4

PROLOGUE: TELEPHONE DEVELOPMENT BEFORE COMPETITION

COMMERCIAL DEVELOPMENT of the telephone business began in 1877. From 1878 to 1880, there was a brief bout of competition when the Western Union telegraph company attempted to enter the business using instruments invented by Thomas Edison and Elisha Gray. Bell sued Western Union for patent infringement, however, and won a settlement from the powerful telegraph firm. The agreement cemented Bell's control of the business from 1880 until 1894, when the last patent protecting Bell's original invention expired.[48]

Fourteen years of monopoly set the stage for the superheated rivalry that followed in three distinct ways. First, the Bell organization fought an unrelenting legal battle to preserve its patent monopoly, despite numerous indications that the demand for telephones was not being met. Second, growth of the system led to rate increases, leading to continual conflict with the public. Finally, the Bell interests, with Vail as the chief articulator of strategy, took a *nationwide systems* approach to telephone development, an approach modeled after its historical predecessor, the telegraph. That particular vision of universal service left huge pockets of demand unmet.

[48] In the out-of-court settlement of November 1879, Western Union agreed to withdraw from the telephone business for seventeen years, to sell its exchanges to the Bell Co., to transfer all telephone-related patents to Bell, and to pay 20 percent of the cost of any new Bell telephone patents for seventeen years. Bell agreed to stay out of the telegraph business, and to forward to Western Union all requests for telegraph service that came through its exchanges, and to pay Western Union 20 percent of its rental on telephones. FCC *Telephone Investigation* 124 (1939).

A Legacy of Suppression

The Bell patents did not automatically give it a monopoly. Alternative companies sprang up like crabgrass all through the 1880s, and Bell had to actively suppress them. The usurpers could be small, local enterprises or nationally organized stock promotions. Any inventor, backyard mechanic or charlatan who claimed to have invented a telephone could and did serve as the front men for entrepreneurs who needed a patent to enter the business.[49] The telephone instrument was a fairly simple and inexpensive device to make once the principle of voice transmission by electrical analogue was under- stood.

The real subject of that litigation was not who invented the telephone but who would get to profit from its commercial development. The high price of Bell telephones aroused the enmity of many subscribers and the avarice of many a potential competitor. A rival patent claim, no matter how spurious, gave promoters the pretext they needed to organize a company, sell stock, and begin to install lines and phones.[50] And there was always the chance that their claims might be sustained by the courts. Not until 1887, when the U.S. Supreme Court upheld the controlling nature of Bell's patents in a case combining many challenges to his rights, was the issue clearly settled. In the interim, the electrical journals of the 1880s routinely published notices of non-Bell telephone companies being formed-and of their closure after a few months for infringing the Bell patents.[51]

Two specific cases from the mid-1880s illustrate the nature and consequences of that strategy of suppression. In May, 1884, two promoters paid $15,000 for the telephone patents of one Dr. Myron L. Baxter and formed the Baxter Overland Telephone and Telegraph Company in the city of Utica, New York. By October of that year the Baxter Company was operating a telephone exchange with 300 subscribers, and had built up the physical capacity to serve 800. Whatever the merits of Dr. Baxter's patent, the operating company was not a fly-by-night stock promotion scheme but a serious effort to provide telephone exchange service.[52] When the Bell exchange began to lose subscribers the Baxter exchange was shut down by an infringement suit.

At about the same time, an Indiana fanner named John Crump obtained non-Bell telephones from Canada and set up a private line between his house and the home of one of his tenants on an adjoining farm.[53] Crump was not selling telephones or telephone service – the line was for his own personal use. There was no Bell line or exchange anywhere near him. Had he gone to the nearest Bell licensee for his phones he would have had to pay $100 a year to lease them, and he still would

[49] The conflicting patent claims are covered in detail in Robert Bruce, BELL: Alexander Graham Bell and the Conquest of Solitude (Little, Brown 1973).

[50] The importance of making and defending patent claims is clarified by George Smith's observation: "Typical of the organization of all the major firms in the electrical industries, telegraph and telephone company organization crystallized around patent rights, and so whoever desired to enter or sustain business in either field had to come to terms with the holders of significant patents… Survival (in this as well as in most emerging high-technology businesses of the era) required almost obsessive attention to patent claims wherever they arose." Smith, *The Anatomy of a Business Strategy*, 9 (Jolms Hopkins AT&T Series in Telephone History 1985).

[51] Harry B. MacMeal, *The Story of Independent Telephony* 27-29 (Independent Pioneer Telephone Association 1934).

[52] The construction and service quality of the new Company were reputed to be exceptional. and its rates were less than half those charged by Bell. *Ibid* at 43.

[53] 13 *Telephony* 92 (Feb. 1907).

have had to set up the line at his own expense. Nevertheless, Crump was soon visited by Bell agents who warned him that he was in violation of the law and confiscated his telephones.

Examples such as those could be multiplied. Throughout the 1880s, scores of local and national business interests had been willing and able to compete with Bell in the supply of telephone equipment and service. Farmers had always been eager to take the technology into their own hands. For fourteen years those forces of spontaneous development were held in check by injunctions, fines, and confiscations. The expiration of the Bell patents should not be viewed as the beginning of the competitive movement; it was more like the disintegration of a dike that for many years had protected the Boston corporation from a raging flood.

The suppression of independent activity prior to patent expiration also helps to explain the ideologically charged character of the later rivalry. Here was a distant, impersonal corporation growing rich by maintaining a legal stranglehold on a popular, useful device. The scenario could not have corresponded better with the archetypes of Evil promoted by populism. The publicity organs of the independent movement ceaselessly reminded their readers of what it was like in the bad old days of monopoly. Even the names of the early legal independents often mirrored those of the suppressed companies of the 1880s: the Peoples Telephone Co., the Citizens Co., etc.

The experience also deeply impressed itself upon the attitudes of the national Bell Company. As one independent propagandist put it, after fifteen years of skirmishes with patent violators, Bell management "had come to believe, and believe honestly, that anyone who attempted to enter the telephone field, no matter through what gate, was a lawbreaker – an infringer – an interloper."[54] Bell's refusal to interconnect with the independents in the 1890s, and the independents' response in kind, was in part a reflection of that hostility.

Rate Wars

Bell's successful defense of its patent gave it the power to make monopoly profits on its telephones. The national company was not bashful about exploiting that power. It required its licensees to lease rather than buy the telephones manufactured by its Western Electric subsidiary at an annual charge of $14 for each set. Since the machinery itself cost about $4 to make, American Bell guaranteed itself large profits on every telephone in service. As protected monopolies, the operating companies were able to recover those costs in their subscription rates. The instrument lease price paid to American Bell accounted for one-fourth to one-half of the subscription price in small and medium-sized exchanges.

Bell's attempt to reap monopoly profits on telephones fueled public suspicions that the company was gouging its captive market. But the price of the telephones themselves was only one source of discontent over rates. Far more important in the long run was that the licensee companies' operating costs steadily increased through- out the 1880s. The resulting rate increases were not abuses of monopoly power but were legitimately rooted in the economic and technical characteristics of the telephone exchange.

[54] Paul A. Latzke. *A Fight with an Octopus* (Telephony Press 1906).

In 1877 Bell managers had assumed that the local companies were basically in the business of leasing telephones. The telephone did not catch on, however, until the development of exchange service. As switching became more important, the licensees' functions changed. They became operating companies with a large labor force and huge investments in switchboards and outside wires and cables. As the business underwent that transition, Bell managers made a disturbing discovery: the average costs of telephone exchanges increased as they grew. Most companies charged flat yearly rates of $20 to $40. Like their subscribers, Bell managers had expected their operations to realize economies of scope as more sub- scribers joined the exchange. In fact, the reverse was true.[55]

By 1881, Bell managers had come to a rather grim conclusion: expansion had to be accompanied by rate increases. Only three or four of the more than 300 exchanges in operation in 1881 were able to pay for themselves at then-existing rates.[56] Rates would have to be raised "for our self-preservation, even though it places us in the light of a monopoly taking advantage of its position."[57] In noting that it would probably be necessary to raise rates $5 for every 100 new subscribers, one Bell exchange manager warned: "any system which does not provide for that expansion is going to be involved in continual conflict with the public."[58]

What was intended to be a warning turned out to be a prophecy. The need for growth-induced rate increases did involve the Bell companies in "continual conflict with the public" throughout the 1880s. Users responded to higher prices with outrage and frustration. They expected a bigger exchange to offer lower rates, as in any other normal business endeavor. With no alternative to the Bell Company, they felt helpless and exploited as rates went up.

The public responded first with boycotts, then with attempts to control rates by legislation. Neither technique gave the telephone-using public the kind of redress it desired. Boycotts were a costly and ultimately ineffective weapon. Legislation was too clumsy, arbitrary and drastic. In that context, the idea of starting an alternative telephone company backed by local capital and managed by local businesspeople looked very attractive. As noted earlier, hundreds of localities chose that option during the 1880s in flagrant disregard of its illegality. Most, however, were forced to acknowledge that any conceivable form of competition would infringe the Bell patents. So the local telephone users swallowed their frustration, paid their bills, and looked ahead to a time when challenges to the monopoly would be legal.

The link between exchange growth and rising costs would return to haunt Bell's competitors. Independent exchanges found it easy to undercut Bell rates when they first entered the field. They soon attracted so many customers, however, that their unit costs increased. Because many localities conceived of competition as a method of rate regulation, they wrote provisions fixing rates into the new company's franchise. As the independent grew, it was forced either to lose

[55] National Telephone Exchange Association Convention Number 3 (1881), Minutes, 46. AT&T-BLA.
[56] National Telephone Exchange Association Convention Number 2 (1880), Minutes, 137, AT&T-BLA.
[57] Edward J. Hall, Minutes of the National Telephone Exchange Association Convention Number 2 (1880), p. 119.
[58] *Ibid.*

money or to ask for a rate increase, thus reneging on its promises and calling into question what many citizens saw as the justification for its existence.

One System, One Policy…

Conflicts over rates, service, and patent infringement all contributed to the simmering public resentment on which the independent movement capitalized. But two other factors, pertaining to the organization and goals of the Bell system itself, were equally important in setting the stage for the competitive struggle. Those were, first, the national Company's contractual relations with its local operating companies, which were consciously designed to protect its control of the business by weaving its members into an integrated system; and second, the Bell Company's vision of the telephone system as a substitute for the telegraph system-a network of voice communication designed to serve business users in the principal towns and cities. The development plan that flowed from that vision left most of America without telephones or exchanges.

Theodore Vail was the general manager of the national Bell Telephone organization from 1878 to 1887. He later returned as the president of AT&T from 1907 to 1919. Looking back on those early years of the Bell System after it had weathered fifteen years of competition Vail claimed that the Bell System had been organized to achieve universal service all along. "The Bell System was founded on the broad lines of 'One System,' 'One Policy,' 'Universal Service,'" he wrote in AT&T's 1909 *Annual Report*.[59] Around 1918 he made the same claim even more emphatically. "From the commencement of the business," he wrote, "one system, one policy, universal service is branded on the business in the most distinctive terms."[60]

What did Vail mean by that claim? Did he mean, as some modern observers might think, that the Bell system intended to put a telephone in every home and an exchange in every community? That question can be answered in a way that leaves little room for doubt. The behavior of the Bell system during the monopoly period defeats any attempt to read a modern conception of universal service into Vail's pronouncements. By 'One System, One Policy,' Vail meant that Bell intended to establish a centrally coordinated monopoly. By 'Universal Service' he meant that Bell aimed at a nationally integrated system whose subscribers could all talk to each other.[61] The model for that concept was the telegraph industry, which was also both monopolistic and nationally integrated at the time, although far from universal in the sense of reaching into every household.

As general manager, Vail consciously pursued a vision of a nationwide, fully interconnected system. Vail's intentions were clearly revealed during his involvement in the negotiation of the patent settlement with Western Union. Which company would control toll lines was a major source of contention between the two parties. Western Union wanted Bell to confine itself to the local exchange business and allow the telegraph company to control all interexchange connections. Vail's biographer credits him with adamantly rejecting that proposition and insisting on Bell's right to construct and operate long distance lines.[62] The contracts defining the relationship between the national Bell organization and its licensed operating companies provide even stronger evidence of

[59] Theodore Vail, AT&T *Annual Report* 18 (1909).
[60] Gerald Brock, THE TELECOMMUNICATIONS INDUSTRY, 102 (Harvard University Press 1981).
[61] Chapter 8 contains a more extensive discussion of Vail's usage of those terms and their meaning.
[62] Albert Bigelow Paine, *IN ONE MAN'S LIFE* (Prentice Hall 1920).

the nature of Vail's vision. The Boston headquarters did not have the capital or the ability to construct and operate exchanges directly throughout a country as vast as the United States. It relied instead on franchise-like agreements to develop the business. Local operating companies were licensed to lease telephones, raise capital and build and operate exchanges in an exclusive territory. Those contracts were drawn up under Vail's direction and constitute his most important accomplishment as general manager.[63]

Vail's license contracts were shrewd attempts to reconcile the need for integrated development with the fact that the system's actual operations were being conducted by many separate, semi-autonomous companies.[64] The controlling nature of the Bell patents was of course the bedrock on which Vail's system of organization rested, for there was no other legal supplier of telephones. In return for the right to lease telephones, the exclusive Bell licensee in a territory agreed to certain conditions, the intent of which was to bind them to the national Bell organization far beyond the life of the patents themselves. One of the key features of that contract was the parent company's reservation of long-distance interconnection rights. As Vail said in 1918, "it gave us control of the connection of every exchange under license with the outside…. [W]e believed that no exchange could exist without being more or less tied up with the others…"[65] Any licensee company that attempted to break away from the Bell system could be isolated by its inability to connect with any of the surrounding Bell exchanges. That was in fact the same method Western Union had used to achieve its dominance of the industry, as Vail certainly knew.

Vail's organization, in short, was designed to create a unified system, impervious to fragmentation and competition, and capable of providing an end-to-end communications pathway between all of its customers. Monopoly control and universal interconnection were strongly linked, mutually reinforcing categories in his mind: the conditions which led to one necessarily led to the other. The supply of systemic interconnection required centralized control. Systemic interconnection, however, was not merely a product to be offered to customers-it was itself a powerful lever by which Bell's control of the telephone business could be maintained against centrifugal or competitive forces.

Universal service, in the sense of service everywhere, to everyone, is not the same as universal interconnection within a system. A system can be universal in the latter sense while being very restricted in scope. In fact, the phrase "universal service" never appeared in any Bell documents until 1907, the peak of the independents' strength, and by that time the scope and usage of the telephone had been transformed so profoundly that the concept of a universal system had taken on a meaning far different from what Vail had meant when he spoke of a "grand telephonic system" in 1878.

---

[63] See Robert Garnet, *THE TELEPHONE ENTERPRISE* (Johns Hopkins AT&T Series in Telephone History 1985) for a detailed history of the license contracts.

[64] "...the Bell policy was to establish the business on the same lines as if it was done direct by the company with its own lines, only substituting a corporation with its Manager ... performing the duties of a District Manager." Theodore Vail. cited in BROCK, supra note 21, at 102. See also Garnet, supra note 24, at 70.

[65] Testimony of Theodore N. Vail, Read *et al* v. Central Union Telephone Co., Superior Court of Cook County, Illinois, Chancery General No. 299,689, p.l086.

What Vail had in mind during those early years was not the 'universal service' of 1907, much less the ubiquitous network of 1990. The closest model was the telegraph system of the 1870s – a nationwide, business-oriented message communications network linking terminals in all the principal commercial centers.[66] The telephone would reach largely the same people and places, but improve the efficiency and speed of communication by relying on direct conversation instead of written messages and the mediation of telegraph operators. As K. Lipartito observed, Bell managers' idea of what telephone users wanted was based on an "image of a world of businessmen, engineers, and professionals communicating about technical matters with peers with whom they were not intimately acquainted. Such a world demanded a high-quality long-distance system because its residents had many and distant correspondents and contacts."[67]

That this was the model on which his vision was based is, to borrow Vail's words, "branded on the business in the most distinctive terms" if one looks at the pattern of development taken by the system in its first two decades. In 1894 after seventeen years of commercial development, the Bell Company had installed only 240,000 telephones, one for every 225 people in the United States. 85 to 90 percent of those phones were in businesses.[68] The remaining telephones were generally in the homes of businesspeople who wanted to be able to communicate with their offices from their residences. A noted Bell agent often assessed the demand for ex- changes in smaller towns by examining its commercial register.[69]

Of course, many new technologies "trickle down" from business to the home as their costs decrease. But in the case of the Bell system, the overwhelming predominance of business users reflected a deliberate policy, a specific vision of what the telephone was for and who would be interested in using it. From the beginning, Vail was committed to matching the telegraph network in geographic scope, even though voice transmission over long distances posed enormous, unprecedented technical challenges. (The goal of transcontinental voice transmission was not reached until 1915.) Most of the money in telegraphy was made in intercity communication. If the telephone could supersede district telegraphy in local communications, would it not be even more profitable to replace telegraphy's hold over *long-distance* business communications?

---

[66] The telephone operated in an environment dominated by telegraphy for its first twenty years, fulfilling the role of adjunct to, complement of, or substitute for its predecessor. *History of Engineering and Science in the Bell System*, Vol. I, 489 (M.D. Fagen, ed. AT&T 1975). See also Joel Tarr, Thomas Finholt & David Goodman, The City and the Telegraph: Urban Telecommunications in the Pre-telephone Era, 14 *Journal of Urban History* 38-80 (Nov. l987).

[67] Kenneth Lipartito, *The Bell System and Regional Business* 92 (Johns Hopkins AT&T Series on Telephone History 1989).

[68] A detailed breakdown of subscriber categories in the Buffalo, New York exchange in 1892 is contained in the transcript of the Third AT&T Switchboard Committee Meeting, New York, March 15-18, 1892, p.276-77. Residential telephones make up 289 of the total 1,850 stations in the city. The rest are in business offices of various types. By 1907, in contrast, residential telephones comprised 50 to 60 percent of the total in the cities, and a larger portion in the rural areas.

[69] In describing his methods for assessing the most promising places for small exchanges, Thomas Doolittle of AT&T wrote, "Reference was had to Bradstreet or Dun's Commercial Registers, which disclosed the invested capital or what might be called the commercial standing of each place." Doolittle, 1906 *Annual Report*, 17, Box 2020, AT&T-BLA.

Until 1889, local and long-distance telephone services were literally two separate, stand-alone systems. Local exchanges relied on cheaper Blake transmitters and iron, grounded circuits, equipment with a speaking range of about 50 miles. The toll network used circuits of copper twisted pair (known at the time as "metallic" circuits, to distinguish them from grounded circuits) and a more powerful transmitter capable of transmitting speech 800 miles. A subscription to the long-distance service, which was always purchased separately, cost about 35 percent more than the local service. AT&T soon discovered, however, that the development of the toll business was being retarded by its separation from the local exchange business. Most customers did not subscribe to the more expensive long-distance service and therefore were largely inaccessible to the users of the toll network in other cities. In order to increase the utility of the system as a long-distance network, Bell in 1889 decided to integrate local and long-distance telephony.[70] That was to be accomplished by upgrading the local exchanges to the transmission standards of the long-distance system. Henceforth, all circuits would be metallic and only the high-quality instruments would be used. In that case, the goal of complete system interconnection conflicted with the goal of encouraging *local* telephone use by larger numbers of people. The decision encouraged intercity communication at the expense of local use.[71]

The model of intercity business communications is also implicit in the Bell System's decisions about where to put exchanges. The United States in 1890 was still a predominantly rural nation. Over 60 percent of its population lived in towns with less than 2,500 people, or on farms. The Bell network unambiguously ignored that majority and cast its lot in with urban America. There were more than 7,000 incorporated towns with populations under 10,000 in 1884, and the Bell system had established exchanges in only 52 of them. By 1895, rural penetration had improved, but the urban bias was still marked. The 346 largest cities, representing only 27 percent of the U.S. population, possessed 83 percent of the nation's telephones (see table 3-1). In that, Bell was simply following the developmental trajectory of the telegraph system, which began by linking urban centers and gradually extended itself to smaller and smaller towns.

Table 4.1
Telephone Penetration by Community Size, 1895

Population level	# of places	% with telephone exchanges	% of Bell subscribers	% of US population
50,000 +	52	100%	50%	18%
10-50,000	294	98%	33%	9%
2,500-10,000	1150	49%	14%	9%
Rural	--	--	3%	63%

Source: 1900 Census, Exchange Statistics, AT&T-Bell Labs Archives

Apologists for the Bell system often claim that rural areas were ignored because they were more expensive to serve. But in the 1880s and 1890s, the truth was almost the opposite of that. The

[70] Hibbard, Pickernell & Carty, AT&T, "The New Era in Telephony." Address before the National Telephone Exchange Association Convention No. 9, 1889, 35. AT&T-BLA.

[71] David Gabel, Technological Change, Contracting and the First Divestiture of AT&T (unpublished ms, Jan. 12, 1989).

cheapest and least technically demanding course of action would have been to establish many small, local exchanges in the small and medium-sized towns. The equipment needed to provide that kind of service was fully developed and easy to mass produce. By contrast, the growth of exchanges in urban centers constantly posed new technical problems in switching, signaling, operation, and maintenance. Also, because of the diseconomies of growth associated with large exchanges, small-scale development would have required less capital investment and fewer workers per subscriber and less complex management practices.

Bell was clearly bent on another task. It was responding to a specific kind of demand for telephone service: the demand of urban businesses for voice telephony as a substitute for, and improvement upon, the nationwide telegraph infrastructure. It therefore left untapped a huge reservoir of public demand for local exchange service. Thousands of farm communities and small towns had no telephone exchange, and those communities embodied precisely those conditions which made entry into the telephone business easiest. The small, local exchanges they wanted required only modest levels of capital investment and technical expertise. There were also hundreds of larger cities in which the demand for purely local telephone service had been retarded, partly by Bell's monopoly prices and partly by its preoccupation with a grander vision of what telephone service could be.

Vail was at least partially right; a peculiar vision of *universal service* had informed the Bell system almost from its inception. But that was not universal service as we know it today, implying widespread household penetration and an effort to make telephone access available everywhere, to everyone. It meant, instead, a commitment to provide nationwide voice communication to business, even if that meant completely neglecting service to rural areas, local exchange service to households and short-distance toll connections. The Bell managers would soon discover, however, that their attempt to cultivate one grand system had left open enormous, fertile expanses where hundreds of smaller ones could grow.