



TELECOM IN NORTH TEXAS: A CASE STUDY IN AGGLOMERATION

IF THE 1970s television series “Dallas” were recast in the 1990s, J. R. Ewing’s fortune would likely come from a high-tech start-up rather than an oil inheritance. Dallas’ Texas Instruments, Austin’s Dell Computer and Houston’s Compaq make the most technology-related headlines. However, Texas boasts hundreds of high-tech firms employing about 341,000 workers—second only to California’s 742,200 high-tech workers and followed by 306,300 in New York, according to the American Electronics Association.¹

Despite Austin’s image as Texas’ high-tech Mecca, North Texas has the largest number of high-tech jobs in the state. Dallas/Fort Worth’s 230,000 high-tech workers place the region among the ranks of California’s Silicon Valley in terms of employment. According to the Texas Workforce Commission, most high-tech workers in the North Texas area are employed in the telecommunications industry.

As illustrated in Table 1, nearly half of Texas’ 129,131 telecom jobs are in the Dallas area.² In fact, Richardson’s “Telecom Corridor” is home to the largest concentration of telecom firms in the world—more than 600 within two square miles.³ However, the industry spills out beyond the borders of the Telecom Corridor and accounts for



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TABLE 1
TEXAS TELECOM INDUSTRY

Area	Total employment	Telecom employment	Telecom as a percent of employment	Local telecom as a percent of Texas telecom
Texas	8,677,968	129,131	1.49	100
Dallas	1,781,909	62,741	3.52	49
Fort Worth	698,607	11,487	1.64	9
Houston	1,907,150	16,633	.87	13
Austin	578,421	8,482	1.47	7
San Antonio	665,388	10,404	1.56	8
Other	3,046,493	19,384	.64	15

SOURCE: Texas Workforce Commission, Fourth Quarter 1997.

3.52 percent of all employment in Dallas. This is more than double telecommunications' share of employment in Austin and San Antonio.

This article takes a look at the telecommunications industry that has clustered, or "agglomerated," in North Texas. The telecom industry's high concentration in North Texas means that firms are located quite close to their competitors. We focus on the relationships between the area's telecom companies and the benefits the firms derive from choosing a common location for their businesses.

Telecom in Texas

The Federal Reserve Bank of Dallas informally surveyed telecom businesses in and around Richardson's Telecom Corridor. These companies account for most of Dallas' 62,741 telecom jobs. Our questions addressed five topics: corporate function at the national and regional levels, motivation for locating in North Texas, regional employment, relationships with other companies and customer base. The results are tabulated in Table 2.

The survey revealed two striking characteristics of North Texas' telecom industry. First, an extensive mix of service and manufacturing firms has settled in the area, and second, telecom firms have a strong tendency to locate their headquarters in the North Texas region.

The principal lines of business for telecom firms are (1) providing long-distance, local and wireless communications for businesses and individuals;

(2) operating networks for voice and data, wired and wireless transmissions; (3) building and designing physical infrastructure for operators; and (4) manufacturing equipment ranging from cell phone handsets and fax machines for consumers to the fiber-optic cable, satellites and switches that form net-

works. Individual telecom firms usually engage in more than one of these principal lines of business, but can be roughly categorized into service and manufacturing firms. According to our survey, Nortel, Alcatel and Lucent Technologies are the largest equipment manufacturers in the area, while GTE dominates service provision in terms of employment.

Our survey also indicates the prevalence of international, U.S. and functional-level headquarters in North Texas. Many respondent firms have parent companies in Europe, Asia and other parts of North America. Nevertheless, telecom companies are not simply opening regional offices in North Texas. They are bringing their headquarters to the area. When survey respondents were asked why they chose to locate in North Texas, one of the most common answers was to be closer to other telecom firms.

TABLE 2
NORTH TEXAS TELECOM FIRMS

Year arrived	Company (origin)	Function of Dallas area operations	Business and product lines in region	Dallas area employment
1978	MCI (U.S.)	Engineering headquarters	Long-distance, wireless, Internet service	6,000
1978	Nortel (Canada)	U.S. headquarters	Manufactures switches, base stations, cell phones	8,000
1984	Fujitsu (Japan)	U.S. headquarters	Manufactures switches, base stations, other equipment	1,700
1985	Ericsson (Sweden)	U.S. headquarters	Manufactures switches, base stations, cell phones, displays	3,000
1987	AT&T (U.S.)	Regional headquarters	Long-distance, wireless, Internet service	3,350
1987	Excel (U.S.)	U.S. headquarters	Long-distance service	1,500
1988	GTE (U.S.)	Global headquarters	Long-distance, local, Internet service	14,000
1989	Siemens (Germany)	Branch	Manufactures switches	270
1991	Alcatel (France)	U.S. headquarters	Manufactures switches, base stations, light wave, microwave	5,000
1991	SBC (U.S.)	Wireless headquarters	Local, wireless service	9,000
1992	Nokia (Finland)	Branch	Manufactures wireless monitors, base stations, switches	3,700
1995	PrimeCo (U.S.)	U.S. headquarters	Digital wireless service	1,000
1996	Samsung (Korea)	Global headquarters	Manufactures cell phones	350
1996	Lucent (U.S.)	Branch	Manufactures switches, base stations	5,000
1997	Bosch (Germany)	Branch	Manufactures switches	175
Total employment				62,045

NOTE: This survey was designed to be comprehensive, though not exhaustive.

SOURCE: Federal Reserve Bank of Dallas Survey of Telecom Companies, October 1998.

Closer to the Competition?

Our survey of telecom companies and historical accounts of the region indicate three principal reasons companies have located in and around the Telecom Corridor. First, firms are drawn to the area to be near a supplier or customer. For example, MCI settled in Richardson to be near local start-ups DanRay and Collins Radio, two of its major suppliers. Second, firms come into the region through the acquisition of a local company, such as Nortel through its purchase of DanRay and Alcatel through its purchase of Rockwell International's Network Transmission Systems Division (which had acquired Collins Radio). The final rationale for choosing North Texas, cited by more recent settlers such as Samsung, is to join a well-established telecom region.

Preferring to locate close to the competition may sound counterintuitive, but high-tech firms have a strong tendency to choose a common location, a phenomenon known to economists as "agglomeration." Other, more traditional industries also have a tendency to agglomerate, such as the auto industry in Detroit and the theater business in New York. The traditional benefits from locating close to the competition include the formation of a highly specialized labor force (based on the accumulation of human capital and face-to-face communications), the availability of specialized inputs and the existence of modern infrastructure. High-tech firms enjoy these benefits from agglomeration as well. However, high-tech firms also cluster to take advantage of the most important factor of production in their industry—namely, ideas.

High levels of research and development distinguish high-tech firms, such as those in North Texas' telecommunications industry, from traditional manufacturing firms. Innovation in the telecom industry generates a positive externality that economists refer to as "knowledge spillovers."⁴ When one firm makes an investment to develop a new product or process, a portion of the knowledge generated by that investment may be transmitted, or spill over, to competitors. This transmission of in-

A Tough Call

Dial, wait, listen, talk, hang up. The apparent simplicity of an individual phone call masks the complexity of the hundreds of firms, thousands of workers, miles of wire and multitude of technologies constituting the Texas telecommunications industry.

A complete telephone network relies on three basic types of equipment. Terminal equipment, such as cell phones and fax machines, translates your voice or data into an electronic impulse. Transmission equipment, such as fiber-optic cables in wired communication or radio base stations for wireless, carries the impulses from one point to another. Switching equipment directs traffic within the system to ensure the impulse reaches the intended receiver.

The first phone networks were fairly simple: a stationary phone, cable, and an operator to mechanically direct the call. Today, one company supports its half-million Dallas cellular phone users with a network consisting of approximately 250 radio base stations and five switches. The telecom firms clustered in North Texas provide the equipment and service that make these more complex communications networks possible.

formation takes place through interactions between customers and suppliers, by employees moving from one firm to another, and through informal business and social interaction among members of various companies.

Patents diminish the spillovers associated with an innovation by preventing competitors from simply copying an invention. The knowledge surrounding the innovation is much more difficult to keep proprietary. The closer firms are geographically, the more likely they are to benefit from this flow of information.⁵ In addition to the presence of plentiful suppliers and customers or the possibility of specialized financing, knowledge spillovers drive those North Texas companies that cite "the existence of an established network of telecom firms" as the primary motivation for locating in the area.

The knowledge spillovers that drive telecom agglomeration in North Texas are similar to those at work in Silicon Valley.⁶ The technical community of Silicon Valley is characterized by homo-

geneity of its founders—young, ambitious individuals lacking in industrial experience and migrating from outside the region. The level of informal cooperation among them was high in the early days of the region's development. They all knew each other and went to the same restaurants and bars. They collaborated and shared information as a technological community, in spite of being fierce competitors. Numerous trade associations, industry conferences and clubs, such as the Homebrew Computer Club, became the center of an informal network. A highly efficient job-search network was also essential to Silicon Valley. When employees moved between companies, they took with them the knowledge, skills and experience acquired at their previous jobs. This reinforced a shared technical culture and accelerated the diffusion of technological capabilities and know-how. The region and its network of people replaced individual firms as the locus of economic activity.

By locating close to their competitors, telecom firms in North Texas take advantage of the same type of informal interaction that generates spillovers in Silicon Valley. Ideas are shared between firms and their suppliers, sparking innovations that benefit many other firms in the immediate area. Recruiting efforts by large firms (discussed in the following section) bring workers to North Texas. Spillovers from large, established firms such as GTE and MCI flow to smaller companies throughout the region when workers switch jobs and take their technical skills and training with them. These benefits from a common location are less tangible than things like a common infrastructure and specialized legal, financial and accounting services, but they are no less important.

Competitors Cooperating?

Knowledge spillovers are an indirect benefit firms derive from choosing a common location. North Texas telecom firms gain direct benefits when they take advantage of their proximity to engage in joint projects that expand the entire telecom market.

Brandenburger and Nalebuff (1996) coined the term “co-opetition” to describe when firms cooperate to expand an industry’s market size while still competing for market share. Traditional economic analysis assumes a profit-maximizing firm can gain only at the expense of the competition. Co-opetition considers situations where firms engage in win-win strategies for themselves and their competitors. Examples of co-opetition include research joint ventures, government lobbying efforts by many firms in an industry, and industry (rather than firm-specific) advertising campaigns. Texas’ telecom firms engage in co-opetition when they jointly work to expand their labor market and extend their global influence.

The telecom industry has an insatiable appetite for skilled workers, so North Texas telecom firms are cooperating to attract new workers and train regional residents for telecom jobs. To make it easier for job seekers to find out about the region and its opportunities, area companies launched the “eJobs-Telecom Corridor Program” Web site. The Internet resource features links to Web sites of more than 130 companies through an alphabetical listing; it avoids pushing one company over another by beginning each day at a different letter of the alphabet. Information about the region’s housing, cost of living, climate, recreation and even shopping is also included. By clicking on the “submit resume” button, a job seeker can electronically send a resume to one, six or all of the companies. Through August 1998, 19,000 job seekers had sent 27,000 resumes to 121 companies using the eJobs Web site.

Qualified people are more likely to risk moving to a new area if they have more than one job opportunity. Regardless of which company initially hires a worker, other area firms will benefit from the knowledge the worker acquires at the first firm, should that worker ever switch companies.

Firms are also cooperating with local universities and community colleges to train new workers. Companies including TI, Motorola, SBC and AT&T have each committed \$100,000 per year for the next five years to form an educational consortium with the University of

Texas at Austin, the University of Texas at Dallas, Texas A&M University and Texas Tech University. The consortium will focus on meeting the employment and research needs of Texas-based telecom firms. The Telecom Corridor Technology Business Council, together with Collin County Community College and Richland College, received the largest state Skills Development Fund contract in fiscal 1996–97. The \$2 million trained more than 800 computer technicians and other skilled workers in the Dallas area (Mt. Joy, 1998).

Companies are cooperating with local government entities and each other to expand the region’s international influence and market share. In August 1994 the Richardson Chamber of Commerce created the Telecom Corridor Technology Business Council, the first such organization in Texas. Council objectives are to influence public issues, cooperatively develop programs and services to expand Telecom Corridor companies, facilitate communication between executive peers and create value for the Telecom Corridor and its competitive position in the metroplex and the nation. The council’s board of directors is a prime example of co-opetition. The board includes presidents and vice presidents from companies that fiercely compete for customers, workers and innovations. Nevertheless, the executives cooperate on the council to achieve objectives that benefit all telecom firms in the region.

The co-opetition between businesses has been fostered—not forced—by local government entities. Ron Robinson, president and CEO of the Richardson Economic Development Partnership that generated the Telecom Corridor Technology Business Council, explains government’s role in the region:

The development of the Telecom Corridor...has been entirely private sector driven. While some tax incentives from local government have been provided and some of the start-ups and existing companies depend heavily on federal contracts, the thrust of the entire development has occurred without public sector stimulation. Local government has done what it should do best—provide good government,

superb local services and quality of life factors that complement the workplace. (Robinson, 1995)

The companies concur. None of the firms surveyed listed preferential tax treatment as an incentive for locating in North Texas. Although firms have partnered with local government and each other to promote North Texas’ cluster of telecom companies, the industry’s regional development has occurred with minimal public sector influence.

Fueled by Free Enterprise

The region’s growing telecom industry was made possible by the worldwide movement toward free enterprise. Deregulation and privatization have opened new markets for manufacturers and service providers and have increased competition to develop the next technological innovations.

The North Texas telecommunications industry took off after the Department of Justice and AT&T negotiated a complex restructuring in the early 1980s. The AT&T manufacturing and service monopoly—long supported by federal, state and local regulators who thought competition would result in inferior service—was divided into several local service providers, like Southwestern Bell, and one long-distance provider, AT&T. As the U.S. market opened, competing equipment manufacturers and service providers located in North Texas, joining MCI and its suppliers.

Global telecom privatizations have also benefited the North Texas telecom industry. Alcatel, created by the 1987 French telecom privatization, came to Richardson in 1991 after acquiring a supplier to MCI. MCI, whose engineering division is headquartered in North Texas, acquired Brazil’s long-distance service in 1998 through one of the largest privatization transactions ever.

Increased competition and larger markets have encouraged North Texas firms to develop new transmission, switching and terminal equipment technologies and new services. Richardson start-up Optical Switch Corporation just an-

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nounced an optical switching device it claims may be the missing link in making the network of the future a reality. Southwestern Bell recently launched digital cellular phone service that also provides customized news updates.

By promoting freer telecommunications markets, governments have enabled businesses to choose the locations, customers and suppliers that best suit them. Continued privatization and deregulation, along with agglomeration and co-opetition, will leave the North Texas telecom industry well poised to compete in the 21st century.

— Marci Rossell
Meredith Walker

Notes

¹ The American Electronics Association uses 45 Standard Industrial Codes (SIC) to define high-tech, including high-

tech manufacturing, software and computer-related services, and communications services. Because they exclude biotechnology, research and development services, etc., these high-tech employment figures are conservative.

² For our purposes, the telecommunications industry is defined by SIC 366 (Telephone and Telegraph Apparatus; Radio and Television Broadcasting and Communication Equipment; Other Communications Equipment) and 481 (Radiotelephone Communications and Telephone Communications, Except Radiotelephone).

³ Source: Richardson Chamber of Commerce.

⁴ For a survey of the literature on spillovers, see Griliches (1992).

⁵ Jaffe, Trajtenberg and Henderson (1993) provide empirical evidence of the extent to which knowledge spillovers are localized.

⁶ See Saxenian (1994) for a description of Silicon Valley's development.

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