did industry analysts appreciate that, as a network, telephones became more attractive as more people subscribed and that there might be economies of scale. George Ladd, president of Pacific Telephone in 1883, expressed the conservative position. He wrote to Vail that he opposed the reduction of residential rates because it could not pay and customers would not be grateful: "I am opposed to low rates unless made necessary by competition. . . . Cheaper service will simply multiply the nuisance of wires and poles and excite [political pressure to put wires underground], without materially improving profits or permanently improving relations with the public."<sup>19</sup> Residential service was therefore a stepchild in the system.

This attitude, later described even by Bell's friends as arrogant, predominated in the company. In 1906, for example, New England Bell commissioned an attorney to study telephone service in the Midwest. In its earlier history, he reported, "the public interest received scant attention" from Bell companies. They "were almost, if not quite, inexcusably slow in coming to an intelligent apprehension of the public need and desire for increased and improved telephone service."<sup>20</sup>

Bell managers were also skeptical about providing service in smaller communities. Businessmen in several small California towns, for example, appealed to Pacific Telephone for service but were turned away. In a few cases local entrepreneurs built bootleg systems, risking lawsuits.<sup>21</sup> AT&T focused on providing big-city businesses with high-quality service, including long-distance calling, at high prices. Its representatives later explained that the pressures of escalating demand and technical renovations prevented the company from pursuing wider markets until the mid-1890s.<sup>22</sup> Still, most Bell managers saw few possibilities for expansion, and nearly none for greater profit, in the general residential market or even the business market outside the major centers.

Between 1880 and 1893 the number of telephones in the United States grew from about 60,000—roughly one per thousand people—to about 260,000—or one per 250 people. The vast

majority, more than two-thirds, were located in businesses.<sup>23</sup> This expansion, while dramatic in the early years, slowed after 1883, perhaps because of the technical problems or, just as likely, because of predatory monopoly pricing.

## NOTES

1. Reproduced in AT&T, *A Capsule History of the Bell System* (New York: AT&T, 1979), 11.
2. Crandall, "Has the AT&T Break-up Raised Telephone Rates?" *The Brookings Review* 5 (Winter), 40–41.
3. On the early evolution of the Bell System, see especially Robert Garnett, *The Telephone Enterprise* (Baltimore: Johns Hopkins Press, 1985); Kenneth Lipartito, *The Bell System and Regional Business* (Baltimore: Johns Hopkins Press, 1989).
4. Letter of 2 February 1880, in "Measured Rate Service," Box 1127, AT&THA [American Telephone and Telegraph Historical Archives]. In 1884 Hall recalled the situation in 1879: "In Buffalo we had so many subscribers that the service became demoralized. Our switchboards were not equipped to handle the necessary amount of business . . . growing under the high pressure of competition" (Hall, "Notes on History of the Bell Telephone Co. of Buffalo, New York," [1884], 9). . . .
5. See Robert J. Chapuis, *100 Years of Telephone Switching* (New York: Elsevier, 1982); Morton Mueller, "The Switchboard Problem," *Technology and Culture* 30 (July): 534–60.
6. See Albert Paine, *Theodore N. Vail* (New York: Harper, 1929). Accounts of Vail appear in most telephone histories.
7. Los Angeles: "Telephone on the Pacific Coast, 1878–1923," Box 1045, AT&THA; Boston: Moyer, "Urban Growth," 352.
8. Letter (no. 75968) to Vail, 13 February 1884, in "San Francisco Exchange," Box 1141, AT&THA.
9. Bell had planned to switch from flat-rate to measured-rate (per-call) charges. With the support of city hall, subscribers organized a boycott. Eventually, Bell agreed to delay measured service for five years, place its wires underground, and pay the legal costs. See H. B. MacMeal, *The Story of Independent Telephony* (Chicago: Independent Pioneer Telephony Assoc., 1934), 111.

10. Los Angeles rates: "Telephone on the Pacific Coast, 1878-1923," Box 1045, AT&THA. Wage data come from the United States Bureau of the Census, *Historical Statistics of the United States*, tables D735-38.
11. On the debate over rates, see "Measured Rate Service" and other files in Box 1127, AT&THA. The quotation about "superfluous business" is from a Vail letter to Hall dated 7 February 1880.
12. Sidney Aronson, "Bell's Electrical Toy," in *The Social Impact of the Telephone*, ed. Ithiel de Sola Paul (Cambridge, MA: MIT, 1977), 19.
13. Biographical notes on Hall were culled from press releases and clippings provided by Mildred Ettlinger at AT&THA. See also Lipartito, *The Bell System*, for an account of Hall's work in the South.
14. William Patten, *Pioneering the Telephone in Canada* (Montreal: Telephone Pioneers, 1926), 1ff, points out that Canadian telephone executives also had backgrounds in telegraphy.
15. On doctors and telephony, see Sidney Aronson, "Lancet on the Telephone," *Medical History* 21 (January): 69-87, and S. Aronson and R. Greenbaum, "Take Two Aspirin and Call Me in the Morning," Queens College, N.Y. Typescript courtesy of Sidney Aronson, 1985. Histories of telephony often note the early role of doctors. . . .
16. Letter to Thomas Sherwin, 11 July 1891, in "Classification of Subscribers," Box 1247, AT&THA.
17. Circular by Vail, 28 December 1883, and attachments, in Box 1080, AT&THA.
18. Mueller, "The Switchboard Problem."
19. Responses to 28 December 1883, circular by Vail, Box 1080, AT&THA.
20. G. W. Anderson, *Telephone Competition in the Middle West and Its Lesson in New England* (Boston: New England Telephone & Telegraph, 1906), 13-14.
21. The California cases are in "PT&T News Bureau Files," Telephone Pioneer Communications Museum of San Francisco, Archives and Historical Research Center. . . .
22. See, e.g., the rationale for not pursuing wider markets as expressed in the United States Bureau of the Census, *Special Reports: Telephones and Telegraphs 1902* (1906), chap. 10. The stress on high quality was indeed important. In the South, for example, local managers were discouraged from building simple, low-cost systems, because of the national company's insistence on maintaining quality levels needed for the long-distance network (Lipartito, *The Bell System*). . . .
23. In the New York-New Jersey data over 80 percent of telephones were located in businesses. In the same year, in Kingston, Ontario, about 70 percent of telephones were located in businesses, although many officially listed as residential were really used for business by people such as physicians [Robert M. Pike, "Kingston Adopts the Telephone," *Urban History Review* 18 (June): 32-47; Robert M. Pike and Vincent Mosco, "Canadian Consumers and Telephone Pricing," *Telecommunications Policy* 10 (March): 17-32].

## CHAPTER 17

# Time, Space, and the Telegraph

James W. Carey

*The late James Carey was professor at the Columbia School of Journalism and a leading figure in advancing the study of communications history. His book, Communication as Culture, which is the source of the present excerpt, develops a model for examining the implications of early media development in the United States.*