EVOLVING TELEPHONE POLICY: UNIVERSAL SERVICE

by

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ABSTRACT

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Important public policy decisions are commonly made that depend upon short, medium, and long term time periods to achieve success or widespread adoption. Universal Service and telephone penetration among underserved residential consumer groups are useful cases for studying the rate of change for adopting public policies. Telephone subscribership and its related socio-economic elements are examined using the *Telecommunications Act* of 1996 (Pub. L. 104-104, 110 Stat. 56) and the *Communications Act* of 1934 (47 U.S.C. SS 151 et seq.). Theoretical foundations include the legislation, regulatory policy, and other telephone developments. Findings conclude that: (1) the diffusion of telephones, telephone services, and telephone-related public policies have greater similarity to the widespread adoption of electricity than to the adoption of radio, with which telephone-related diffusion is most often associated,

(2) there is a pronounced split between residents' income and urban-rural factors, and, (3) rather than consumers benefiting from adoption of telephone innovations and a transition to economic competition from behavioral regulation, there is a noticeable slowness in accomplishing objectives of the Acts. Alternative approaches to constructing similar public policies are recommended.

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CHAPTER 1

INTRODUCTION TO EVOLUTION OF MODERN TELPHONE POLICY

The research question was twofold: (1) what were the Universal Service effects in underserved residential consumer populations of the 1996 Telecommunications Act in contrast to the 1934 Communications Act and (2) what were the implications of these effects for the underlying concepts? The multiple objectives of this research were (1) to determine to what extent passage of the *Telecommunications Act* of 1996 (Pub. LA. No. 104-104, 110 Stat. 56) was followed by changes in telephone service subscribers and nonsubscribers in population subsets identified as underserved residential consumers; (2) to what extent this change was like or unlike changes following passage of the *Communications Act* of 1934 (47. U.S.C. 151 et seq.); (3) what implications these changes had for Universal Service; and, (4) what were the connections and implications of the theory behind the two Acts. The public policy concept of Universal Service was distinct from its mechanisms of support. Universal Service support mechanisms were the means by which affordability was to be achieved. Affordability came to be based on local rates, local calling area size, income levels, cost of living, and socio-economic indicators like educational level attained (FCC-CCB, 1997). The case study method provided data drawn from available estimates for telephones, population, housing, and income. The measure of telephone subscribers and nonsubscribers was penetration (the

number and percent of households having telephone service). Penetration was based on conventional telephone services which were part of the Public Switched Telephone Network (PSTN) in the 1930s and the 1990s.

Universal Service had been a telephony[1] objective for nearly 90 years when the 1996 Act was enacted. The 1934 legislative concept of Universal Service had been a business objective of AT&T between 1908 and 1913. The intent was to spread telephone service so broadly that every American home would have a telephone in it. It was important to acknowledge the possibility of duality in this intention to spread. While early 20th century telephone services were an innovation from which the general public could benefit, the interest in connecting all Americans via telephones was originally a corporate intention. The generalized concept became a touchstone of the 1934 Act and of related legislation such as those of the rural electrification process and of the progression of radio spectrum usage. Prior to the 1996 Act, studies typically stressed infrastructure investment and rate-setting aspects. Much capacity data was not collected or was proprietary before 1997, key measures changed after 1997, and many post-Y2000 studies leapt upon computer ownership and I-Net access foci, evidently forsaking basic telephony conditions as though unaware of caveats about the kinship of

[1] Definitions of telephony most often specified the transmission of sound between the different stations, the transmission of speech at a distance, and the reproduction of sound at a distance than they did the technology and manufacture of telephone equipment. A 1995 definition specified telephony as communication, often two-way, of spoken information, by means of electrical signals carried by wires or radio waves. The term was used to indicate transmission of the voice as distinguished from telegraphy (done in Morse code and usually termed "continuous wave" or CW transmission), radio teletypewriter (RTTY) transmission (also termed FSK for "Frequency Shift Keying," the modulation scheme used by such machines), and, later, facsimile (Dictionary.com, 2003).

telephone and computer. Industry perspectives seemed to outnumber consumer perspectives.

As a national policy, a standard was adopted which stressed public interest, necessity, and convenience. This policy standard evolved into the term and concept of the Universal Service policy. According to Dimech (1994), President Woodrow Wilson equated access to basic telecommunications services and fundamental human rights more than 75 years ago. Sirota (2002) said the *Post Roads Act* of 1866 reflected Universal Service of public communications as a founding principle of America. Sirota (2002) referred to Benjamin Franklin's postal programs which were written into the U.S. Constitution. By 1812, Sirota (2002) said, more than 50,000 miles of post roads were in use and, by 1860, the private sector, seeing a need to get mail to California faster than the postal service could, introduced the Pony Express. In turn, the Pony Express was displaced in 1861 by the electronic-transcontinental telegraph, predecessor to services of telephone companies. These latter developments, 1860 and 1861, were examples of ingenuity which exemplified Harvey's (1989) concept of increases in turnover time in which capital became a form of technology-infusion by funding changes to communications and transportation. Nonetheless, the view taken here was based in the NeoClassical paradigm because NeoClassical was the legislative foundation of Universal Service.

1.1 Preliminaries

The policy of Universal Service was conceptualized as "every American having affordable, quality telephone service" (U.S. Congress, 1934). Early 1990s reports like

those of the Information Industry Association (IIA, 1994) referred to Federal Communications Commission (FCC) Monitoring Reports which estimated more than 95 percent of American households had telephone service. These were aggregate estimates. Realization of the 1990 aggregate Universal Service level occurred in a monopolistic environment involving substantial regulation and subsidy arrangements (IIA, 1994). Many subsidies were implicit rather than explicit. When the aggregate was broken down into population sub-groups, it became evident that some areas had not reached an overall 95 percent level. Disproportionate numbers of underrepresented groups were found in nonsubscribed households (FCC 2003-a, Department of Commerce, National Telecommunications and Information Administration [NTIA], 2000). The International Telecommunications Union (ITU, 2003) said the FCC (based on Census Bureau data) reported 94.1 percent of all American households had telephone service in 2000. This meant 5.9 percent of all households did not have telephone service. Representing 6,223,320 households, or about 6.2 million, that 5.9 percent was an increase of about 1.4 million from the 1990 estimate (without taking into consideration overall population changes). Regional nonsubscribers varied by 4 percent to 8 percent in 1990; in Texas nonsubscribers were 9 percent (523,034 households) in 1990 and 6.5 percent in 2000 (FCC-CCB, 2004).

The poor, the young, minority groups, rural areas, and inner (central) cities were found to have low penetration rates (NTIA, 2005-a, 2000). This study found its tribal, rural, minority, and inner city cases were below the 1990 national rate. These findings emphasized the importance of the publicly stated governmental priority of "establishing

a Universal Service scheme that ensures reasonable rates for all consumers and protects those areas of the country where competition is not likely to materialize in the short term" (NTIA, 2005-b). In addition, a NTIA spokesperson (2005-b) said that not merely access but meaningful access for every American was the fundamental issue, with his use of the term access seeming to encompass both Universal Service and access charges. A report by the Universal Service Task Force (FCC-CCB, 1996) summarized telephone service subscribers and dynamics of nonsubscribership. The Task Force (1996, p. 10) said, "…Studies of subscribers rates in Washington, D.C. and New York City suggest that even with highly subsidized local service rates, significant numbers of low-income households remain off the telephone network…." The low income case in this research was slightly above the 1990 national rate but below it in 2000. The profile sketch of households without telephones accompanying the Task Force report was similar to Smith's (1990) and emphasized dynamics of poverty, mobility, disconnection resulting from inability to pay, and privacy. Smith (1990) generally found telephone nonsubscribers to be outside the economic mainstream, even economically marginal, as well as from regional and racial subcultures, with weak attachment to social processes and institutions, and often in lifestyle transition. Smith's finding of subculture distinctions pointed to the efficacy of population subsets.

Smith's (1990) profile found income to be the strongest single but not the sole predictor of telephone ownership. This implied that an area's less than full subscribership to the telephone network could indicate a consumer base not able, not willing, or simply not interested in being on the network for reasons including those of

personal finance and consumer cost. Additionally, a report by the General Service Administration's Federal Technology Service's Office of Service Delivery (GSA, 2004) found the extent of overall wireline connections were affected by consumers who did not want a telephone, households in transition, and wireless-cable substitutions. Connectivity variation of states ranged from 1.2 percent to 9.1 percent unsubscribed. A few news items suggested also the existence of an abundance of supply except in the remotest and hardest to reach places; several argued that the unused supply played a part in the 2002 telecommunications crisis (CNN, 2002; Business Week European Insider, 2002). Other reports found significant disparities in telephone subscribers by income, race/origin, education, age, gender, household type, location within a region, state of residence, type of housing structure, and home ownership (Bureau of the Census, 1994; FCC, 2004; NTIA, 2000). A portion of this set of characteristics was used in this research to examine population subsets drawn from the *Second Report* (FCC, 2003-a) and other regulatory accounts. The population subsets forming the cases were tribal, rural, minority, low income, and inner city. Tribal was a separate subset because American Indian households as a group have significantly lagged national rates of telephone penetration, because American Indian lands are often rural, and because it could not be assumed that American Indian households typified rural households or that rural typified American Indian households. Many urban American Indian households were established following the 20th century relocations. In this instance, however, tribal peoples on tribal lands rather than scattered urban American Indian households were the

designated subset. Tribal lands were typically rural but had unique issues including lack of access to telephone service and lack of basic infrastructure (FCC, 2003-a, p. 88).

Rural places were described in the 1996 legislation as those with less than 10,000 inhabitants and not part of a larger metropolitan area. Frontier places were separately described as sparsely populated rural areas with six or fewer persons per square mile; in 1995, 383 counties nationwide, not including Alaska boroughs, qualified as frontier areas (Federal Office of Rural Health Policy et. al., 1998). Small places were reported to be among the most underserved. The FCC (2003-a, pp. 52-87) found the least deployment in the smallest towns and most thinly populated areas, identified as critical a distinction between densely clustered rural places and sparsely populated outlying areas, and tentatively concluded that levels of service were dependent on population density. The FCC (2003-a) said the majority of rural residents did not have readily available, lowest-cost access and were particularly vulnerable to untimely or lack of access to advanced capability if left to market forces alone, more particularly so if in frontier areas. This vulnerability was partially attributed to some outlying areas being too far from a central office or in too sparsely populated an area to be served. The FCC said also that wireless might overcome some of these limitations but had certain technical limitations of its own, satellite might be pervasive but had technical limitations including satellite's reliance on a telephone's return path, and outlying areas might not stock the hardware necessary for access and advanced capability. In addition to FCC (2003-a) specifications, the NTIA (2000) described disparities in penetration affecting certain demographic groups, "such as low income,

young, and certain minority households" as more noticeable in rural areas. Low income was a separate subset because it could not be assumed to be common to each subset.

Telephony was not immune to the broad range of socio-economic and political influences. Examples of interdependencies seemed evident in the conduct of the famous Hawthorne studies in a telephone company facility and in the backgrounds of authors like Chester Barnard. The emphasis on structural elements theoretically derived often placed the burden of proof on environment, including culture. As Yeates (1980, pp. 51-52) commented in other contexts, the explanation for differences and recent changes might lie in a mixture of economic and social factors, some unique to specified areas. However, general socio-economic research strategies historically include elements which are largely an accident of birth[2], such as gender and race, but which also have important relations with and are given social meaning by culture. Culture could be a link between elements of nurture (environment) and elements of nature (birth-related). In this study culture per se did not predominate because there first had to be established a consistent base from which such a closer look at place differences in telephone service could be made.

NTIA (2000) figures implied most American households had basic home telephone service[3] as well as readily available neighborhood pay telephones,

2 While it was true that "accident of birth" might be a premise from which ontological assertions related to the origin of the universe could ensue, that was not the direction of this discussion. Comte's 1855 work, Positive Philosophy of Auguste Comte, Part I, translated by Harriet Martineau (2003), might be useful to future discussions in that direction.

3 Basic service was generally a simple working telephone connected to the local exchange carrier. Marketing did not so much represent basic telephone service as it did competition for business customers, long distance customers, and enhanced services customers, enhanced services being add-ons like Caller ID, Call Notes, Special Rings, Anonymous Call Rejection, timing devices, etc.

inexpensive calling cards, and increasingly affordable mobile devices. Were this implication taken at face value and the aggregates not broken down into sub-groups, the indication could be that modern American telecommunications had nearly achieved conventional Universal Service in the early 20th century sense of putting a telephone in every American home. The bottom-line American telecommunications issue could appear to be the ultimate diffusion of innovation, what might also be described as distribution. In 1934, the innovation was the personal telephone; in 1996, the innovation was something termed advanced telecommunications. This contemporary term was given technical definition in many publications but not common-parlance working-man's definition. For instance, in 1934 it could be said a person was first on their block to be getting a home telephone but in 1996 it didn't sound as sensible to say a person was first on their block to be getting an advanced telecommunications. From this angle, the matter of (1) what exactly was being deployed in 1996 and beyond, as well as (2) how, and why, innovations were diffused, became accentuated. However, without enunciation of the specific innovation, this aspect did not readily lend itself to examination. Universal Service features seemed a preliminary step to understanding diffusion of telephone innovations. Concepts of Universal Service reflected the passage of time: in 1934, the idea was, like a chicken in every pot, a telephone in every home; by 1996, the *Telecommunications Act* included a statement that Universal Service was whatever the FCC said it was[4].

4 The specific statement (FCC, 2003-c) was "Universal service is an evolving level of telecommunications services that the Commission shall establish periodically under this section, taking into account advances in telecommunications and information technologies and services" and is found at

Given the ambiguity of the 1996 approach and the colorful history of pricing telephone services, Crandall and Hausman (2003) deemed Universal Service to be only a rate-setting strategy by policy makers and regulators. There were other definitions. The Alliance for Telecommunications Industry Solutions *Telecom Glossary 2000* defined Universal Service as "The concept of making basic local telephone service (and, in some cases, certain other telecommunications and information services) available at an affordable price to all people within a country or specified jurisdictional area." Farrell and Katz (1998) defined Universal Service as the widespread availability of basic and advanced services to consumers in all parts of America. A government official defined it simply as "the idea that all Americans should have access to affordable telephone service" (NTIA, 2005-a). The FCC's *Telecommunications Glossary* (2004-b) defined Universal Service as: "A program that helps ensure that all consumers in the nation have access to quality telecommunications and information services at affordable rates. The program also makes support available to schools and libraries to receive access to telecommunications and Internet services." The various availability wordings implied a supply, or industry, perspective whereas wording variations of affordable access implied a perspective with greater cognizance of consumer interests and of consumer demand. The glossaries made no distinction between Universal Service and Universal Access. The telecommunications industry use

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file s652.enr, Title 1 - Telecommunication Services, Subtitle A - Telecommunications Services, Sec 101 - Establishment of Part II of Title II, Part II - Development of Competitive Markets, Sec 251 Interconnection, Sec 252 Procedures for Negotiation, Arbitration, and Approval of Agreements, Sec 254 Universal Service, a) Procedures to Review Universal Service Requirements, 2) Commission Action, c) Definition.

of access was most often in matters of rate structures, pricing, and funding related to the mechanisms of support for Universal Service. All too often Universal Service seemed tangled in the details of its asserted basic function of assuring all Americans access to affordable telephone service.

1.2 Antecedents

The parallelism of telegraph and railway was instrumental to the continuous development of communications. This evolution of communications worked synergistically with that of transportation in modern urban development, beginning with the telling of a man with a dream of linking the American states. Travel-ways frequently served as design-form for communication ways, with there being a bond of the two phrases such that historical documents reported pioneers saying "opened a communication" (Innis, 1977; Innis and Lower, 1977) where modern roadbuilders might say "opened a thoroughfare" or like others might say "opened a gate." In April 1808, Secretary of the Treasury Albert Gallatin prepared a proposal, in Cain's (1997) telling, to give the country a "tidewater inland navigation" of a series of north-south canals and major east-west links along with a north-south road parallel to the Atlantic coast and a "national road" along the Ohio River. Much of Gallatin's dream of a comprehensive Federal road system connecting all the states culminated in the *Interstate Highway Act* of 1956 (Cain, 1997). In 1818, the editor of the *St. Louis Enquirer*, who subsequently served in the Senate, wrote a series of editorials proposing a similar network of roads and canals to connect the Missouri and Columbia Rivers (Gibson, 2004). Between the 1808 proposal and the 1956 Highway Act, Cain (1997)

said, America embraced the railroad. He described the railroad as the innovation best characterizing the economic transformation of the 19th century despite the wider idea that no single innovation created American economic growth.

In the 19th century, railroads and canals linked distant places; roads did not. The first iron rails were laid in Bath, England, in 1761. More than 60 years later, in the mid-1820s, the first American rail services began in Massachusetts, Maryland, Virginia, and Pennsylvania (Pacific Southwest Railway Museum, 2006). By the 1850s the impetus for the Transcontinental Railroads was well entrenched. The idea of a transcontinental railroad was meant to link the nation as well as increase property values by way of a land boom (Cain, 1997). Railroads were America's first big business (Cain, 1997) and the transcontinental railroads hastened the closing of the western frontier as well as brought economic growth through developments of mining, farming, and ranching along main rail lines and their branches (Columbia Electronic Encyclopedia, 2003). Many of these developments were the seedbeds of modern urban areas. As America became interconnected by means of transport and travel, its means of communications developed. Indicating this parallelism was that the *Pacific Railroad Act* of 1862, by which the Transcontinental Railroad was authorized, chartered both railway *and* telegraph lines between Omaha and the California Territory (Smith, 2003). Telephone development ensued from developments in telegraphs and electromagnetism. Electromagnetic induction theory, formulated by Michael Faraday in mid-19th century, described electricity and allowed Faraday to be credited with its discovery.

Morse demonstrated telegraphic relay in 1837. Until development of telephony, radio and telegraph were allied; with the advent of telephone services, telephony advances furthered development of radio broadcasting. Indicating this sequence was that the first transmission of Bell's voice by telephone was in 1876 and the first transmission of human voice by radio was between 1892 and 1906 (FCC-CGAB, 2002). The ITU (2004) identified the first radio transmissions of human voice as being in 1902, seven years after the first radio-relay system signals transmissions in 1895. In general communications, early radio developments like the work with electromagnetism and electricity accompanied telegraph and telephone developments but radio broadcasting did not develop until after the telephone was developed. Technical achievements were pursued in the telephone and recording industries, became available for broadcasting, and were developed further. Telephone development became "the nerve-end to society" (Brooks, 1975).

1.2.1 Invention

Available about 40 years after the telegraph, the telephone was first referred to as "a speaking telegraph." Alexander Graham Bell was credited with its invention. According to Gorman (2002), when Bell began his early experiments, he was thinking of a multiple telegraph rather than of a telephone. Bell, Elisha Gray, and Thomas A. Edison were each after a device which could send more than four messages simultaneously (Gorman, 2002). Bell lacked the electrical knowledge and expertise of the other multiple (harmonic) telegraph inventors, but had unique expertise: he was a

teacher of the deaf to whom the role of speech in communication was evident[5], he was interested in devices which could help the deaf visualize speech, and his personal interest extended to devices used to visualize sound (Gorman, 2002). By the spring of 1875, Bell had a mental model of but not a prototype of his telephone and had patented parts of it (Gorman, 2002); in 1876, the first patent for the entire telephone was issued to Bell (Webb, 2002). Other inventors, like Faraday and Nikola Tesla, were also important in the development of the telephone through their contributions in electricity and wireless communications (Thinkquest, 2004). Tesla was described as the electronic guru without whom there would not have been modern telephone, radio, auto ignition, alternating current power generation and transmission, and television (Johnston, 2003). Tesla researched high-voltage electricity and wireless communication, and was said to have created an earthquake which shook the ground for several miles around his New York laboratory (Johnston, 2003). Tesla reportedly anticipated worldwide wireless communications, fax machines, radar, and radio-guidance of missiles and aircraft. Tesla (2003) devised a system he termed his World System of wireless transmission, portraying the system as making possible the instantaneous and precise wireless transmission of any kind of signals, messages, or characters to all parts of the world as well as enabling the interconnection of existing telegraph, telephone, and other signal stations without any change in equipment. His description emphasized such miniaturization as there was at that time: "An inexpensive receiver, not bigger than a watch, will enable [a telephone subscriber] to listen anywhere, on land or sea, to a

[5] Both Bell's mother and Bell's wife were deaf.

speech delivered or music played in some other place, however distant." Tesla tried to commercialize his World System in New York in 1900 (Tesla, 2003).

1.2.2 Diffusion

When Tesla began his marketing efforts in 1900, Bell Telephone Company already had nearly 856,000 telephones in its system (Webb, 2002). This equaled an average of more than 37,200 telephones per year from inception of the company in 1877. This early diffusion included first-time developments in 1878 of telephone exchanges, telephone directories, and Federal government connectivity. Telephone numbers were first put into use in 1879, pay telephones in 1880, differentiated day and night rates in 1887, and dial telephones in 1896. In 1924 there were more than 15,000,000 telephones in use, not quite double the 1900 level. By June, 1948, the 1924 level was itself nearly doubled in a 24 year span with installation of the 30 millionth Bell System telephone. Not quite ten years later, in March, 1957, the 50 millionth Bell System telephone was installed. The previous March, Southern Bell, formed in 1926, had installed its 5 millionth telephone, indicating dispersion of telephony services during its 30-year duration at a pace similar to the parent Bell's (Webb, 2002). By 1989, 117 years after the first offerings of retail telephony services, America had 138.1 million subscriber telephone lines, a figure reaching 157.9 million in 1994 (Webb, 2002). Cellular subscriber activations reached the 25 million mark in 1995, a growth of 24 million activations from 1987 (Webb, 2002). Consumer cellular activations were initially low in demand because of their cost.

Baldner (2002), describing telephone milestones, noted that the process of technical development was and is one of trial and error as well as pointed out that dates of technical advances in telephony actually mark the culmination of years of research and experimentation. He said telephones were not always well received. In its early days, voices over the telephone were almost inaudible and long distance rates were too expensive for most people. However, telephone service continued its advancements until becoming so much a part of daily American life that it seemed almost unnecessary to note its importance. Bruce Sterling (2001) said, "…[T]he telephone devoured the telegraph. And now the telephone itself is in the process of being devoured by even more powerful and mobile machines. We know that the telephone must have had an enormous effect on society, because everyone has one. It's the kind of intimate, household technology that is visible only by its absence; everyone simply expects you to have a telephone, and if you lack one it's as if you have no running water. And yet it's very difficult to describe exactly what effect the telephone has had on society because the effects keep re-complicating themselves." Sterling went on to detail his concept of telephony making urban sprawl and skyscraper forms "informationally possible" and utilized a technique he ascribed to H. G. Wells of conceptually expanding the present to "think forward" sprawl and forms.

Other writers also caught this sense of modern telephony ubiquitousness. For instance, Betteridge (1997) conducted three periods of ethnographic research from 1989 to 1991 with the aim of accounting for the role of technology in changing social relationships. The research took place on Whiddy Island in Bantry Bay, County Cork,

Eire, off the coast of southwest Ireland, an island three miles long, one and one-half miles wide, with only 40 remaining inhabitants. The islanders were encouraged in interviews and less formal conversations to remember the start of telephone services and their effects (Betteridge, 1997). The rationale was that people, in the course of their daily lives, rarely spoke of non-television technologies, they used them, and technology was what people did with it (Betteridge, 1997). Alternatively, there were those who insisted the telephone was taken for granted because it could be so long as it did not malfunction (Kahin, 1992-a, 1992-b). Like Tuan (1977) who spoke of untoward events compelling attention, there were those who indicated that it was mostly dysfunction which brought the telephone to the forefront of society's immediate attention.

1.3 Evolving Regulatory Policy and Universal Service

The 1866 Post Roads Act was usually identified as the beginning of regulatory policy (FCC-CGAB, 2002; Sirota, 2002). Ease of horse riding and mail carry was considered essential for adequate communications in the U.S. Then, Congress authorized the Interstate Commerce Commission (ICC) in 1887 to require telegraph companies to interconnect their lines for greater public service and extended ICC provisions to wireless telegraph with passage of the *Mann-Elkins Act* of 1910. More Federal acts were passed, and their resulting regulations and rules demonstrated the links of public policy to the success of diffusion of this innovation. The 1910 Act began government oversight of accounting practices of wire communications carriers. Cain (1997) asserted that commission control spread from a foray into industry regulation in 1887 to an enormous apparatus of regulatory power co-developing

alongside technical advances. He argued that, once begun, regulation of common carriers led to nearly ubiquitous control since competing modes left free could underbid the regulated forms. Created to regulate, the FCC came into existence as a result of radio legislation 58 years after the first telephone patent was issued. In 1910 Congress approved the first radio legislation (FCC-CGAB, 2002), the *Wireless Ship Act* which dealt with marine radio, and in 1912 enacted the *Radio Act*. This was the first domestic law for general control of radio communication, including the then little-known concept of broadcasting. By 1925 the increase in the number of AM radio broadcast stations caused so much interference that a fourth National Radio Conference asked for a limitation to be placed on AM broadcast time and power. In 1926 President Coolidge urged Congress to remedy the chaos in AM broadcasting; the *Dill-White Radio Act* of 1927, signed into law on February 23rd, resulted. The FCC-CGAB (2002) noted the *Radio Act* of 1927 did not give the Federal Radio Commission (FRC) jurisdiction over telephone and telegraph carriers. Jurisdiction was split between the Post Office Department, the ICC, and the Department of State with the FRC having jurisdiction over broadcasting. The potentially overlapping authority of this jurisdictional split created confusion. As a result, the FCC-CGAB (2002) said Roosevelt in 1933 requested an interdepartmental committee for studying electronic communications and that committee recommended "establishment of a new agency that would regulate all interstate and foreign communication by wire and radio, telegraphy, telephone and broadcast." In 1934, Senator Clarence C. Dill of Washington (a sponsor of the 1927 radio legislation) and Representative Sam Rayburn of Texas introduced bills to carry

out this recommendation. That June President Roosevelt signed the *Communications Act* and the FCC began operating on July 11, 1934. Its first project was to decide if broadcasters' policies and programs were in the public interest and to change substandard program and advertising policies if necessary (FCC-CGAB, 2002). This first effort indicated that a public good premise was important in telecommunications regulation at the outset. However, many writers pointed out that there were frequent reversals of policy making by the FCC. Noam (1994) suggested this might indicate a process capable of adapting to changing circumstances, other writers suggested it indicated an agency captured by the client politics of the industry it was meant to regulate (Messere, 2002, citing Breyer and Stewart, 1979). Definitions and standards of the public interest, convenience, and necessity standard have varied according to the composition of the FCC and the mandates given by Congress (Messere, 2002).

1.3.1 Universal Service Evolution

Universal Service in telecommunications came about through commercialization of Bell's invention. Bell Telephone Company was the original industrialization. Bell's father-in-law, Gardiner Greene Hubbard, founded the corporation and nurtured it for Bell (Brooks, 1975). The company issued its first stock in 1877 (Webb, 2002). In 1885, the certificate of incorporation for the American Telephone and Telegraph Company (AT&T) was filed in New York City. The certificate stated a business purpose of establishing telephone communications to cities on the American continent and elsewhere around the world by wire, cable, and other appropriate means (Webb, 2002). AT&T became the recognized corporate name of

Bell Telephone Company in 1899 (Brooks, 1975, Baldner, 2002, Webb, 2002). AT&T (2002) said of its history, "Incorporated in 1885, parent of former Bell System, AT&T's primary mission was to provide universal telephone service to virtually everyone in the United States. It also provided international long distance service." For 106 years, from 1877 to 1983, AT&T was essentially the sole provider of telephone service as well as was chiefly responsible for changes and developments in telephone service and equipment (AT&T, 2002; FCC-CGAB, 2002). For about 75 of those years AT&T operated as a government-sanctioned monopoly. Bell's telephone company first had a monopoly from the time commercial offering of telephone service began in 1877 until expiration of key patents in 1893 and 1894 (Brooks, 1975; Baldner, 2002; Webb, 2002). The expirations were eight and nine years after AT&T's incorporation but five and six years before AT&T became the official corporate name. Upon those expirations, Bell Telephone (also known as American Bell) had to secure the patents by which it controlled delivery of telephone service. Independent telephone companies emerged to fill gaps left by the telephone titan and, in larger markets, built directly competitive, rival networks (Brooks, 1975). In the early years Bell fought the much larger Western Union Telegraph and won; at the turn of the 19th century it competed with smaller rivals and won over most of them (Brooks, 1975, Baldner, 2002). In hindsight, these battles may have been pivotal.

In 1908, 23 years after AT&T's incorporation, the Bell System identity was introduced in national advertising along with the theme "One Policy, One System. Universal Service." Universal Service was the idea of Theodore Vail, leader of AT&T,

and not the vision of Bell (Sirota, 2002). The Universal Service theme originated to express AT&T's policy of eliminating dual telephone services and resulted in the 1913 Kingsbury Commitment, a precursor to later antitrust settlements (Webb, 2002). Dual telephone services resulted from the competition which followed the patent expirations. There was incompatibility between the various Bell, AT&T, and competitor systems which forced consumers to have multi-company providers, dual services, in order to have telephone service (Webb, 2002). AT&T had been pursuing acquisitions so as to eliminate rivals and be the sole provider. The Kingsbury Commitment included halting AT&T purchases of independent telephone companies unless approved by the ICC (Webb, 2002). AT&T's policy of buying out independent providers together with the state commissions' practice of prohibiting competitive entry eventually led back to the monopoly provision of local telephone service in existence prior to the patent expirations of 1894 (Supreme Court, *Verizon v. FCC*, 2003, citing Garnet, 1985; Brooks, 1975). The strongest advocate of state regulation might have been AT&T itself for it argued that telephone service was naturally monopolistic and that competition was resulting in wasteful duplication of facilities (Supreme Court, *Verizon v. FCC*, 2003, citing Lipartito, 1989). AT&T invited the bestowal of monopoly status upon itself: in exchange for an easy to use, affordable for every person, and ubiquitous telephone, all Vail wanted was a government mandated monopoly (Sirota, 2002). By 1920, AT&T had an overwhelming majority of telephony exchanges and submitted to state regulation (Webb, 2002; FCC-CGAB, 2002). Anecdotally, Vail died that same year (Webb, 2002). Bell passed on two years later and only Watson lived to see passage of the 1934

Act, dying in December, 1934, 21 years to the day after issuance of the Kingsbury Commitment (Webb, 2002). By mid-20th century, about a quarter century after submitting to regulation, AT&T's Bell System possessed monopoly power in all nationwide telephone markets, supplying local exchange and long distance services as well as equipment (Supreme Court, *Verizon v. FCC*, 2003, citing Vieter and Garnet).

Accordingly, the FCC-CGAB (2002) stressed the importance of two major developments in American telecommunications policy: (1) break-up, or divestiture, of AT&T, and (2) FCC directed liberalization of the American telecommunications industry. With the 1983 break-up, telephone service and consumer ownership of telephone instruments became separate concepts because it became possible for consumers to own a telephone instrument but not have telephone service. Telephone instruments were not typically customer-owned prior to 1983. Interestingly, regulatory approval was recently granted the acquisition of AT&T by one of the Bell Operating Companies (BOCs) spun off in the break-up. The pattern of mergers and acquisitions since 1983 might be indicative of interdependencies and economic integration or re-integration rather than of conventional economies of scale (Kincaid, 2001; Messere, 2002). Three computer inquiries held by the FCC in 1966, 1976, and 1985 could be considered integral to the liberalization process (Cannon, 2005). Messere (2002) said a marketplace rationale began under FCC Chairman Charles D. Ferris (1977-1981) and continued under his successor, Chairman Mark Fowler (1981-1987). Since 1920, when AT&T regained Bell's original monopoly status, telephone service has grown in service delivery as well as has become entrenched as an essential modern convenience rather

than as a luxury item had mostly by elites. Using decennial census population counts, the FCC estimated American telephone development on the basis of the number and percent of households having telephone service. The FCC-CCB (1997) said this estimate of penetration was the fundamental measure of Universal Service.

Table 1.1 Historical Telephone Penetration Estimates

	Households with Telephones	Access Lines per 100 Population	Households without Telephones
1920	35%	9.6	65%
1930	40.9%	12.5	59.1%
1940	36.9%	12.7	63.1%
1950	61.8%	21.7	38.2%
1960	78.3%	27.6	21.7%
1970	90.5%	35	9.5%
1980	92.9%	46.2	7.1%
1990	94.8%	54.8	5.2%

Note: Access line data 1920-1970 were estimated by multiplying the number of telephones by the proportion of main plus equivalent main stations to total telephones for the Bell System. For 1980 and 1990, access lines reported by USTA were used; line growth averaged about 3 percent per year (FCC-CCB, 2004, p. 8-1).

Source: Table 17.3, p.17-5, FCC-CCB, 2004; Without Telephone estimates by author.

From a 5.9 percent rate of change in 1920 to 1930, through the Great Depression, to the post-World War II and post AT&T break-up years, and into more recent times, telephone service diffusion as depicted in the table above had grown by 1990 to include nearly 95 percent of American households in the aggregate. However, the other-side of that 95 percent was 5.2 percent without telephones, or 4,817,457 households (Bureau of Census, 1994). By 2000, the aggregate penetration rate was 94.1 percent to 97.6 percent (ITU, 2003; Bureau of Census, 2004-e and -f). Assuming a 2.6 average household size and multiplying by the number of unsubscribed households

provided an indicator of how many individuals might be affected by not having telephone service, for instance, in 2000, as many as 16,180,632 of a total national population of 281,421,906 could have been affected, an estimate nearly equal to recent total Texas population estimates (Bureau of Census, 2004-b). Universal Service as a policy designed to supply every American citizen with affordable quality telephone service can be presumed to have had a key role in the development of telephone communications. By the 1996 legislation, the Universal Service concept in telephony applications had become complicated and involved substantial matters of subsidization. Policy concepts like Universal Service moved the bounds of telecommunications policy discourse from strictly one of regulation vs. deregulation into a broader realm of policy effects on convergence and new technologies. The term convergence had several uses, some of which implied forms of industry integration or re-integration and many of which implied a transition or transformation into digital modes of transmission from analog.

1.3.2 Universal Service Regulation

The 1996 Section 254 (c) said "universal service is an evolving level of telecommunications services" (U.S. Congress, 1996; FCC, 2003-c). This phrase conveyed that what counted as universal from implementation of the 1996 Act forward was up to the FCC. This was interesting because the 1934 Act established the characteristic concept of Universal Service and stated in its purpose "…to make available, so far as possible, to all the people of the United States…wire and radio communication service with adequate facilities at reasonable charges…" (U.S.

Congress, 1934). Further, the specific wording of the 1996 legislation said, after "evolving level of telecommunications services," "that the Commission shall establish periodically under this section, taking into account advances in telecommunications and information technologies and services" (U.S. Congress, 1996; FCC, 2003-c). Thus, services not widely deployed or in accord with statutory guidelines at one point in time might at another meet the specified criteria and thereby compel a re-defining of Universal Service. In this sense, Universal Service could never again be a static, stationary target. Section 254 of the 1996 Act identified the principles to be used in defining Universal Service. These principles were based on quality and rates, access to advanced services, access in rural and high cost areas, equitable and nondiscriminatory contributions, specific and predictable support mechanisms, access to advanced telecommunications services for schools, health care, and libraries, and such other principles as the Joint Board and Commission determined necessary and appropriate to protect the public interest, convenience, and necessity, and which were consistent with the legislation. This policy implied a concern with access and the logistics of desired accessibilities. The Joint Board in this instance meant a specifically convened group of Federal and state experts (U.S. Congress, 1996; FCC, 2003-c). In redefining Universal Service, the embedded implicit subsidies existing in the Federal system had to be made explicit and nothing which served to create new implicit subsidies could be supported; the 1996 Act outlawed implicit subsidies (U.S. Congress, 1996; FCC, 2003-c).

The Universal Service Final Rule was arrived at through a 15 month process of public proceedings (FCC, 1997). The Final Rule (FCC, 1997) identified the broad

objectives of Universal Service as promoting the availability of quality services at just, reasonable, and affordable rates; increasing access to advanced telecommunications services throughout the nation; and advancing the availability for such services to all consumers, including those in low income, rural, insular, and high cost areas at rates reasonably comparable to those charged in urban areas. In addition to the principles stated in the legislation, the Final Rule included a principle of competitive neutrality (FCC, 1997). This principle was defined to mean that all providers of interstate telecommunications services should make an equitable and nondiscriminatory contribution to the preservation and advancement of Universal Service. The Joint Board held that the principle of competitive neutrality encompassed the principle of technological neutrality and was applicable regardless of size, status, or geographic location of Universal Service recipients and contributors. The Final Rule (FCC, 1997) stated this principle as meaning that Universal Support mechanisms and rules neither unfairly advantage nor disadvantage one provider over another, and neither unfairly favor nor disfavor one technology over another. The contributions were payments made by companies toward the cost of Universal Service. Because companies generally pass this payment burden on to consumers to the extent allowed, these contributions had consumer impact.

Core services to be supported by Universal Service mechanisms were designated by the Final Rule (FCC, 1997). There were eight: single-party service[6],

6 As published in the Final Rule, single-party service meant only one customer was to be served by each subscriber loop or access line; the wireless equivalent being a dedicated message path for the

voice grade access to the public switched network[7], DTMF signaling or its functional digital equivalent[8] (also known as touch-tone dialing), access to emergency services[9], access to operator services[10], access to interexchange service[11], access to directory assistance[12], and toll limitation services for qualified low-income consumers[13] (FCC, 1997). For purposes of Section 254 of the 1996 Act, these core Universal Services were defined functionally rather than by tariff[14]. The functional approach was said in the rule (1) to promote competitive neutrality by being technology neutral and (2) to provide greater flexibility than a services-only base would (FCC, 1997). The rule also specified that to receive Universal Service support, carriers must be a common carrier and must provide each of the eight services described. Transition periods were provided the carriers (FCC, 1997).

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length of a user's particular transmission rather than a single channel dedicated to a particular user at all times.

7 As published in the Final Rule, voice grade access included the ability to place and to receive calls, including the appropriate signals to the network that calls are going or coming.

8 As published in the Final Rule, Dual Tone Multifrequency signaling systems provided network benefits like accelerated call set-up but were not subscribed to by consumers.

9 As published in the Final Rule, access to emergency services included network components necessary for access to 911 service, to which about 90 percent of lines had access capability, and to E911 Automatic Numbering Information call back and Automatic Location Information find services, but not of underlying information systems components of the 911 and E911 services.

10 As published in the Final Rule, these services could be live or automated.

11 As published in the Final Rule, access to interexchange meant use of the loop and that portion of the switch paid for by the end user, or the functional equivalent of these network elements in wireless, but not the interexchange or toll service itself and not the equal access (1+ dialing) to the service. This latter was for reasons of the regulatory conflict with respect to Commercial Mobile Radio Services (CMRS) which would result.

12 As published in the Final Rule, access in this instance meant the ability to place a call to directory assistance and did not include publications of telephone directories.

13 Named in the Final Rule in the Affordability section rather than in the Designated Services section, these services were the Lifeline and the Link Up programs.

14 A tariff was defined in the FCC's Telecommunications Glossary as the documents filed by a carrier describing their services and the payments to be charged for such services.

Voice grade access was identified by the Final Rule as the appropriate goal of Universal Service (FCC, 1997). The rule stated that a broader focus could increase the cost of Universal Service and thereby increase the basic cost of telecommunications services for all consumers. The rule further stated that merely ensuring access to services was not sufficient. Usage of the network, not simple access, was specified as critical and encompassed the ability to place calls at affordable rates. In several sections the Final Rule addressed expansion of eligible services (FCC, 1997). For instance, it devoted Section 27 to a discussion of the importance to Universal Service of the distinction between telephony and I-Net access. It described I-Net access as including (1) a network transmission component which is the connection over (2) a Local Exchange Carrier (LEC) network from (3) a telephone subscriber's I-Net Service Provider (ISP). A telephone, or telephone service subscription, was deemed essential to consumer access to the I-Net and essential to usage in the sense of maintaining access. The telephone, or telephone service to which subscribed, was not deemed essential for utilizing the underlying information service beyond connectivity. I-Net access included the underlying information service component which was not a telecommunications service. The rule stated that voice grade access had not been displaced by higher quality I-Net access by a substantial majority of residential consumers (FCC, 1997). The voice grade access goal was excepted by a designation of high speed data transmission with respect to eligible schools, libraries, and health care providers (FCC, 1997). Sub-section h of the 1996 Act's Section 254 had broader authority and asserted the underlying information service was essential to public education and health. In

education and health instances, therefore, the policy goal could shift from voice grade access to high speed data transmission (FCC, 1997).

1.3.2.1 Subsidization

In accord with orthodox, or NeoClassical, economic theory, the primary problem with subsidies, which had long been used for support, was their undermining of competitive markets by creating artificial demand, by discouraging competition, and by creating price anomalies (IIA 1994, Campbell 2000). Subsidies in a newly shaping market affected the price paid for entry and the price paid to compete (Campbell, 2000). The 1996 Act required the FCC and state regulators to jointly put in place explicit Universal Service policies which provided predictable support as well as which reformed existing Universal Service policies (U.S. Congress, 1996; FCC, 2003-c). The 1996 Act aimed to make the implicit subsidies explicit so as to equalize taxing and subsidizing in order to prevent distortion of competition. The FCC (2002, 2003-b) said that Universal Service policies themselves should not inadvertently create barriers to service provision. Hence, albeit deregulating, the FCC could be said to be reconfiguring regulatory oversight rather than dismantling it. According to Farrell and Katz (1998), two tools were used to subsidize telecommunications historically: an accountable amount of "fairly" explicit tax and subsidy and an unknown but "surely very large amount" of not very explicit internal cross-subsidy. Internal cross-subsidies were used by carriers offering services to some consumers which also must be offered to other consumers who might be in higher-cost or lower-demand areas which were less attractive to serve. Farrell and Katz (1998) said that policies designed to promote

competition, investment, and universal deployment might conflict with each other because there could be important but unanticipated or unintended interactions among the policies. They said these conflicts were not inevitable consequences of conflicts between the objectives but were inescapable conflicts between specific policies being implemented in pursuit of objectives. New and existing policies collectively determine success in achieving objectives, according to Farrell and Katz (1998), and this determination could have broad effect. Just as major interface breakdowns could be attributed to unexpected behaviors, so, too, failings of regulation-led market forces could be attributed to irrationality in NeoClassical Theory (Office of Naval Research, 2005).

1.3.2.2 Universal Access Reform

Generally speaking, Access Reform most often referred to funding and pricing at the local exchange carrier (LEC) level. LECs pay access charges to interexchange carriers. The argument was that the economic cost of providing access, particularly as measured by average revenue per minute, was less than the access charges because the incumbent LECs (ILECs) still had a monopoly in the exchange access market and might be impervious to market forces where local exchange and access charges were concerned (U.S. Congress, McGovern Statement and Testimony, 1997). The IIA (1994) specified protection of the public interest by a government as being about service availability, performance reliability and quality, maintenance of reasonable rates, and the extent and appropriateness of regulation. The broad objectives of access reform were said to be (1) making explicit implicit subsidies, (2) reducing the cost of

the mechanisms of support for Universal Service, (3) creating incentives to ensure prudent use of supported services, (4) targeting discounts to minimize the risk of a widened digital gap, and (5) maintenance of competitive neutrality (FCC, 1997; FCC-CCB, 1997). The FCC was to encourage deployment on a reasonable and timely basis to all Americans by utilizing price cap regulation, regulatory forbearance, measures which promoted competition in local markets, or other regulating methods which removed barriers to infrastructure investment (U.S. Congress, 1996; FCC, 2003-c). The general literature did not explicate distinctions between consumer, industry, and regulatory views of best interests very well. Often, firm and household interests were garbled. Some of this disorder might have resulted from over-reliance on industry and regulatory perspectives. Investment was an evident looming concern and there was ambiguity in the concepts of efficiency and market forces (Bromley, 1995; Selwyn, 1995; Crandall and Ellig, 1996; Kaneshige, 1996; Economides, 2001; Farrell and Katz, 1998; Ellig, 2001).

1.4 Legislation

The grounding of this research was the *Telecommunications Act* of 1996 (Pub. LA. No. 104-104, 110 Stat. 56) which rewrote the *Communications Act* of 1934 (47. U.S.C. 151 et seq.). Both Acts were of the NeoClassical paradigm but differed in ideological strategy. The 1996 Act reflected NeoLiberal ideology; the 1934 Act reflected the New Deal era and Keynesian ideology. Amendments in the years after passage of the earlier Act upgraded it technologically but not functionally.

1.4.1 Telecommunications Act of 1996

The *Telecommunications Act* of 1996 was signed into law by President Bill Clinton on February 8th. The Act had been passed the prior week by wide margins on both sides of Congress. Wirth's 1982 *HR 5158* and Hollings *1994 Communications Act* proposals were examples of the efforts which led to passage of the 1996 Act (Sterling, 2000, p. 78). Farrell and Katz (1998) said the 1996 Act had three overarching objectives in areas of two-way voice, data, and video services. These objectives, related to the Act's purpose, were said to be (1) promote competition, (2) ensure timely deployment of advanced services and the underlying infrastructure necessary to support deployment, and (3) ensure Universal Service. The analysis by Farrell and Katz (1998) implied the objectives had a supply orientation. Sections of the Act which were particularly germane included Sections 257, 254, 251, 252, and 271-276; Universal Service was the topic of Section 254 (U.S. Congress, 1996; FCC, 2003-c). Universal Service was given a broad definition which could change with time but was to always consider the extent to which services were essential, had been subscribed to by a substantial majority of residential consumers through the operation of market choices, were being deployed in public networks, and were consistent with public interest, convenience, and necessity. This direction acknowledged the role of consumers in the configuration of telecommunications supply and demand. Review procedures for Universal Service requirements were set forth and the section specifically stated that a telecommunications carrier could not use services which were not competitive to subsidize services which were subject to competition. A requirement was made for the

eventual phasing out of all Universal Service subsidies. In Section 274, Electronic Publishing by Bell Operating Companies (BOCs), basic telephone service and basic telephone service information were defined.

1.4.1.1 Concepts within the Act

Hundt[15] (U.S. Congress, S.Hrg. 107-275, 2001) described the 1996 law as the first Act passed by any significantly large country in the world to totally reject established precedent and craft a new dominant theme of competition and deregulation. He identified the precedent as regulated monopoly, "at best carefully controlled oligopoly," in every dimension of the information sector. Hundt (U.S. Congress, S.Hrg. 107-275, 2001) asserted that the 1996 Act repealed the entire idea of the precedent by making promotion of competition, investment, and innovation the law of the land. Farrell and Katz (1998) said that the broadest policy change wrought by the 1996 Act might be the fundamental shift in regulatory objective from protecting monopoly to promoting competition. Economides (2001) argued the Act envisioned a network of interconnected networks comprised of compatible components providing both competing and complementary services. Economides (2001) said this reorganization of the telecommunications network as a network of interconnected networks[16] imposed conditions meant to ensure that de facto monopoly power could not be exported to vertically-related, meaning complementary, markets. Among these conditions, Hundt

15 Hundt was an architect of the 1996 Act as well as an FCC senior executive.

16 Advances in technology reflected a convergence of all forms of electronic communications into common transmission base forms, or network systems, and the emergence of the world wide web (www) as a "ubiquitous network 'living' on top of the telephone network" encouraged movements toward convergence (Economides, 2001).

(U.S. Congress, S.Hrg. 107-275, 2001) contended, were requirements that the FCC foster development of competition for all telecommunications services and do so in partnership with state commissions. To foster competition between monopolistic carriers providing local telephone service and companies seeking to enter local markets, the Act restructured the old telecommunications regime of state sanctioned monopolies (U.S. Congress, 1996; FCC, 2003-c). The old regime came about because states typically granted an exclusive franchise in each local service area to a Local Exchange Carrier (LEC). This made the LEC the owner of, among other things, the local loops (wires connecting telephones to switches), the switches (equipment directing calls to their destinations), and the transport trunks (wires carrying calls between switches) which altogether constituted a local exchange network (Dash, 2003). According to Economides (2001), the 1996 Act redirected the markets through the use of both structural and behavioral instruments. Noam (1994, 2002) argued that new principles became essential with deregulatory moves away from "the retail approach of detailed legislation" towards "the wholesale approach of policy principles." He said this was because a principled superstructure was necessary as a framework for the technical infrastructure and because "merely invoking" competition would not make the industry competitive. He argued that, even relationally, the "mechanism of invisible-hand guidance" must connect to a body of law because (1) the more complex and advanced any network system became the less it could be centrally guided and (2) diversity could not assure social or operational optimality with pursuit of different strategies by different participants and with divergence of private and public objectives. Noam

(1994) argued that a network-of-networks concept was a primary public policy responsibility.

1.4.1.2 Impediments to Implementation of the Act

Opposition to the 1996 Act tied the Act up in litigation soon after its passage and for nearly all its duration thus far. Universal Service, however, went to Final Rule in 1997. There were also legislative impediments to implementation, such as H.R. 1542, sponsored by Bill Tauzin (R-LA) and John Dingell (D-MI). H.R. 1542, commonly referred to as the *Tauzin-Dingell bill* or the *Internet Freedom and Broadband Deployment bill*, passed out of the House in February, 2002 (Fendelman, 2002-a, 2002-b). It called for an end to FCC policies inaugurated by the 1996 Act while offering the enticement of an increased fining provision as augmentation of FCC enforcement strength (Fendelman, 2002-a, 2002-b; Kushnick, 2002; Wagner, 2002). The Supreme Court (*AT&T Corp et al. v. Iowa Utilities Bd. et al.*, 2003), although not in full unanimity, said the Act was in many ways a model of ambiguity, even of self-contradiction, but not of clarity. The Court said that, while ambiguity was unfortunate for legislation affecting an economic sector worth tens of billions of dollars, Congress knew the ambiguities it chose to produce in a statute would be resolved by the implementing agency (Supreme Court, *AT&T Corp et al. v. Iowa Utilities Bd. et al.*, 2003, citing *Chevron v. NRDC 467 U.S.*, at 842-843). This was a reference to the Chevron Doctrine which said that agencies are better equipped to make difficult policy choices than are the courts, provided the agencies are reasonable, responsible, and prudent (Cannon, 2002).

1.4.2 Communications Act of 1934

The *Communications Act* of 1934 was part of President Franklin D. Roosevelt's New Deal. It was meant to fortify the *Radio Act* of 1927 (Sterne, 2002), was rewritten by the 1996 Act, and was included here to contrast Universal Service as originally enacted and as rewritten. The 1934 Act set up the regulatory structure which prevailed for more than 60 years and created the FCC as a permanent regulatory body. The power given the FCC as successor to the FRC encompassed regulation and control of telephone, radio, and television communications on the premise that satisfactory service and the prevention of chaos necessitated regulatory control (Laks and Finkelstein, 2005). The language of the Act and the flexibility built into the Act's general provisions gave the FCC oversight of a wide variety of technologies and services (Messere, 2002). The regulatory agency mandate set forth by the 1934 Act specified "instrumentalities, facilities, apparatus, and services" (Supreme Court, *AT&T Corp* et al. *v. Iowa Utilities Bd. et al.*, 2003, citing 282 U.S. 133 1931). This came to mean that customer premises equipment (CPE) offered by a common carrier was also regulated predicated on the view that the "all instrumentalities" provision of Section 3 of the 1934 Act made such devices part of common carrier communications service (Supreme Court, *AT&T Corp* et al. *v. Iowa Utilities Bd. et al.*, 2003, citing 282 U.S. 133 1931). The all instrumentalities language in the 1934 Act originated in the *Interstate Commerce Act* (ICA) of 1887, specifically the so-called Hepburn Amendments[17]

[17] Because the *Elkins Act* of 1903, which had amended the original ICA, was being circumvented in discriminatory ways, Congress drew the Hepburn Amendments from the *Hepburn Act* and adapted them to the ICA in hopes of eliminating secret rebates of all kinds (Cannon, 2002). The

(Cannon, 2002). The Act brought common carriers, those prohibited from matters of content who provided facilities for transmission but did not originate messages, and broadcasters, those responsible for content transmitted, together under one regulatory umbrella (Messere, 2002) as well as concentrated on behavioral regulation by which common carriers were to be controlled by rate regulation and broadcasters by licensing. Of regulatory design and intent, the Act was formulated after existing technologies were developed, after the market was operative, and after infrastructure was in place (Robinson, 2002).

Conceptually, (1) wire and radio communication and transmissions, (2) the availability of services, (3) the reasonableness of the charges of services, (4) the adequacy of the facilities of services, and (5) the quality (rapidity, efficiency, geographic coverages) of interstate and foreign communication services were meant to be regulated by the Act (U.S. Congress, 1934). Other than its expression of "…to make available, so far as possible, to all the people of the United States…," Universal Service in the amended 1934 Act was mostly like that of the 1996 Act (U.S. Congress, 1934, Sec. 1., 47 U.S.C. 151, Purposes of Act, Creation of Federal Communications Commission). Codification at Title 47, Chapter 5, Subchapter II, Part I, subsections 201 and 202, specified that it was (1) the duty of every common carrier to provide service which was just, reasonable, and non-discriminatory in all charges, practices,

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Hepburn Act broadened the meaning of the terms railroad and transportation to include all instrumentalities and the means of accommodation necessary in transit (Cannon, 2002). The all instrumentalities provision as well as various other provisions gave the Interstate Commerce Commission (ICC) authority over rates, charges, and carrier practices and subsequently became the foundation for comparable provisions in the *Communications Act* of 1934 (Cannon, 2002).

classifications, and regulations as well as stated that it was (2) unlawful for any common carrier to make unjust or unreasonable discrimination, directly or indirectly, (a) by any means or device, in facilities and services and (b) in charges, practices, classifications, and regulations or to (c) give undue or unreasonable advantage or disadvantage in any way (U.S. Code, 2005). As in the 1996 Act, the final section described establishment of the Telecommunications Development Fund which had as purpose, in part, support of Universal Service and promotion of delivery of telecommunications services to underserved urban and rural areas (U.S. Congress, 1934).

1.4.2.1 Concepts within the Act

The *Communications Act* of 1934 was identified as the first statute to address interstate telephone regulation independently (Supreme Court, *Verizon v. FCC*, 2003). Noam (1994) noted that some of the original 1934 Act's provisions were older than its New Deal-era enactment date, going back to 1910 *Mann-Elkins Act* provisions which applied principles of railroad regulation to telephony. The *Mann-Elkins Act* of 1910 was the earliest Federal statute prescribing rates for interstate and foreign telephone and telegraph carriers as part of revisions to railroad rates set by the ICC (Supreme Court, *Verizon v. FCC*, 2003, citing Vietor, 1994). Federal railroad regulation was incidental to general interstate carrier regulation under the *Interstate Commerce Act* of 1887. With the spread of regulation, regulators sought to offset monopoly power and to ensure affordable public access to goods and services (Supreme Court, *Verizon v. FCC*, 2003, citing Phillips, 1984; *Smyth v. Ames 169 US 466*, 470-476, 1898; and *Munn v. Illinois*

94 US 113, 134, 1877). The mandate in enabling Acts was that rates be "just and reasonable," and not discriminatory (Supreme Court, *Verizon v. FCC*, 2003, citing *Transportation Act* of 1920 41 Stat 474 *49 USC 1 (5)*; Barnes, Note 289, 1934). All rates were subject to regulation this way: (1) retail rates charged directly to the public and (2) wholesale rates charged among businesses involved in providing the goods or services offered by the retailer (Supreme Court, *Verizon v. FCC*, 2003).

1.4.3 Contrasting the Two Acts

The 1996 Act's introduction emphasized competition and deregulation in order to accomplish particular objectives (U.S. Congress, 1996; FCC, 2003-c). Those goals were lower prices, higher quality services, and rapid deployment. The 1934 Act's introduction stressed regulation (U.S. Congress, 1934). Inherent in the introductions was the intent of the 1996 Act with its regulation-reducing component to bear upon the 1934 Act with its regulation-making component. The purpose of the 1934 Act was not substantially altered by the 1996 Act, remaining essentially as last stated with insertion of the non-discrimination principle[18] (U.S. Congress, 1934). For telephony sections of the 1934 Act the measure of success was threefold: the extent to which every American

18 The non-discrimination clause was that phrase which began with "without discrimination on the basis of…" and ended with "…or sex…": "For the purpose of regulating interstate and foreign commerce in communication by wire and radio so as to make available, so far as possible, to all the people of the United States, without discrimination on the basis of race, color, religion, national origin, or sex, a rapid, efficient, nationwide and world-wide wire and radio communication service with adequate facilities at reasonable charges, for the purpose of the national defense, for the purpose of promoting safety of life and property through the use of wire and radio communication, and for the purpose of securing a more effective execution of this policy by centralizing authority heretofore granted by law to several agencies and by granting additional authority with respect to interstate and foreign commerce in wire and radio communication, there is hereby created a commission to be known as the 'Federal Communications Commission,' which shall be constituted as hereinafter provided, and which shall execute and enforce the provisions of this Act" (U.S. Congress, 1934 and 1996; FCC, 2003-c).

citizen (1) had telephone service, (2) had affordable telephone service, and (3) had quality telephone service (U.S. Congress, 1934). This measure was the quintessential concept of Universal Service. Crandall and Hausman's (2003) comment that the "measure of success for the [1996] Act must be the degree to which local telecommunications markets are opened to competition" was drawn from the 1996 Act and reflected the evident legislative intent to push all telecommunications markets towards competition (Economides, 2001). The 1996 purpose provided twice as many measures of success as the earlier Act: the extent to which (1) markets were opened to competition, (2) regulation was reduced, (3) lower prices for American telecommunications consumers were secured, (4) higher quality services for American telecommunications consumers were secured, (5) deployment of new telecommunications technologies was encouraged, and (6) deployment of new telecommunications technologies was rapid (U.S. Congress, 1996; FCC, 2003-c). The "…make available, so far as possible, to all the people of the United States…" of the 1934 Act's purpose was not discernibly continued in the 1996 Act's purpose (U.S. Congress, 1934 and 1996; FCC, 2003-c). While this difference might arguably reflect the basic supply and demand configuration of telecommunications, it also allowed the addition of a seventh measure of success, that being the extent to which underserved populations gained access to service.

These measures also shaped a simple comparison of the purpose of each Act. Regulating was the first matter noted in the purpose of the 1934 Act; reducing regulation was the second matter noted in the purpose of the 1996 Act (U.S. Congress,

1934 and 1996; FCC, 2003-c). This change from regulating to reducing regulation, like the lack of specific statement about citizen access, was very visible. Reasonable charges (in 1934) and affordability (in 1996) were specified in the Acts. In 1934 rapid, efficient service with adequate facilities was stated while in 1996 quality was stated (U.S. Congress, 1934 and 1996; FCC, 2003-c). In 1934 centralizing authority was important; in 1996 promoting competition was important (U.S. Congress, 1934 and 1996; FCC, 2003-c). In 1934 affordability and quality imperatives anchored the Universal Service mandate of "make available…to all" to consumer issues; in the 1996 purpose, securing lower consumer prices and securing higher quality consumer services had no similar such mandate to anchor (U.S. Congress, 1934 and 1996; FCC, 2003-c). The legislative focus appeared to shift over 62 years from one of control and affordable service to one of supervision and affordable competition. There was also a shift from a stance of supplying a good service to an orientation which equated competition, low prices, higher quality, and technological advances. One of the largest consequences of the 1934 Act was that it allowed complexities of its support mechanisms to overwhelm its service provision policy concept (Wheatley, Selwyn, and Kravtin, 2002; Selwyn, 1995; Economides, 2001; Farrell and Katz, 1998; Crandall and Hausman, 2003). Similarly, one of the largest problems with the 1996 Act was that its consequences were still mostly unforeseeable. Details of what use it might ultimately be put to could not be ascertained yet, for the sake of deregulation it purported to dismantle legislative standards of fairness, nondiscrimination, and just rate-setting which had been integral to telephone service since early regulatory policy.

1.5 Theoretical Underpinnings

The economic public policies instigated in the 1934 and 1996 Acts were collected from different theoretical strategies, Keynesian and NeoLiberal, which were both NeoClassical in orientation. Palley (2004, pp. 3-10) described Keynesian dominance in economic policy during the 25 years after World War II and asserted that NeoLiberal dominance began surfacing around 1980. He said that between 1970 and 1980, as dominance shifted, Keynesians in general were weakened by the rift of internal discord. Within recent NeoLiberal economic policy dominance, a U.S. model associated with industrialized countries and a Washington Consensus associated with international policy have held sway (Palley, 2004, pp. 10-11). In common, the model and the consensus have deregulation, privatization, free trade, and open markets. The U.S. model, Palley (2004) said, inclusive of the Washington Consensus, is the source of NeoLiberal policy. According to Palley (2004, p. 1), NeoLiberals are liberal in the sense of laissez-faire economics, free markets, and limited trade restrictions. NeoLiberal policy is similar to that of the 1980s Supply-Siders (Chamberlin, 1958; Vickrey, 1971; Samuelson and Nordhaus, 1989; Riddell, et al., 1991; Walker-Daniels, 1993; Feiner, 1994).

Keynesian and NeoLiberal schools of thought encapsulated many of society's differences in caring for what was sometimes termed "the least among us," the first approach encouraging government-aided social services, housing programs, public provision of goods and services, and full employment, and the other eschewing such programs. The philosophical base of these differences might run to interpretations of

Smith's (1776) original point about the commonwealth objective he thought he saw in the channeling of economic activity. Smith argued the maximum benefit for the most people occurred if business people were allowed to seek profitable opportunities as they saw fit, any interference having negative ramifications for the country as a whole (Riddell, et. al., 1991). In *The Wealth of Nations* (1776), Smith recognized that markets could be subverted through monopoly power, particularly by the nation-state bestowing exclusive privileges as has been done in the telecommunications and utility fields. Keynesians, particularly those of the New Deal era, held disparaging views toward free markets, tolerated monopolies, and supported the establishment of institutions of social protection. NeoLiberals held disparaging views towards institutions of social protection and supported open, competitive markets.

NeoClassical has an origin in common with Political Economy theory, that being Adam Smith's roots in Hume, Cantillon, Locke, St. Augustine, Aristotle, and Plato (Wolff and Resnick, 1988). When capitalism emerged from feudalism during the 17th and 18th centuries, Smith was the first major writer to formulate new thinking about consumption, production, and distribution of goods and services (Wolff and Resnick, 1988). Smith, and then Ricardo, made their observations of the new economy from middle class British comfort. Karl Marx, coming from the German Hegelian perspective, began his written legacy to following generations by adhering to the original thrust of Smith and Ricardo but then deviating on the point of commodity values. In the end, Marx made his observations from the discomfort of exile, having become a poverty-stricken social outcast (Wolff and Resnick, 1988). Had Political

Economy influenced the legislation as strongly as did NeoClassical, the price-related commoditization link (Babe, 1995) might have had greater pertinence. This is because price determination was a prime point of disjuncture between NeoClassical and Political Economy (Wolff and Resnick, 1988; Babe, 1995). According to Heyer and Crowley (*Introduction*, Innis, 1991, p. xv), Innis' early references to the "penetration of the price system" could be re-cast today as globalization of the markets. In his time, Innis (1949, 1972) presented that aspect as dependent on media industrialization.

Additionally, inclusion of Political Economy considerations would allow greater emphasis of context and, thereby, the density factor. The Baltimore Conference (National Center for Geographic Information and Analysis [NCGIA], 2003) identified a better understanding of the role of spatial technologies[19] in restructuring the economic geography of cities as an important research area which would need to integrate time as a dimension, and density would be a relevant concern to such efforts. Grasping effects on urban growth patterns of differential access, commodification of information, and functional consequences of spatial patterns might require reconceptualizations of urban space and time because of the changing nature of movements towards dynamic processes and away from static processes, and the interactional complexity of individuals and institutions involved in related research. Lefebvre (1968, 1970, cited in Castells, 1977, and in Gottdiener and Hutchison, 2000) argued that social activities were not solely about interaction, but also about the space in which they occurred and

[19] Spatial technologies were defined by the Conference in accord with Couclelis (1994) who identified them as the complex of communications, transportation, and information technologies which together modify spatial relations.

that interaction produced space by altering space to fit particular needs. A similar concept of humanity as an "orientated," or situated, people was found in Tuan (1977). Castells (1977, p. 234), construed space as a constructed point of examination tied to ideological segmentation which factored in elements relational to itself. Unlike the NeoClassical view that interaction was produced by space, social interactions in Political Economy created and influenced space. Space was both an end result of behavior and an influence on behavior, and this might be demonstrated by analyzing impacts of Keynesian behavioral regulation and NeoLiberal structural regulation in future research of connections between spatial technologies and urban economic geography.

1.5.1 Deregulation

Over the last few decades, the NeoLiberal trend has seen an increasing objective of shifting governmental resources away from regulations deemed inefficient. This shift has often been presented as a means of allowing resources to be put to more innovative and productive uses. The 1996 Act itself, in its Preamble, presented part of its objective as substituting competition for regulation (U.S. Congress, 1996; FCC, 2003-c). According to the Organization for Economic Cooperation and Development (OECD, 1999) economic deregulation initiatives might produce increased productivity, lower costs, industry restructuring, surges in innovation, service improvements, and new high growth industries. Osborne and Gaebler (1992) suggested regulatory reform, including privatization, could increase productivity, lower prices, eliminate shortages, and stimulate innovation and consumer choice, ultimately enhancing economic growth.

Cain (1997) cautioned about expecting too much of privatization and similar reforms. In expounding on links between public infrastructure investment and private economic growth, including those of pivotal indirect effects from industrialization, urbanization, and regulation, he said it should be clear that privatization, or outsourcing, was not a new solution but rather a "return to the turnpikes of the 1790s and 1950s, to the private waterworks of the 1810s, to a special relationship between corporations [as they existed in English Common Law][20] and government."

1.5.2 Natural Monopoly

A primary idea behind telecommunications regulation was that it was essential because the services market was a natural monopoly in which a second competitor would not survive (Economides, 2001). In the late 1890s, the existence of more than one competing firm in many regional markets, prior to their absorption into the Bell system, belied the idea that all telecommunications markets were natural monopolies. Beginning in the 1970s (Supreme Court, *Verizon v. FCC,* 2003, citing Vietor, 1994), technological developments engendered a change in expert opinions by undermining the natural monopoly rationale. Many experts tended to view telecommunications as oligopolistic (Chamberlin, 1958; Samuelson and Nordhaus, 1989) rather than monopolistic although some suggested interdependence was a problem of theories of oligopoly (Schenk, 2003). Exclusionary control, including that over price mechanisms

[20] This comment drew on changes in concepts of corporations over the 19th century which Cain (1997) specified. He cited *Dartmouth College v. Woodward* (1819) in which Chief Justice John Marshall wrote that a corporation was an intangible "being" in law so as to allow for relations between private collective economic bodies and government like that already provided for in relations between individuals and government. Accordingly, Cain (1997) said, the manipulations of the large, national collectivities which emerged as the market widened gave rise to hatred and envy.

and production, were implicit to notions of monopoly power. Nonetheless, exclusionary control and monopolistic commoditization were beset by realities of "what the market will bear": priced too high, demand might slacken; priced too low, production costs might not be covered. These were constraints on monopoly power (Chamberlin, 1958; Samuelson and Nordhaus, 1989; Schenk, 2003; Dagan, 2003). Justification for the monopoly position had been the idea that telecommunications was a public service which necessitated a unity, a protected monopoly, in its provision to best safeguard a sufficient amount of high quality telecommunications facilities accessible to all citizens at reasonable conditions (Farrell and Katz, 1998). Unity in provision conceptualized that common carriers were in need of protection from competition in order to ensure their ability to invest in new facilities and their willingness to serve all segments of the public, including segments to whom service was priced below cost. A protected monopoly was viewed as the means of insuring quality service for everyone at all times (Economides, 2001).

Innis (1972, also cited in Babe, 1995, p. 113) instigated work on telecommunications and global empire well before contemporary studies of globalization's issues of power and control became available. Many works by Innis (1949, 1972, 1991) dissected communications market monopolization. Innis, according to Heyer and Crowley (Innis, 1991, *Introduction*, p. xx), suggested that at the very moment when monopolies seemed shattered, they reasserted themselves. Accordingly, resurgent monopoly was an idiomatic term referring to the tendency of dominant organizations following break up or meltdown to attempt to regroup and to regain or re-

assert control. Often, resurgence was suggestive of economic defensibility models based on the simple assumption that territorial or possessive behavior was favored when benefits exceeded costs and with the costs of resource defense influenced by intruder pressure (Calhoun, 1962; Moore, 1999). In some instances, regulatory advantages encouraged monopolistic resurgence (Schenk, 2003). Wheatley, Selwyn, and Kravtin (2002) argued that industrial policy proposals which focused on existing incumbent telecommunications monopolies as a device assuring increases in telecommunications output, jobs, and productivity failed because they lacked the discipline imposed by the capital-rationing process which occurs in private unregulated sectors of the economy. Industrial policy was described as a centralized, monopolistic development strategy at odds with private risk-capital entrepreneurial approaches (Samuelson-Nordhaus, 1989; Wheatley, Selwyn, and Kravtin 2002; Selwyn, 1995; NTIA, 2000).

Babe's (1995, p. 113) Political Economy perspective included a recommendation of dismantling large portions of the transnational telephone infrastructure bolstered by examples which might tacitly lionize monopoly power as well as emphasize the possibility of structural flaw. Rogers (2003, pp. 35, 130-135) said a criticism of the innovation-development process was its widening of the socioeconomic gaps between higher and lower strata of a system. A similar digital divide related to telecommunications had been the subject of many news reports and articles from before passage of the 1996 Act. By diverting attention onto the technology itself, the basic issues which resulted from the dominance and dependencies created by control over technologies could be obfuscated and unaddressed (Babe, 1995,

p. 184). Mere technology can not produce structural outcomes without human hand at its helm and Babe (1995, p. 195) argued that contemporary re-convergence was not technologically induced but stemmed from corporate powerplays. The emphasis on power stressed the importance of criteria behind policy change as much as it did possible consequences. There were any number of stated reasons for the extensive telecommunications policy change from the 1934 Act to the 1996 Act, the most frequent being an overall need for modernization and access. Economides (2001) argued that the original cause of regulatory change was usually rapid technological change; in this instance, the 1996 Act hit upon changes deemed necessary as a result of technological determinism rather than of social constructionism: an interest in (1) increasing the basis for industry competition as a policy matter as well as in (2) technological progress. The monopoly position in electronic communications had been deliberately eroded over time by movements into a partially regulated, partially deregulated environment (Brennan, 1997), but the regulatory framework had not proven conducive to increasing competition, achieving lower prices or higher quality services, or improving corporate profitability, even with decades of progressive, incremental deregulation (Economides, 2001). As already discussed, underlying the apparent reasons was a shift from the New Deal era's Keynesian regulation of capitalism to late 20th century NeoLiberal capitalism which was unrestrained except by unspecified market forces which were conceptually a natural structural regulation.

1.5.3 Marketplace Forces

Rather than particularizing market forces, regulatory reports typically described the marketplace similarly to its delineation in the 1996 Act (Sections 254, 257, and 259, U.S. Congress, 1934 and 1996; FCC, 2003-c): the operation of consumer market choice; a diversity of media voices, vigorous economic competition, technological advancement, promotion of public interest, convenience, and necessity, promotion of full economies of scale and scope, and conditions which promote cooperation. Nonetheless, new market-related considerations were introduced. The Center for Innovation (Cap Gemini Ernst & Young, 2002; Funk and Jordan, 2002; Meyer and Funk, 2002) identified these as being concerns about (1) the interrelationships of networks and markets, (2) the effect of changes in the economy on the creation and extraction of value from the markets (derivation of value), (3) the mechanisms of network interactions and derivation of value among network elements, and (4) the ability of unique, in the sense of proprietary, sustainable competitive advantage and open, aggressive, non-proprietary technological, social, and cultural systems to co-exist. Bromley (1995) contended that the telecommunications sector was an integral part of a nation's social and technical infrastructure, playing a critical role in economic growth and technical progress. He said to leave sectoral processes to the market was to incorrectly imagine that the market existed independently of political and social processes which define a nation-state and that the continual challenge was to manage the process of technological and institutional transformations. The International Geographic Union (IGU, 2001) argued a sudden liberalization which left all participants

open to market forces would lead to the servicing of only the most profitable corridors at both national and international levels and the concurrent bypassing, or short circuiting, of the high-cost lower-profit network territories. It was the IGU's (2001) contention that the principal telecommunications axes would be built to conform with lines of territorial power and that the unequal development of regions would be virtually irreversible, at least insofar as making it possible to provide services at prices and technological trustworthiness comparable to other networks, specifying satellite in particular.

Kincaid (2001) said that economic policy-making in highly-integrated federations was based on a common interest in maintaining a mutually beneficial economic regime. The FCC (2003-b) said it would structure a regulatory framework which promoted competition, investment in advanced services infrastructure, and innovation while maintaining effective oversight and enforcement but did not specify details. However, the FCC (2003-b) reflected the integrative view described by Kincaid (2001) when it said, "[the *Second Report* (2000)]…identified three main factors linked to deployment of advanced telecommunications capability as sufficient demand in a particular locality, the presence of competition among advanced services providers, and the strength of local community efforts to increase the level of deployment…." In other words, the introduction of competition into a particular locality could not diminish the importance of place-specific factors, such as local history, geography, demands, and costs (Supreme Court, *AT&T Corp* et al. *v. Iowa Utilities Bd. et al.*, 2003). Hackler (2003) and Abler (1987, 1991) said the relationship between telecommunications and

economic development was complex and mutually reinforcing with causality not unidirectional. Hackler (2003) said that all constraints on economic growth and development, not just those of a single sector like telecommunications or a sectoral group like network industries, must be considered in market assessments. He pointed out that the lesson most apparent in telecommunications was inconsistency. To Messere (2002), the FCC's reliance on unspecified marketplace forces represented Congressional views that economic competition was preferable to behavioral regulation.

1.5.4 Information Flow and Circulation

Inter-geographic circulation was considered an essential dimension of information flow (IGU, 2001). It included the creation of territorial networks and the network organizational structure popularized by effects of improvements in telecommunications linked with rapid transportation. From the IGU (2001) perspective, network organization was inseparable from social life and so network structure was depicted as both social and technical. The IGU identified the role taken by the technical network as exhibiting the greater change in recent times and found technical structure to be implicit in social networks. The IGU (2001) specified the key as knowing how telecommunications exerted influence and said the concept of "telecommunications being an all-powerful structural influence was just unbelievable." As an immaterial flow, information, including voice telephony, could not be accomplished without the spatial elements of facilities, technical networks, and infrastructure. Telecommunications and transportation organized the ecology of geographic space by introducing elements of speed, volume, direct connections, and connections in real time

by means of technical networks, and indicated in doing so that linear space lost practical importance when reorganized into relational space (IGU, 2001; Doxiadis, 1968, 1974; UNCHS, 2002). Because relational space was discontinuous and cut into zones whose limits depended upon the relative costs of telecommunications and transportation, rate-setting policies came to play important roles in spatial organization (IGU, 2001).

Relationships between telecommunications and cities were thought to have an especial affect on urban growth and development. The IGU (2001) said this influence had been recognized since at least 1895, the year in which Marconi realized effective wireless telegraph-radio transmission (IGU, 2001). Several reasons for this influence were suggested. First, it might be that telecommunications provided a partial substitute to the convergence of all paths upon a site which then grew into a hub market, particularly when access to central services was allowed, and, secondly, it might be that telecommunications contributed to the reorientation of conditions by which activities were spatially distributed (IGU, 2001). The structure of space and social relations connoted the importance of information flow in urban development. Meier (1962) argued that cities were concentrations of knowledge because more movement of information took place in cities than in non-urban areas. For urban regions, advances in telecommunications were generally expected to allow dispersal of significant resources, labor, and management, rendering urban agglomeration obsolete. Instead, Sassen (1991) argued, telecommunications had indirectly promoted agglomeration. Agglomeration resulted in regional concentrations which, like localization economics, benefited firms directly (Yeates and Garner, 1971; Yeates, 1980; Mills, McDonald,

and Mclean, 1992; McDonald, 1997). Tacit presumptions that the benefits experienced by area firms extended to area residents did not hold throughout the social sphere. Structural outcomes indicated both homogenizing effects and new cleavages arose from telecommunications advances, some of which affected social and spatial polarization and reduced participation in processes which shaped socio-economic, political, and cultural developments (Sassen 1991; Knox, 1995; Scott, 2003, p. 3). Henderson (1988) considered how urban systems reacted and adjusted to technological shocks, such as those brought about by diffusions of innovations, whether the impact was one of economic development, and whether the impact was one encompassing both urban concentrations and rural-urban allocations of population. He drew on Richardson (1975, cited in Ford's *Explaining InterUrban Variation in the Level and Distribution of Income*, 1977) to suggest that initial concentrations of resources were limited to one or two major areas followed by a period of subsequent deconcentration of resources into secondary areas. This was evocative of Smith's (1990) comment that telephone diffusion was an elite-to-the-fringes pattern.

Advances in telecommunications affected Universal Service by modifying sectors, participants, existing stratifications, and regulatory regimes. Preceding sections have indicated these complexities mostly from the NeoClassical view because that was its ideological foundation. However, as the Baltimore conference (NCGIA, 2003) described, spatial technologies affected access to other economic and social opportunities which in turn affected class and social consciousness. To direct research towards policy consequences derived from philosophical biases and ideological

assumptions masked by rhetoric might require moving beyond NeoClassical models. For instance, circulation was a facet of Harvey's (1989) concept of the imperative of capital accumulation and capitalism to increase the turnover time of capital by which the increases provided ever faster, ever better communications and transportation while binding capital turnover and technological innovation together. The 1996 Baltimore Conference also noted that new understandings of the affects of modern communications on spatial patterns would necessitate reconceptualizing time and space dimensions because of trends toward dynamic processes. Castells' (1977, pp. 130-238) circulation paradigm included location decisions like those made by industry about placement of telecommunications technologies. Castells (1977, pp. 227-230, 443) found a connection between milieu and spatial organization of urban environments which shaped the interactions within. From this, he construed (1) temporal patterning of historical time and oriented space (2) with distance as a twin sense (3) which provided a predisposition to eliminate space as a source of orienting specificity and (4) which provoked the minimization of unsegmented time. This emphasized both the orienting source (environmental anchor point) and segmentations, particularly that of time. In noting that time became increasingly central to processes [of immediate production, of circulation of capital], fragmenting into specific operations according to the differential speed of realization, he indicated that even time's centrality was of less importance than its transformation into operational fragments. In part, this greater influence of the transformation of time was evidenced because, as Tuan (1977, pp. 130-131) said, the influence of time allowed every activity to generate a particular spatio-

temporal structure. It was untoward events which thrust that structure to the forefront of awareness and compelled people to reflect on it, as was noted in the earlier discussion of Sterling and Betteridge.

1.5.5 Urban-Rural Concepts

Castells (1977, pp. 10-11) found the difficulty of separating urban and rural concepts an insurmountable contradiction in establishing a theoretically significant empirical delimitation, either spatially or culturally, of an urban form distinct from a rural form or of a continuous movement from one continuum end-pole to the other, and concluded that an urban-rural dichotomy had no meaning. He found greater meaning in the concept of ensemble, particularly given worldwide variance in common criteria which determine spatial organization. Castells (1977) stated that Dewey's 1960 critique of Redfield's folk-urban continuum pared the root of the indistinguishibality problem and that Dewey's analysis indicated to him that differences between urban and non-urban were only empirical expressions of a series of processes simultaneously producing specific effects at other levels of the social structure. Castells said this failure of classification rendered the rural-urban dichotomy void of all meaning because (1) the impossibility of finding empirical criterion was an expression of theoretical imprecision and (2) the imprecision was ideologically necessary to connote modernity through a material organization. Altogether, this said that urban was both precise and imprecise at the same time, urban being the base of Castells' examination (Castells, 1977, pp. 10, 17, 235). Spaulding (1951, pp. 33-36) said the problem was the Aristotelian, or absolutistic, mode of thought which relied on classification. Whether

by rigid line of demarcation between rural and urban typologies (e.g., either-or) or by ranges of relativities between polarities of typological extremes (e.g., to what extent), the basis was classification of differences. Spaulding (1951, pp. 34-35) suggested solving the problem by redefining the frame of reference, that being social systems. Berlo (1960, pp. 133-140) defined social systems as a consequence of human need to relate one's behavior with the behaviors of others in order to accomplish goals, ultimately becoming a collection of role-behaviors assigned interdependent positions. Spaulding (1951) said amplifying social systems in terms of similarities would promote a transition to a non-Aristotelian mode of thought and overcome unclarified identifications with the society being studied. In Spaulding's (1951) day, what had looked like distinct sophisticated city places and agricultural rural places was already beginning to more closely resemble a range of places typified by size, economic activities, built environment, and throughways. The IGU (2001) said that new technologies for communications and information systems had been superimposed on classic forms of urban and regional structures, retaining the distinction of the classic form within the less distinct superimposition. The unity concept discussed in the Natural Monopoly section fostered hostility towards competition, containing within it the bias of this urban-rural distinction which it drew upon to favor urban services over rural services. The urban-rural distinction was an old bias which enhanced the risk of an urban-rural digital divide (Spaulding, 1951; Castells, 1977). Cai (2002) and the NTIA (2000) pointed out that uneven development of telecommunications infrastructure contributed to a widened digital divide, became a barrier to information

flow in a democratic society, and jeopardized the economic well-being of rural communities. Cai (2002) argued that telecommunications infrastructure development was a process of spatial interaction and mutual growth between infrastructure and demands, particularly since telecommunications networks were inherently spatial, and said that biased distribution of infrastructure might have significant consequences on the right of equal access information resources. He remarked that some areas with service gaps might have been omitted because of the manner in which infrastructure and access networks were spatially plugged together to reach individual users. Kincaid (2001) said that digital divides suggested the existence of economies of scale not satisfied by low densities of far-out places and resulted from delivery differences in infrastructure capacity, differences said to result from a higher cost in delivering dial-tone to sparsely populated rural areas (FCC-CCB, 1996).

1.5.6 Infrastructure

Crandall (1997) rephrased Babe's (1995) concern with communication as influence and Cai's (2002) focus on the right of equal access information resources by concentrating on whether or not telecommunications was truly infrastructure. He seemed to conclude that it was, stating (1) that essential aspects included the ability of subscribers to connect to most other subscribers even if not on the same network and (2) that expansions of network capacity and functionality were creating the ability to deliver far more services than now offered but in an unseasoned marketplace in which no one knew which services would find willing buyers. The IGU (2001) also noted concern that network build-up was deserting (1) a deficit of infrastructure only to

advance to (2) a deficit of suitable services. This progression was considered worrisome because of urban development: while cities had many different functions, most found telecommunications integrated as an essential dimension of regional development influencing the structure of space and the patterns of social relations (IGU, 2001). Infrastructure was considered elemental to commerce because it provided transmission facilities increasingly used to distribute products and services, according to the IIA (1994). Hackler (2003) argued that infrastructure might be a necessary condition to economic expansion but it could not ensure economic expansion in and of itself. Cain (1997) highlighted the question of who pays for construction of public infrastructure, the debate between public and private funding, as an old question in an old debate, similar to issues of appropriate jurisdictions and efficient levels of production. Left to its own devices, the private sector generally does not supply public infrastructure as broadly as is wanted by the public. In the sense that NeoClassical theory posited of space creating social interactions, the structure of space and the patterns of social relations were being re-shaped in the 1930s and 1990s by an increasingly essential infrastructure which was (1) muddling its way through a reconfiguration of its supply and demand assemblage and (2) in the throes of a changing regulatory system.

CHAPTER 2

METHODOLOGY

The method selected is case study, a qualitative method. Incompatibility of the form of historical and contemporary data is a difficulty. Hackler (2003) said telephone infrastructure *data* is difficult to uncover and document. Further searches disclosed that empirical, or observable, data (in useful units of measurement) had not been collected in any way suitable for this study. Telephone infrastructure, per Hackler (2003) is largely invisible, mostly follows the routes of railroads and highways, and contains intricate technical aspects. In its *Second Report* (2003-a), the FCC utilizes case study methodology to illustrate deployment of advanced telecommunications, focusing in that instance on Los Angeles county, CA., containing the 2nd largest U.S. city; Waltham, MA., a suburb of 58,000 outside Boston; Muscatine, IA., a town of 23,000; Miller, SD., a small town of 1,600, and Wilsondale, WV., a rural, residential town of 571 persons.

This investigation limits its samples to places within the state of Texas which might be able to be generalized to the national level. The five places and benchmark selected for case examples are: Subset One, Tribal area: Alabama-Coushatta Reservation near Livingston town in Polk County; Subset Two, Rural area, particularly those outside population centers: Blanco city in Blanco County; Subset Three,

Minority area: Hempstead city in Waller County; Subset Four, Low Income area: Bowie city in Montague County; Subset Five, Inner City area: Dallas city in Dallas County; and Benchmark: West University Place city in Harris County.

The cases are localized place examples which have available descriptive statistics common by place and across time. Aggregates at county and above levels can be different from the local levels and generalizable local depictions are considered a more relevant examination. The localized examples represent urban and rural populations. Urban and rural both are relevant because the presumed ubiquity of infrastructure implies that similar patterns can be found which might enhance understandings of patterns within urban environments and their regions. Changes in telecommunications formulation from 1930 to 2000, particularly the eras of 1934-1940 and 1996-2000, are examined. The emphasis is on residential consumers rather than on non-residential subscribers and nonsubscribers. The next Chapter describes the cases, including the basis upon which each case locale was chosen.

2.1 Place Specification and Data Limitations

Place specification is important because geographic locale positions the consumer groups in three of the five case instances, those being rural, inner city, and tribal. Urban and rural distinctions are important because inner city areas must reflect dominant minority populations and tribal areas require land delineated for recognized tribes[21]. Several process reviews of various types are conducted before place selection is finalized. Secondary source materials provide data and locales. Both approaches,

qualitative and quantitative, are refined through data reviews to include important sources. Demographic data, place locales, and related reports from the U.S. Census Bureau, the Texas State Demographer's Office, the FCC, the ITU, the United States Telecom Association (USTA), the Indiana Business Research Center (IBRC), and the National Atlas, as well as several chambers of commerce, business associations, and community relations offices are source materials. Census Block Statistics Maps and Mapquest maps identify regional locations, major roadways, and general transit accessibility, as well as spatial alterations in the area boundaries. Many county population estimates are from the Texas State Data Center's 2000 and 2001 population and housing estimates. Income estimate ranges are predicated on published reports of county and place income levels. Assessment considers telephone penetration and socio-economic changes. Unit of analysis is geographic-unit change. All of the above information is examined to develop pertinent qualitative findings.

2.1.1 Variables and Controls

Qualitative (case study) methods do not require specification of variables and controls. However, strong, supporting historical information or parameters (factors, influences) from which inferences can be drawn are essential. For example historical data has inherent difficulties. Initial factors are telephone penetration rates, total population, housing (dwelling) units, households-occupied units, owner-occupants, Nonwhite owner occupants, median household income, poverty rate, and, when available, owners without telephone service, owners below poverty and without

[21] The *Federally Recognized Indian Tribe List Act of* 1994 says the Federal government has a trust

telephones, and occupied units below poverty. Race is segmented into only White and Nonwhite categories because of historical data limitations.

2.1.2 Data Limitations

Census data emphasizes telephone subscribers' factors but is constrained by data limitations: the farther back in time, the less local data available. Definitional boundaries are a challenge. For instance, telephone enumerations are said by the *Historical Census of Housing Tables* (Bureau of the Census, 2005-b) to be defined differently at different points in time: the 1960 and 1970 data refer to availability of a telephone whether or not in the actual housing unit, the 1980 and 1990 data refer to the presence of a telephone in the housing unit, and the 2000 data refer to the extent to which households have access to telephone service. These distinctions condense possibilities of having telephone instruments but not having telephone service and of having nearby public telephones but not having in-home service. A lack of sub-level price and cost to households and a lack of 1930 and 1940 data also complicate a fair comparison.

Information on cost to consumers before 1995 is spotty and not broken down to the local level. In the aggregate, contemporary cost to consumers is flat between 1995 and 1997, increases $1.00/month between 1997 and 2000, and increases $2.00/month between 2000 and 2003. The range is $30.00/month in 1995 to $37.00/month in 2003 (FCC-CCB, 2004; USTA, 2003). The aggregate average monthly residential local rate in the *Statistical Abstract* (2004-e) differs, indicating $19.24 in 1990 ($17.79 prior to

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responsibility to and a government-to-government relationship with recognized tribes (FCC, 2004-a).

modification in 1995), $19.95 in 1996, $20.78 in 2000, and $23.37 in 2002. Information on cost to service providers is also limited. Because service providers must have business telephone service, operating statements are reviewed. Line items for telephone and other purchased communication services and line items for purchased utilities represent 0.4 percent to 0.8 percent of total operating expenses in a sample of companies primarily providing telephone, voice, and data communication services (Bureau of the Census, 2005-e). Coverage, the where of telephone company provision of services, and usage, household telephone records, are evidently matters of telephone company bookkeeping reported to accessible sources only in the aggregate and/or are mostly proprietary and mostly unavailable.

Telephone data were not enumerated during telephony's early years as it is now. Telephone data was provided to the Census Bureau by the telephone companies and Western Union. Little information developed directly by the telecommunications industry is used here because it is reported mostly as national aggregate data and is not collected or reported by sub-county units. Further complicating a clear longitudinal analysis is the existence of phantom circuits[22], noted in at least one Census Bureau report preceding the 1934 Communications Act. With the establishment of the FCC in 1934, statistical coverage of communications was concentrated in that agency and reports changed. There were counting changes specific to the Act, specific to the telephone companies, and, according to source material footnotes, specific to exclusion from enumeration after 1933 of some private lines. Original records are part of the

Commerce Cluster found in Record Group 173 of the National Archives and Records Administration (NARA, 2003); they include reports of the Office of the Chief Accountant 1934-1949 (173.7), finances 1914-1970 (173.9), and a 1936 Special Investigation (173.5); and are physically stored in locations on the eastern seaboard.

A note in an early report states that all variations in enumeration after 1902 result in miles of telephone wire and number of telephones being the most consistently comparable measures. However, number of telephones eventually becomes number of households with telephones, miles of telephone wire discontinues after 1990, and it becomes possible to have a telephone but to not have telephone service after 1983. Inconsistencies in the form and style of data at the aggregate level carry through to data at localized levels.

22 A phantom circuit is an extra circuit obtained without use of additional line wires by special

Table 2.1 Telephone Development in the Aggregate

	U.S. 1937	U.S. 2000
Telephone Systems and Lines	50,560	---
Telephones	19,444,200	---
Miles of Telephone Wire	90,831,000	---
Carriers	---	52
Access Lines	---	245 (Mils)
Originating Calls	33,618,000	537 (Bils)
Telephones/1000 Population	150	---
Households with Telephones*	34%	95%
Average Monthly Residential Local Telephone Rate	---	$20.78
Total Telephone Plant in Service (Bil. Dol.)	---	$362
Wire Telecommunications Carriers	---	26,223,000
Wireless Telecommunications Carriers Except Satellite	---	10,424,000
Satellite Telecommunications Establishments	---	728,000
Miles of Telegraph Pole Line**	253,576	---
Miles of Telegraph Aerial Single Wire	1,983,596	---
Miles of Underground Single Wire	335,179	---
Miles of Telegraph Submarine Single Wire	9,057	---
Messages (Telegrams, Revenue Messages)	218,116	---
Miles of Railway Company Single Wire	318,116	---

*By comparison, the extent of households having radio ranged from 39 percent in 1930 to 73 percent in 1940 to 89 percent in 1947.

**Land and Ocean-Cable Telegraph Systems combined.

Source: Bureau of Census, 2003, 2004-e and 2004–f.

The incompatibility of these inconsistencies is indicated in the preceding table, Table 2.1 Telephone Development in the Aggregate. As can be seen, only estimates of originating calls and households with telephones are available in both 1937 and 2000. The other line items are available at one enumeration or the other but not both. Census reports do not distinguish between residential and non-residential telephones until 1943 which is also when reporting distinctions between local and toll calls begins and radio-

interconnection of the four wires forming two existing physical circuits.

telegraph estimates begin supplanting telegraph estimates. It is not until 1960 that Census enumeration of telephone subscribers by place begins. The appearance of telephone items in 1960 is initially a simple yes or no question about having a telephone, equipment and service being synonymous then, and mostly limited to SMSA areas. Through 1983 telephone counts by place remain a difficult quarry. Consistent simple counts of no telephones by occupied units by localized place in 1960, 1970, and 1980 are not available. Smoothing techniques which account for the passage of time are intricate. One decades-old calculation is to divide the number of residential lines by the number of households, however, as second lines and second homes increase the margin of error increases, and that increase is compounded by the potential blurring of wire lines and wireless circuits in various enumerations (FCC-CCB, 2004).

Population enumeration change over time. Through at least 1960, the Nonwhites category is defined to include Negroes, Indians, Japanese, Chinese, and Other, with Other including Filipino, Korean, Asiatic Indian, etc., based largely on the individual's country or area of origin. Between 1930 and 1940, a unique population category change is made: in 1940 and 1950, persons of Mexican birth or ancestry who were “definitely” not Indian or other Nonwhite were included with White. These persons "were returned as white in 1940 [and in 1950] but designated Mexican in 1930,” which “returning” they previously had not been (Bureau of the Census, 1943-c). For all historic population categories, mixed-race and blended origins are classified according to the Nonwhite parent or, if both parents are Nonwhite, in accord with the sire's race. Cultural distinctions in tracking lineage, whether that of matrial or patrial

lines of descent, are not noted as a distinction in historical or contemporary Census data. Several recent population categories, such as gender by race, are not found or are not broken down to the local level for all or some of the cases in 1990. Those items have to be estimated on the basis of their area's racial breakdown of their total populations if they are to be used.

By 2000 there are 15 Race and two Origin (Ethnicity) categories used by the Census Bureau: White, Black (including African-American and Negro), American Indian and Alaska Native (which allows for tribal identification), Asian Indian, Japanese, Native Hawaiian, Chinese, Korean, Guamanian or Chamorro, Filipino, Vietnamese, Samoan, Other Asian (which allows for categorical identification), Other Pacific Islander (which allows for categorical identification), Some Other Race (which allows for categorical identification), Hispanic, and non-Hispanic. Everyone is classified as both a member of one or more of the race groups and also as either Hispanic or non-Hispanic. Respondents self-identify on Census Bureau surveys; Some Other Race (Other) is the identifier provided for those who do not find their race among the 15 groups. These classifications treat race and ethnicity as separate and independent categories, are not scientific, and are designed to promote consistency in Federal record keeping and data presentation (Bureau of the Census, 2005-f).

Historical income figures are not consistently enumerated through the decades and, in the early years of the 20th century, are not broken down below places of 250,000 or greater population. While employment status, occupation groups, and wage groups can be assessed at the state level, it is not feasible to readily narrow that historical

analysis for any place smaller than Dallas (Bureau of the Census, 1943-d, pp. 1-7, 459-645). For instance, Part 5 of the 1940 Census (1943-d) identifies 359,441 males, 28,218 females, 91,703 Nonwhite males, and 9,457 Nonwhite females as comprising the occupation category of Laborers Including Farm Laborers. In Dallas this total pool at that time is 7,886 of which 5,167 are White males. Statewide, a total of 1,675,495 males, 462,860 females, 220,081 Nonwhite males, and 119,629 Nonwhite males are categorized by occupation. Plainly, in 1940 more men than women earn income but without estimates it can not be factually said how this inequality plays out in the smallest places. Historic income levels are most readily available as aggregates, and not always as median household income. Prior to the 1940 Census Bureau enumeration and report modernizations, personal income is more common.

Surrogate data is sought but found to be not readily available or not readily applicable. For instance, plumbing data, mostly advancements of bathtub or shower availability, is reviewed. Plumbing information is consistently present from the first housing census, a consistency unlike other items which are modified or dropped between Census surveys or which begin later than 1940. The plumbing data serve as an indicator of residential development trends and do not directly connect to telephony provision. This trend indicator is important because there is little localized telephone data before 1960 and little localized residential units data before 1940. Inasmuch as residences were to contain telephones, plumbing is useful in marking the historical progression of residential development even though plumbing is not critical to telephone service. It seems reasonable that the diffusion of residential telephone service

is affected by the progression of housing development, especially in early developmental transitions. This perspective re-emphasizes the importance of income because it costs money to plumb a house, it costs money to have telephone service, and ready-built, already-wired suburban subdivisions are not commonplace before World War II. From one era to another, consumers have to make choices from different sets of possibilities. It also seems reasonable to presume that household income bears heavily on those choices. For all of these reasons, qualitative research and the available data sets, such as tables of records kept and other accounts in the literature, will be used to develop the conclusions of this study.

CHAPTER 3

CASE EXAMPLES

Telephones, like many technical innovations, have been "elite-to-the-peripheries" (Smith, 1990) in their diffusion. The poor in sparsely settled counties could not as well afford telephone service at the outset of public telephone service as could the nation's trendsetters in busy urban centers. The same is true of other critical innovations like electricity, plumbing, central air and heat, and oven cooking. Radio, however, appears to diffuse more rapidly than other modern appliances and conveniences. As noted under Table 2.1 Telephone Development in the Aggregate, the extent of households having radio ranges from 39 percent in 1930 to 73 percent in 1940 to 89 percent in 1947. Various reports found correlation between income and telephone service penetration (FCC, 2003-a, pp. 92-94) and income may be relevant to owner-occupancy considerations. Some of the same reports indicate age might also have a relevant role, particularly in tandem with owner- and tenant-occupancy. The various reviews generally support the notion that telephone nonsubscribers by poverty and by age is greater among tenant-occupancy. This suggests that renter-occupancy has less income stability than owner-occupancy. When contrasted with race-ethnicity breakdowns, which tend to reflect the general population make-up of the areas, the

emphasis on occupancy indicates the influence of income on telephone subscribers more so than does the emphasis on race-ethnicity.

Historical data provided too little information on the least populated places, typically rural or frontier places, to use all estimate types mentioned in literature. A portion of these sets of factors is used to examine the population subsets. Simple frequency depictions of these distinctions is important but complicated in using historical data. The Indiana Business Research Center (2004) and the Census Bureau provide most location detail which follows. The 1940 Census, its companion *Data for Small Areas Part 2* (Introduction, pp. 1-5; Texas, pp. 555-615), and other decennial Census counts through 2000 are primary sources of place data. The 1940 Census is identified as the first modern census, the first census to use sampling, and is said to have launched the *Census of Housing* as a companion to the *Census of Population* (CIS, 1980, p. 201).

In reviewing Census data, a mid-century summary of general Texas trends is found (Bureau of the Census, 1952-a). Accordingly, the 1950 urban population of the state of Texas is nearly nine times as large as the state's 1900 urban population. The summary said that 1940 to 1950 represents both the largest numerical increase in urban population (58.4 percent) and the first loss of rural population (11.6 percent) in Texas. Total rural population increases by 480,577 persons from 1940 to 1950 nonetheless (Bureau of the Census, 1952-a).

3.1 Population Overview

IBRC (2004) identifies the state of Texas as having a population density of 85.9 per square mile (by 2006 density is 87.3 per square mile), an average household size of 2.74 persons, an average family size of 3.28 persons, and population growth of 86.2 percent from 1970 to 2000. In contrast, the population of the nation grew 38.4 percent from 1970 to 2000. Population density is 83.0 per square mile (by 2004 density is 85.9 per square mile, 2006 reports say it is 83.0 per square mile), average U.S. household size is 2.59 persons, and average family size is 3.14 persons. In 2000, 97.5 percent of the state population report only one race with 11.5 percent of those reporting African-American while, overall, 32 percent report Hispanic of any race. That same year, 97.6 percent of the U.S. population reports only one race with 12.3 percent of those reporting African-American while, overall, 12.5 percent report Hispanic of any race. Based on these data, Texas has greater growth, population density, and average household and family size than the nation as well as a greater proportion of population identifying themselves as Hispanic. The differences in growth rates are large: 86.2 percent for the state and 38.4 percent for the nation; the proportions of reporting one race and reporting African-American are similar. The state's average poverty rate, 15.4 percent in 2002, is lower than the national average. Census Bureau *USA Statistics in Brief* (2005-g) estimates indicate the national poverty rate is 34 percent in 1990, 32 percent in 2000, and 35 percent in 2002.

Aggregate service provisions are reviewed because network size plays a part in network availability and network availability plays a part (1) in service availability,

including deployment to underrepresented groups, and (2) in the liberalization of local markets, by which is meant opening markets to competition (Ennis, 2002). Using local telephone loops for an indicator, state and national provision are counted by study area[23] as of December, 1999 (FCC-CCB, 2004, p. 8-4). At that time, Texas has 13,174,403 loops; national loops numbered 184,985,055. Texas telephone loops averaged slightly more than 1.58 per person of the 2000 Bureau of Census estimate of 20,851,820 total Texas population (Bureau of the Census, 2004-f). National loops grew 1.8 percent to 4.5 percent per year between 1980 and 1999. The *Historical Census of Housing Tables* (Bureau of Census, 2005-b) summarizes this growth in a broad context, saying that about 1-in-5 households overall have no telephone service available in 1960 but by 1980 that estimate has dropped to 7 percent. The rates achieved by Texas in the same report are shown below.

Table 3.1 Historical Estimates of No Telephone in Housing Units

	No Telephone – TX	As % of Housing
1960	1,961,636	29.4%
1970	609,096	17.7%
1980	4,465,923	9.4%
1990	523,034	8.6%
2000	234,909	3.2%

Source: Bureau of the Census, 2003, 2004-b, 2004-d, 2004-e, 2004-f, 2005-b, 2005-g

In Table 3.1 Historical Estimates of No Telephone in Housing Units, Texas drops to less than 10 percent without telephones in 1980 after having a 1960 estimate of 29.4 percent. Texas is estimated at 8.6 percent of households without telephone service

[23] Study areas are local exchange operating areas; in Texas there were 57 in 1999, nationwide there were 1,432.

in 1990; the 1990 national rate was 5.2 percent. By 2000, the southern states had generally dropped to less than 10 percent, the national level was 2.4 percent, and Texas stands at 3.2 percent. These are aggregate counts which do not make distinctions by sub-population.

Table 3.2 Comparison of Historical Texas Estimates of No Telephone in Housing Units to Nearby States

	Texas	AZ	AR	LA	MO	NM	OK
1960	29%	35%	49%	31%	22%	36%	25%
1970	18%	21%	25%	18%	12%	24%	16%
1980	9%	11%	13%	11%	5%	14%	8%
1990	9%	9%	11%	8%	5%	12%	9%
2000	3%	4%	5%	4%	3%	6%	5%

Source: Bureau of the Census, 2005-b; FCC-CCB, 2004, Table 17.3, p.17-5

From Table 3.2 Comparison of Historical Texas Estimates of No Telephone in Housing Units to Nearby States, Texas compares favorably except with Missouri and Oklahoma at each decade and except with Louisiana in 1990. Louisiana in 1970 and Arizona in 1990 have estimates like those of Texas. The Census Bureau (2005-b) said that increased cell usage may have played a part in "dramatic changes" from 1990 to 2000 when the national aggregate had a 3 percent decrease in nonsubscribers. Generally speaking, the only era without substantial national change was 1980-1990. That decade's national aggregate rate experienced a 2 percent decrease in nonsubscribers, decreases between 1960 and 1980 were 3 percent to 12 percent.

3.1.1 Earlier Trends

Some housing details were included in the 1920 and 1930 *Census of Agriculture* (sometimes referred to as the "Farm Census") but were enumerated only for farm operators. Therefore, comparisons are not logical but worthy of review. In 1940, these details were categorized in rural-farm dwellings units and included all farm dwellings rather than only that of the farm operators (Bureau of the Census, 1943-a, 1943-b, 1943c). While the classification of areas and populations into rural and urban categories has been difficult for policy makers for most of the nation's existence (Federal Office of Rural Health Policy, et al., 1998), the distinction is pertinent for several reasons. Most obviously, some of the cases are urban and some are rural. Less plain is that non-rural cases became increasingly urban between 1930 and 1950.

Table 3.3 Historical Change in County Farms

	Total Farms 1930	Total Farms 1950	Numerical Decrease
Polk County	2,300	1,022	1,278
Blanco County	708	567	141
Waller County	1,463	1,130	333
Montague County	2,360	1,611	749
Dallas County	4,830	3,519	1,311
Harris County	4,131	3,360	771

Source: University of Virginia Library, 2005

Table 3.3 Historical Change in County Farms depicts the decrease in the total number of farms in each county as urbanization progressed. These county depictions were indicative of the general state trend. During 1900 to 1950 the proportion of the state's population living in urban territory increased from 17.1 percent to 59.8 percent (Bureau of the Census, 1952-a). Generally speaking, the state was transitioning in the

1930s and 1940s to accommodate modern conveniences, like telephones, now so much taken for granted even as it was struggling with issues of the Great Depression and World War II.

Table 3.4 Historical Farm Telephone Penetration Estimates with Other Modern Conveniences Estimated

	Telephones	Electrically Lit Homes	Autos	Trucks	Tractors
1920	2,498,493	452,620*	1,979,564	131,551	229,332
1930	2,139,194	845,356	3,650,003	845,335	851,457
1940	1,526,954	2,032,316	3,542,036	944,184	1,409,697

* Electricity or Gas

Source: Bureau of the Census, 1943-e, p. 220.

The preceding Table 3.4 Historical Farm Telephone Penetration Estimates with Other Modern Conveniences Estimated, from a report which described itself as identifying "the relative place of farm facilities," indicates 1940 rural telephone subscribers were about 38.9 percent less six years after the 1934 Communications Act went into effect than 14 years before the Act passed into law. This decrease occurs during the same time frame as in which there are a decreasing number of farms, forms of farm ownership and management were changing, and economic upheaval was rampant throughout the broader environment. Additionally, telephones were a luxury rather than an essential in their earliest diffusion.

3.1.2 County Background

To particularize the national and state depictions, Texas county data is used for initial screenings because historical county data is more readily available than historical place data. There are about 3,141 counties or county equivalents in the United States,

Texas has 254 of them (IBRC, 2004). To winnow the 254, qualitative and quantitative profiles are reviewed. Final selections are Polk, Blanco, Waller, Montague, Dallas, and Harris counties. Nonsubscribers in these counties range from 3 percent to 6 percent of households in 2000. Within each of the counties are specific places with which telephone development can be exemplified. Places in each county are similarly profiled to identify those most evidencing the rationale by which the county was selected. Based on these reviews, the place pool is narrowed to: Alabama-Coushatta Reservation in Polk County (Tribal case) with Livingston town in Polk County as non-Tribal area comparative (Tribal neighbor), Blanco city in Blanco County (Rural case), Hempstead city in Waller County (Minority case), Bowie city in Montague County (Low Income case), Dallas city in Dallas County (Inner City case), and West University Place in Harris County (Benchmark).

3.2 Tribal Case

According to NativeData (2004) and other American Indian sources, there is only one Texas tribe with land, the Alabama-Coushatta. The Alabama-Coushatta Reservation, located wholly within Polk County, is selected to be the tribal case and Polk County designated the tribal case county. While Polk houses the Reservation, it must be noted that Reservations are currently sovereign territory. The Alabama-Coushatta tribe is estimated to have 4,600 gross acres and a Native population accounting for almost all its total population (Bureau of the Census, 2004-c, 2004-f). There are differences in estimates of population and land between the Alabama-Coushatta website, various affinity sources, and Census Bureau information. For

instance, the Alabama-Coushatta website (2004) reports 550 tribal members in a 1,000 member community on a 4,600 acre Reservation whereas R. Edward Moore (2004) reports 1,100 enrolled tribal members with about 500 on or near 1,280 to 2,800 acres which used to be a Reservation. NativeData (2004) includes estimates similar to that of the Census Bureau in its reports of gross acres and population. The Cobell[24] litigation encourages reliance on Census Bureau data by restricting data availability from other sources. The Alabama-Coushatta Reservation was among the subjects of special Census Bureau counts in 1990 and 2000 as was the Rural case in 1950.

The Alabama-Coushatta Tribe originally was two tribes of the Southeastern Mound Building cultures, according to R. Edward Moore (2004). These cultures included the Creeks, Cherokees, Caddo, Natchez, Choctaw, Muscogee, and others. Some of these cultures belonged to the Five Civilized Tribes. The Five Civilized Tribes were the nations of the Cherokee, Chickasaw, Choctaw, Creek and Seminole. Members of the civilized tribes tried to emulate White society, including owning slaves. In addition, portions of their tribal governance contributed to the form and structure of U.S. national governance. In the late 1700s and early 1800s, the tribes were uprooted from their homes east of the Mississippi River in a series of removals. Those who moved to Texas prior to removal, such as the Alabama-Coushatta, arrived at the outset of the secession of Texas from Mexico, the Texas revolution, and the assimilation of Texas into the United States.

[24] *Cobell vs. Norton* was filed in 1996 over the unsatisfactory handling by the U.S. Interior Department, parent agency of the Bureau of Indian Affairs (BIA), of trust monies and trust lands belonging to America's tribal populations. The suit insists upon a full and complete accounting of

Because the tribal case presents unique considerations, a non-Reservation place in Polk County, Livingston town, is included for contrast, selected on criteria of sameness of county, similarity of distance from major urban areas, proximity to Reservation, and historical data availability. This inclusion is predicated on presumptions that the physical locale similarities of Reservation and non-Reservation place might help identify important aspects of this case.

An examination of expansion and contraction trends in the telecommunications industry (GSA, 2004) found American Indian Alaskan Native (AIAN) communities had the lowest reported subscriber levels. Penetration for all housing units nationwide is 83.1 percent in 2000 yet the American Indian segment was 67.9 percent (FCC-Wireline, 2003; Bureau of the Census, 1994). Ten years earlier the tribal penetration level was more than 20 percent lower: comparable 1990 Census data indicates a 46.6 percent penetration rate for American Indian households. Bureau of Indian Affairs (BIA) information is unavailable due to the Cobell litigation.

3.2.1 Critical Indicators

Polk County's overall telephone penetration in 2000 is 95.5 percent. Although county telephone estimates for 1940 are unavailable, other county infrastructure estimates of that era are available: 22.6 percent of Polk County's occupied housing units have electric lights and 47.1 percent have radio. From 1940 to 1950 infrastructure indicators largely increase which indicates an expansion of other modern structural amenities and conveniences, including telephones. Statewide, electrically lit homes are

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Federal government handling of monies and lands of indigenous peoples since inception of the *Individual*

59 percent and radio by household is 66.9 percent. The state electrical range is 18.4 percent for rural farm households to 84.7 percent for urban households. The state radio range is 49.4 percent for rural farm households to 78.6 percent for urban households. The 1940 national aggregate telephone penetration rate is 36.9 percent. Telephone service for many decades in many places is as often a community telephone or a party line as it is an individual household instrument for places distant from main service-providing offices. County population growth from 1970 to 2000 is 184.5 percent and from 1990 to 2000 was 34 percent. Its 2002 undeflated median household income is $33,740; its 2000 undeflated median household income is $30,495; and its 1990 median household income is $18,968. Its 1990 poverty rate of 21.4 percent decreases to 17.4 percent in 2000. Its 2000 poverty rate is higher than the state average. Population density in 2000 is 39.9 per square mile; land area is 1,057.3 square miles. At that time, its population is 20 percent urban and its housing is 10.8 percent urban. Livingston is identified as 14.5 percent rural. Its 1990 telephone penetration rate of 93.7 percent increases to 95.1 percent in 2000. At that time it has a per capita income of $17,214. Its 2000 undeflated median household income of $31,424 is an increase from its 1990 median household income of $19,806. Its poverty rate increases during that same decade to 22.3 percent in 2000 from 22.1 percent in 1990.

The Reservation's 2000 telephone penetration rate of 84.3 percent is a decrease from its 1990 rate of 90.2 percent. The Reservation's 2000 undeflated median household income of $26,458 is an increase from its 1990 median household income of

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Indian Trust in 1887 (Cobell, 2003).

$22,321; its 2000 per capita income is $10,465. The Reservation poverty rate, like the town and county rates, is higher than the state average. The Reservation poverty rate drops to 23 percent in 2000 from 23.9 percent in 1990. The poverty rates indicate a lack of broadly-based wealth. All the Reservation's occupied units are identified as rural. Indicators related to the 1934 Act are limited and may reflect a lag of broader infrastructure development in this instance as well as difficulties with historical data. In 2000, Reservation land area totals 7.18 square miles of which 0.04 are water. Population density is 67.3 with a 28.4 housing density.

The area's pace of modernization could be an effect of being rural and of income factors. Neglect of seemingly uninfluential sub-population segments also might be a factor[25]. For Polk County overall it seems unlikely the pace of infrastructure development has racial connotations. Except for the Reservation, the area has a long history of being predominately White. The Reservation's history, of course, is very little White. If telephone development were predicated on race-ethnicity considerations one would think the Reservation's 1990 penetration of 90.2 percent and Livingston's 1990 penetration of 93.7 percent would be further apart. As was previously said, AIAN populations are the least subscribed of all population segments. The table below indicates the 1940 total AI enumeration equaled only .3 percent of total population by categories.

[25] Elaborating this idea in future research would include effects of special governmental relationships.

Table 3.5 Individual "Minor Races," 1940

	American Indian	All Population Classes
U.S.	333,969	131,669,275
South Region	94,139	41,665,901
West South Central Division	66,307	13,516,990
State of Texas	1,103	6,414,824
San Antonio	40	
Fort Worth	33	
Dallas	28	
Houston	14	

Note: "Minor" races were defined like Nonwhites but without Negroes: Indian, Chinese, Japanese, Filipino, Hindu, Korean, and Other. Regions were identified as North, South, and West. North contained the Northeast, Mid-Atlantic, East North Central, and West North Central Divisions, South contained the South-Atlantic, East South Central, and West South Central Divisions, and West contained the Mountain and Pacific Divisions.

Source: Bureau of the Census, 1943-c, p. 46.

Shown in Table 3.5 Individual "Minor Races," 1940, is an extract of the special count taken to better identify sub-groups like tribal populations. Only 115 members of any Texas tribe are identified by place in the 1940 special census. It is likely the remaining 988 were in smaller places like the Alabama-Coushatta Reservation. Ten years later, in 1950, tribal data is aggregated by county and largest urban areas. Three of the case counties, Dallas, Harris, and Polk, are included then. In Dallas County, 66 of 109 AIAN are in the City of Dallas and, in Harris County, 108 of 184 AIAN are in the City of Houston. Polk County is not delineated below the county level. Those same three counties are ranked in a nationwide report on counties which have at least 100 AIAN persons in 1999 (Bureau of the Census, 2004-a). Out of 1,498 counties, Dallas ranks 23rd, Harris ranks 30th, and Polk ranks 390th by number of estimated AIAN population as of July 1, 1999. By percent of AIAN population, Dallas ranks 682nd,

Harris ranks 985th, and Polk ranks 316th. State AIAN growth is 34.7 percent between April 1, 1990 and July 1, 1999 and is projected to grow from 84,000 in 1995 to 95,000 in 2000 and to 107,000 in 2005, reaching 159,000 by 2025 (Bureau of the Census, 2004-a). The Alabama-Coushatta Reservation's 480 person population is less than 1 percent of the state's projected total AIAN population of 95,000 in 2000.

3.2.1.1 Race-Ethnicity, 1940 and 2000

The Reservation in 2000 is 97.1 percent Nonwhite in its occupied housing and its total population is 52 percent female. Nonwhite females account for 97.2 percent of the female population and 98.5 percent of the total population. The County, the town of Livingston, and the Rural-Nonfarm sector are predominantly White and have 41 percent, 29.6 percent, and 55.2 percent, respectively, owner occupancy in 1940. Countywide, 32.5 percent of all occupied units are Nonwhite; 585 of 2,115 owner occupied units are Nonwhite owners. Rural-Farm is 61.1 percent White with 55.2 percent of its occupied housing owner occupied, 377 of 1,262 owner occupied units are Nonwhite owners. By 2000, 75.3 percent of all Livingston's occupied housing is occupied by Whites. White males dominate the male population but, overall, Livingston is 54 percent female in 2000. White females account for more than 71 percent of the female population and 38.6 percent of the total population.

3.2.2 Tribal Case Example

By population, Polk County ranks 66th of Texas' 254 counties, with a total of 46,397 in 2004. In 2000, 98.7 percent of its population report only one race with 13.2 percent of those reporting African-American and 1.7 percent reporting AIAN while,

overall, 9.4 percent report Hispanic of any race. Polk ranks 63rd in the state by households (2000 enumeration), 157th by poverty rate (15.3 percent, 2002 enumeration), and 43rd by unemployment rate (6.9 percent, 2004 enumeration). In 2003, 39.1 is the median age. Nationwide, Polk ranks 2,465th (of 3,141 counties or county equivalents) by percent of adults with a high school diploma or more education (2000 enumeration) and 1,241st by per capita personal income (2003 estimation). In Polk County, 60 percent of grandparents living with grandchildren have responsibility for those children (2000 enumeration).

3.2.2.1 Alabama-Coushatta Reservation

In 2000, 100 percent of the Alabama-Coushatta Reservation report only one race with none reporting African-American and 96.5 percent reporting AIAN. Overall, 3.5 percent report Hispanic of any race (in this instance, 3.3 percent Mexican with .2 percent Puerto Rican). A total population of 480 is reported with 172 households, 76.4 percent adults age 25 and older with a high school diploma (including equivalency) or more education, and an 11.2 percent unemployment rate. That portion of the population in the labor force equals 57.9 percent. Average household size is 2.84 with average family size of 3.24 and a median age of 30.7. Of grandparents living with grandchildren, 63 percent have responsibility for those children (2000 enumeration).

3.2.2.2 Livingston town

In 2000, 98.4 percent of Livingston town report only one race with 18.5 percent reporting African-American and 0.6 percent reporting AIAN. Overall, 13.9 percent report Hispanic of any race. A total population of 5,433 is reported with 2,048

households, 71.9 percent adults age 25 and older with a high school diploma (including equivalency) or more education, and a 6 percent unemployment rate. That portion of the population in the labor force equals 60.6 percent. Average household size is 2.50, with a median age of 35.3. Of grandparents living with grandchildren, 67 percent have responsibility for those children (2000 enumeration).

3.2.3 Data

Until the end of the 20th century there is no place-specific telephone data.

Table 3.6 Tribal Case – Polk County

	1930	1940	1990	2000
Owners and Renters With Telephones	---	---	---	14,443
Overall Telephone Penetration	---	---	---	95.5%
Total Population	17,555	20,635	30,687	41,133
% Urban Population	0.0%	0.0%	---	20%
Total Housing Units	3,961	5,439	---	21,177
% Urban Housing	---	---	---	10.8%
Total Households-Occupied Units	3,961	5,163	---	15,119
Median Household Income	---	---	$18,968	$30,495
Total Owner Occupants	1,536	2,115	---	12,343
Owner Occupancy % of Total	40.1%	41%	---	81.7%
Owners Without Telephone Service	---	---	---	409
Owners Without Telephone Service %	---	---	---	3.3%
Owners Below Poverty, No Telephone	---	---	---	106
Owners, Poverty, No Telephone, %	---	---	---	6.4%
Poverty Rate	---	---	21.4%	17.4%

Note: All decennial census data from each source was said to be drawn directly from volumes of U.S. Census of Population and Housing, some numbers may not match because of recalculations at source and because some numbers may be based on sample data.

Source: Bureau of the Census 1943-a, 1943-b, 1943-c, 1952-a, 1952-b, 1952-c, 2003, 2004-b, 2004-d, 2004-e, 2004-f, 2005-a, 2005-c, 2005-d, 2005-g; IBRC, 2004; University of Virginia Library, 2005; TSDC, 2004-a, 2004-b, 2004-c, 2000-d.

In Table 3.6 Tribal Case – Polk County, the County evidences population, housing, and ownership growth from 1930 to 2000. Polk County has both a high poverty rate and high overall penetration in its recent estimates.

Table 3.7 Tribal Case – Livingston town

	1930	1940	1990	2000
Owners and Renters With Telephones	---	---	1,794	1,948
Telephone Penetration	---	---	93.7%	95.1%
Total Population	---	---	5,019	5,433
% Rural	---	---	---	14.5%
Total Housing Units	---	569	2,211	2,358
Total Households-Occupied Units	---	543	1,915	2,048
Median Household Income	---	---	$19,806	$31,424
Total Owner Occupants	---	---	---	1,171
Owner Occupancy % of Total	---	49.5%	55.9%	57.2%
Nonwhite Owners	---	---	21.8%	24.7%
Owners Without Telephone Service	---	---	---	36
Owners Without Telephone Service %	---	---	---	3.1%
Occupied Units Below Poverty %	---	---	---	2.2%
Owner Occupants Below Poverty %	---	---	---	12.5%
Owners Below Poverty, No Telephone	---	---	---	0.0%
Renters Without Telephone Service %	---	---	---	11.3%
Poverty Rate	---	---	22.1%	22.3%

Note: All decennial census data from each source was said to be drawn directly from volumes of U.S. Census of Population and Housing, some numbers may not match because of recalculations at source and because some numbers may be based on sample data.

Source: Bureau of the Census 1943-a, 1943-b, 1943-c, 1952-a, 1952-b, 1952-c, 2003, 2004-b, 2004-d, 2004-e, 2004-f, 2005-a, 2005-c, 2005-d, 2005-g; IBRC, 2004; University of Virginia Library, 2005; TSDC, 2004-a, 2004-b, 2004-c, 2000-d.

Table 3.7 Tribal Case – Livingston town indicates that the town of Livingston changes very little between 1990 and 2000. Occupied housing units without telephones increase to 6.8 percent from 6.3 percent. Livingston is 1.1 percent lower in 1990 and 2.5 percent lower in 2000 than the national estimate. Livingston owners with telephones are 8.2 percent more than Livingston renters with telephone service.

Livingston has high poverty rates and high overall penetration in its recent estimates but less progress in owner occupancy as a percent of total. It has less poverty and greater penetration than the Reservation.

Table 3.8 Tribal Case – Alabama-Coushatta Reservation

	1930	1940	1990	2000
Owners and Renters With Telephones	---	---	129	145
Telephone Penetration	---	---	90.2%	84.3%
Total Population	---	---	478	480
% Rural	---	---	---	100%
Total Housing Units	---	---	150	203
Total Households-Occupied Units	---	---	143	172
Median Household Income	---	---	$22,321	$26,458
Total Owner Occupants	---	---	---	157
Owner Occupancy % of Total	---	---	92.3%	91.2%
Nonwhite Owners	---	---	100%	97.1%
Owners Without Telephone Service	---	---	---	20
Owners Without Telephone Service %	---	---	---	12.7%
Occupied Units Below Poverty %	---	---	25.9%	23.3%
Owner Occupants Below Poverty %	---	---	---	25.5%
Owners Below Poverty, No Telephone	---	---	---	13
Owners, Poverty, No Telephone, %	---	---	---	8.3%
Renters Without Telephone Service	---	---	---	0.0%
Poverty Rate	---	---	23.9%	23%

Note: All decennial census data from each source was said to be drawn directly from volumes of U.S. Census of Population and Housing, some numbers may not match because of recalculations at source and because some numbers may be based on sample data.

Source: Bureau of the Census 1943-a, 1943-b, 1943-c, 1952-a, 1952-b, 1952-c, 2003, 2004-b, 2004-d, 2004-e, 2004-f, 2005-a, 2005-c, 2005-d, 2005-g; IBRC, 2004; University of Virginia Library, 2005; TSDC, 2004-a, 2004-b, 2004-c, 2000-d.

From Table 3.8 Tribal Case – Alabama-Coushatta Reservation, in 1990, 9.8 percent of the Reservation's occupied dwellings lack telephones. At that same time, about 9.1 percent of occupied dwellings lack complete plumbing. Ten years later, those without telephones increase to 11.6 percent while 3.5 percent of occupied housing

lacked complete plumbing. Reservation population is relatively unchanged from 1990 to 2000. Nationally, American Indian households have a less than 50 percent telephone penetration rate in 1990 and a 67.7 percent penetration rate in 2000; this case is above those national estimates in both 1990 and 2000. However, it is lower than Livingston by 3.5 percent in 1990 and by nearly 11 percent in 2000. The absolute value of change between 1990 and 2000 at Reservation and town levels are far apart. The Reservation experiences a drop in overall penetration from 1990 to 2000, falling further below the national average. Owners with telephone service are 12.7 percent less than renters with telephone service in 2000. Reservation owner-occupancy estimates are higher than those in town or county. Owner-occupancy might be an important consideration but is likely cross-linked with other income factors.

3.3 Rural Case

This case uses a .5 percent rural, 99.5 percent urban split as its defining point. Of Texas counties with less than .5 percent urban population (TSDC, 2004-b, 2004-c), the county of Blanco is selected because its median household income, $40,338, is closest to the state average, $40,063 (Bureau of the Census, 2004-b, 2004-d, 2005-d). In 2000, 20 Texas counties have a 75 percent urban, 25 percent rural split and 58 counties have zero urban population and zero urban housing. The state average is 82.5 percent urban population and 80.7 percent urban housing (TSDC, 2004-a, 2004-b, 2004-c). Income and telephone service are correlated in recent studies (FCC, 2003-a).

3.3.1 Critical Indicators

Blanco County's 2000 telephone penetration rate is 96.5 percent. In 1940, 52.4 percent of the County's rural occupied housing units have electric lights and 64.7 percent have radio. Its population growth from 1970 to 2000 is 136 percent and from 1990 to 2000 is 41 percent. Its undeflated 2002 median household income is $40,338; its undeflated 2000 median household income is $36,369; and its 1990 median household income is $22,297. Its poverty rate of 17 percent in 1990 decreases to 11.2 percent in 2000. Population density in 2000 is 11.8 per square mile; land area is 711.2 square miles. It is a wholly rural county in both the early and later parts of the 20th century. Agrarian activity is very important in Blanco County. In 1940, 59.3 percent of rural farm units have radio and 41.2 percent have electric lights. There are 48 fewer farms with telephones in 1950 than in 1945, 210 vis-à-vis 258, but eight more with electricity, 505 vis-à-vis 497.

Blanco city has a 2000 telephone penetration rate of 94.6 percent, up substantially from its 1990 rate of 61.4 percent. A year by year analysis of the change might identify which part of that growth is due to special dispensations given rural areas by the legislation. Blanco's 2000 undeflated median household income of $31,071 is an increase from its 1990 median household income of $18,657; its 2000 per capita income is $14,797. Its poverty rate drops to 13.1 percent in 2000 from 16.9 percent in 2000. Blanco city is wholly rural. While it seems the effect of being rural is indicated in the pace of infrastructure development, other factors may have strong bearing. Blanco's pace has a different acceleration than the first case presented. Blanco has

slower telephone development, similar income, and less poverty when contrasted to the Tribal case. It could be the roles of income and owner-occupancy require greater attention than given here, yet, by 2000, these three places, Blanco, Livingston, and the Reservation, are in a median household income range of $26,000 to $31,500. There is not a full $6,000 difference between them. Their per capita incomes show greater disparity but are still within a range of $7,000 difference: $14,797 in Blanco, $17,214 in Livingston, and $10,465 on the Reservation. Blanco's poverty rate is about 10 percent lower than that of the preceding case. This suggests that rural poverty and income, the extent of area wealth, are a likely linchpin, and that owner-occupancy could be a crucible in particular relation to area wealth.

3.3.1.1 Race-Ethnicity, 1940 and 2000

By 2000, 91.3 percent of Blanco city's occupied housing is occupied by Whites. White males dominate the male population but not the total population. Overall, Blanco is 53.1 percent female in 2000 with White females accounting for more than 89 percent of the female population and 47.6 percent of the total population. Altogether, Blanco has 169 Nonwhite males and females, representing 11.2 percent of the total population and living in 50 of Blanco's 576 occupied housing units. Blanco County population overall is even more heavily weighted with Whites than is Polk County in 1940 although it has somewhat stronger owner-occupancy than Polk. Rural-Nonfarm is 98.6 percent White with 53.6 percent of its occupied housing owner occupied and Rural-Farm is 96.1 percent White with 62.6 percent of its occupied housing owner occupied.

3.3.2 Rural Case Example

By population, Blanco County ranks 173rd of Texas' 254 counties with a population of 9,101 in 2004. In 2000, 98.4 percent of its population report only one race with 0.7 percent of those reporting African-American and 0.6 percent reporting AIAN while, overall, 15.3 percent report Hispanic of any race. Blanco ranks 174th in the state by households (2000 enumeration), 235th by poverty rate (10.2 percent, 2002 estimation), and 218th by unemployment rate (4.3 percent, 2004 enumeration). In 2003, 39.6 is the median age. Nationwide, Blanco ranks 1,326th (of 3,141 counties or county equivalents) by percent of adults with a high school diploma or more education (2000 enumeration) and 769th by per capita personal income (2003 estimation).

3.3.2.1 Blanco city

In 2000, 99 percent of Blanco city reports only one race with 1.2 percent reporting African-American and 1.3 percent reporting AIAN. Overall, 22.7 percent report Hispanic of any race. A total population of 1,505 is reported with 576 households, 74.3 percent adults age 25 and older with a high school diploma (including equivalency) or more education, and a 3.3 percent unemployment rate. That portion of the population in the labor force equals 57.6 percent. Average household size is 2.46, with a median age of 39.3. Total Blanco population for 1940 and 1950 is in the 1950 Census for 1940 and 1950: accordingly, Blanco has a population of 718 in 1950 and 453 in 1940 although the county is more greatly inhabited (Bureau of the Census, 1952-a, Table 7, pp. 43-29).

3.3.2.2 Blanco Farms, 1940-1950

Blanco is also in the 1950 Farm Report, most likely because Blanco County is reported as having 89.9 percent of its land area in farms (Bureau of the Census, 1952-b, pp. 61-367). This provides somewhat different information than that of the other cases. In 1950, 567 farms have 561 White operators, representing 98.9 percent of all operators. Whites operate 412,939 acres, leaving 967 acres operated by six Nonwhite operators.

3.3.3 Data

It is not until 1990 that there is telephone data.

Table 3.9 Rural Case – Blanco County

	1930	1940	1990	2000
Owners and Renters With Telephones	---	---	---	3,188
Overall Telephone Penetration	---	---	---	96.5%
Total Population	3,842	4,264	5,972	8,418
% Urban Population	0.0%	0.0%	---	0.0%
Total Housing Units	903	1,242	---	4,031
% Urban Housing	---	---	---	0.0%
Total Households-Occupied Units	---	1,159	---	3,303
Median Household Income	---	---	$22,297	$39,369
Total Owner Occupants	550	693	---	2,597
Owner Occupancy % of Total	62.6%	59.8%	---	78.6%
Owners Without Telephone Service	---	---	---	59
Owners Without Telephone Service %	---	---	---	2.3%
Owners Below Poverty, No Telephone	---	---	---	11
Owners, Poverty, No Telephone, %	---	---	---	0.42%
Poverty Rate	---	---	17%	11.2%

Note: All decennial census data from each source was said to be drawn directly from volumes of U.S. Census of Population and Housing, some numbers may not match because of recalculations at source and because some numbers may be based on sample data.

Source: Bureau of the Census 1943-a, 1943-b, 1943-c, 1952-a, 1952-b, 1952-c, 2003, 2004-b, 2004-d, 2004-e, 2004-f, 2005-a, 2005-c, 2005-d, 2005-g; IBRC, 2004; University of Virginia Library, 2005; TSDC, 2004-a, 2004-b, 2004-c, 2000-d.

Table 3.9 Rural Case – Blanco County indicates a poverty rate hovering in the mid-ranges, high overall penetration, and steady population growth but a lack of momentum in its owner occupancy as a percent of total.

Table 3.10 Rural Case – Blanco city and Farm

	1930	1940	1990	2000
Owners and Renters With Telephones	---	---	297	546
Telephone Penetration	---	---	61.4%	94.6%
Total Population	---	---	1,238	1,505
% Rural	---	---	---	100%
Total Housing Units	---	---	567	633
Total Households-Occupied Units	---	---	484	577
Median Household Income	---	---	$18,657	$31,071
Total Owner Occupants	---	---	---	368
Owner Occupancy as % of Total	---	---	65.5%	63.8%
Nonwhite Owners	---	---	6.4%	8.7%
Owners Without Telephone Service	---	---	---	10
Owners Without Telephone Service %	---	---	---	2.7%
Occupied Units Below Poverty %	---	---	---	15.1%
Owner Occupants Below Poverty %	---	---	---	11.4%
Owners Below Poverty, No Telephone	---	---	---	4
Owners, Poverty, No Telephone, %	---	---	---	1.1%
Renters Without Telephone Service %	---	---	---	10.5%
Poverty Rate	---	---	16.9%	13.1%

Blanco Farm	1945
Farms with Telephone	258
As % of Total Farms	38.3%
Total Farms	674
Total Farm Operators	673

Note: All decennial census data from each source was said to be drawn directly from volumes of U.S. Census of Population and Housing, some numbers may not match because of recalculations at source and because some numbers may be based on sample data.

Source: Bureau of the Census 1943-a, 1943-b, 1943-c, 1952-a, 1952-b, 1952-c, 2003, 2004-b, 2004-d, 2004-e, 2004-f, 2005-a, 2005-c, 2005-d, 2005-g; IBRC, 2004; University of Virginia Library, 2005; TSDC, 2004-a, 2004-b, 2004-c, 2000-d.

Table 3.10 Rural Case – Blanco city and Farm indicates that, in 1990, 38.6 percent of occupied housing units lack telephones. Ten years later, only 5.6 percent do. This case indicates a substantial increase in telephone penetration from 1990 to 2000 but lags the national estimates for that same time frame by 33.4 percent to 3 percent. Infrastructure development appears to have been quickly adapted whereas general owner occupancy indicates a flatness. Owner occupancy seems on a plateau although Nonwhite ownership indicates a modicum of growth. Owners with telephone service are 7.8 percent more than renters with telephone service. Telephone penetration in the farm sector lags the national estimate, possibly in 1990 as in the 1950 era, and indicates a small drop in penetration relevant to the 1934 Act.

3.4 Minority Case

State ratios indicate that of the three dominant race-ethnicity groups, White (Anglo in the reports), Black, and Brown (Hispanic in the reports), Blacks have the least proportion of the overall population and, therefore, can be said to be the minority group of the three groups (TSDC, 2004-a, 2004-d). All Texas counties with 20 percent or more Black population in both 1990 and 2000 are identified and ranked by similarity to the state's overall racial pattern. Based on these considerations, the county of Waller is selected. Minority identification draws from Census Bureau definitions; survey respondents self-identify (Bureau of Census, 2005-f). According to the Universal Service Task Force (FCC-CCB, 1996), overall subscriber increases plateau after 1983 but minority subscribers increase at about 6 percent, a rate of increase more than double the national rate. Nonetheless, there are about 10 percent less subscribers in Black and

Hispanic households than in White households, falling behind by as much as 30 percent in some demographic categories. Minority households are often identified as continuing to have lower rates of penetration with gaps decreasing only at the highest personal income levels. Minority households with children were among the highest rates of nonsubscribers (FCC-CCB, 1996, p. 10).

3.4.1 Critical Indicators

Waller County's 2000 telephone penetration is 94.4 percent. In 1940, 23.5 percent of the County's rural occupied housing units have electric lights and 36.6 percent have radio. Its population growth from 1970 to 2000 is 128.7 percent and from 1990 to 2000 is 39.7 percent. Its undeflated 2002 median household income is $36,539; its undeflated 2000 median household income is $38,136; and its 1990 median household income is $22,334. Its poverty rate of 21.3 percent in 1990 decreases to 16 percent in 2000. Population density in 2000 is 63.6 per square mile; land area is 513.6 square miles. Its population is 36.6 percent urban and its housing 30.2 percent urban at that time.

Hempstead has a 2000 telephone penetration rate of 85.7 percent, down from its 1990 rate of 90.8 percent. Its 2000 undeflated median household income of $24,095 is an increase from its 1990 median household income of $16,784; its 2000 per capita income is $11,560. Its poverty rate increases to 29.9 percent in 2000 from 29 percent in 1990. Hempstead is mostly urban, being identified as 9.2 percent rural, and has the highest poverty rate, in excess of 29 percent, of the cases discussed thus far. Especially at the sub-county level, financial difficulty and poverty indicators are greater in this

case than in preceding ones. This case presents a substantially different race configuration and a far more nearly even gender mix than those previously presented; the recently high rate of poverty may be important for reasons like those of preceding cases.

3.4.1.1 Race-Ethnicity, 1940 and 2000

Hempstead in 1940 is 39.4 percent Nonwhite with 55.6 percent owner occupancy. In 2000, 88.1 percent of its total households report as either Black or African-American or as White Alone, leaving 198 households reporting as AIAN, Asian Alone, NHOPI Alone, Some Other Race Alone, or Two More Race Groups. More than 88 percent of those 198 households, 175, identify themselves as Some Other Race Alone. By 2000, 40.8 percent of all Hempstead's occupied housing is occupied by Whites, in contrast to the 60.6 percent White occupancy of 1940. White males are not dominant. White males represent 40 percent of the male population and 19.7 percent of the total population. Overall, Hempstead is 50.7 percent female in 2000 with White females accounting for 39.7 percent of the female population and 20.1 percent of the total population. Waller County population overall is less singularly distributed in 1940 than preceding cases. Waller's occupied housing is 48.6 percent Nonwhite in occupancy, owner-occupancy is 49.7 percent. Waller County does not report any Nonwhites other than Negroes in 1940 and by 2000 appears to be mostly a black and white area.

3.4.2 Minority Case Example

By population, Waller County ranks 83rd of Texas' 254 counties with a population of 34,757 in 2004. In 2000, 98.2 percent of its population report only one race with 29.2 percent of those reporting African-American and 0.5 percent reporting AIAN while, overall, 19.4 percent report Hispanic of any race. Waller ranks 91st in the state by households (2000 enumeration), 112th by poverty rate (17.2%, 2002 estimation), and 66th by unemployment rate (6.4%, 2004 enumeration). In 2003, 30.1 is the median age. Nationwide, Waller ranks 2,103rd (of 3,141 counties or county equivalents) by percent of adults with a high school diploma or more education (2000 enumeration) and 1,810th by per capita personal income (2003 estimation).

3.4.2.1 Hempstead city

In 2000, 98.3 percent of Hempstead city report only one race with 43.4 percent reporting African-American and 0.1 percent reporting AIAN. Overall, 24.8 percent report Hispanic of any race. A total population of 4,691 is reported with 1,663 households, 68.8 percent adults age 25 and older with a high school diploma (including equivalency) or more education, and a 5 percent unemployment rate. That portion of the population in the labor force equals 53.1 percent. Average household size is 2.73, with a median age of 29.3.

3.4.3 Data

It is not until 1990 that there is telephone data.

Table 3.11 Minority Case – Waller County

	1930	1940	1990	2000
Owners and Renters With Telephones	---	---	---	9,962
Overall Telephone Penetration	---	---	---	94.4%
Total Population	10,014	10,280	23,390	32,663
% Urban Population	0.0%	0.0%	---	36.6%
Total Housing Units	---	---	---	11,955
% Urban Housing	0.0%	0.0%	---	30.2%
Total Households-Occupied Units	2,564	2,739	---	10,557
Median Household Income	---	---	$22,334	$38,136
Total Owner Occupants	1,151	1,362	---	7,650
Owner Occupancy % of Total	46.9%	49.7%	---	72.5%
Owners Without Telephone Service	---	---	---	256
Owners Without Telephone Service %	---	---	---	3.3%
Owners Below Poverty, No Telephone	---	---	---	95
Owners, Poverty, No Telephone, %	---	---	---	1.2%
Poverty Rate	---	---	21.3%	16%

Note: All decennial census data from each source was said to be drawn directly from volumes of U.S. Census of Population and Housing, some numbers may not match because of recalculations at source and because some numbers may be based on sample data.

Source: Bureau of the Census 1943-a, 1943-b, 1943-c, 1952-a, 1952-b, 1952-c, 2003, 2004-b, 2004-d, 2004-e, 2004-f, 2005-a, 2005-c, 2005-d, 2005-g; IBRC, 2004; University of Virginia Library, 2005; TSDC, 2004-a, 2004-b, 2004-c, 2000-d.

In Table 3.11 Minority Case – Waller County, high overall penetration, an average to high poverty rate which decreases between 1990 and 2000, and growth in both population and owner occupancy are observed.

Table 3.12 Minority Case – Hempstead city

	1930	1940	1990	2000
Owners and Renters With Telephones	---	---	1,223	1,425
Telephone Penetration	---	---	90.8%	85.7%
Total Population	---	---	3,551	4,691
% Rural	---	---	---	9.2%
Total Housing Units	---	521	1,545	1,848
Total Households-Occupied Units	---	502	1,347	1,663
Median Household Income	---	---	$16,784	$24,095
Total Owner Occupants	---	---	---	948
Owner Occupancy as % of Total	---	55.6%	64.3%	57.2%
Nonwhite Owners	---	---	53.7%	59.2%
Owners Without Telephone Service	---	---	---	53
Owners Without Telephone Service %	---	---	---	5.6%
Occupied Units Below Poverty %	---	---	---	27.5%
Owner Occupants Below Poverty %	---	---	---	19.2%
Owners Below Poverty, No Telephone	---	---	---	31
Owners, Poverty, No Telephone, %	---	---	---	3.3%
Renters Without Telephone Service %	---	---	---	23.2%
Poverty Rate	---	---	29%	29.9%

Note: All decennial census data from each source was said to be drawn directly from volumes of U.S. Census of Population and Housing, some numbers may not match because of recalculations at source and because some numbers may be based on sample data.

Source: Bureau of the Census 1943-a, 1943-b, 1943-c, 1952-a, 1952-b, 1952-c, 2003, 2004-b, 2004-d, 2004-e, 2004-f, 2005-a, 2005-c, 2005-d, 2005-g; IBRC, 2004; University of Virginia Library, 2005; TSDC, 2004-a, 2004-b, 2004-c, 2000-d.

Table 12 – Minority Case – Hempstead city indicates that, in 1990, 9.2 percent of all Hempstead's occupied housing units lack telephones. Ten years later, nonsubscribers increase to 12.8 percent. From 1990 to 2000 this case has a rate of change, 5.1 points, greater than that of the value of the change in the national estimates, however, the case experiences a drop rather an increase between the enumerations and lags the national level by 4 percent in 1990 to nearly 12 percent in 2000. Telephone penetration is low overall because of the low level among renters. Owner occupants

have a 94.4 percent overall rate. Owner-occupancy estimates increase from 1930 and 1940 to 1990 but by 2000 appear to be shifting as Nonwhite owner occupancy increases. The general pattern is somewhat like that of Blanco's (rural case) plateau effect but seeming more pronounced. Owners with telephones are 17.6 percent greater than renters with telephones. Hempstead's telephone subscribers and per capita income in 2000 have greater similarity to those of the Reservation than to Blanco's. Indicators relevant to the 1934 Act are very limited although infrastructure appears to have developed readily.

3.5 Low Income Case

Income is considered a primary predictor of nonsubscribers (FCC-CCB, 1996, p. 11). The poor, like the rural, are identified as particularly vulnerable to untimely or lack of access to infrastructure, especially that with advanced telecommunications capability (FCC, 2003-a). Because there is little consistency in defining low income and because zero poverty is presumed optimal, this case uses the state's 2002 all ages in poverty rate of 15.4 percent as the demarcation of low income (Bureau of the Census, 2005-d). According to the Small Area Income and Poverty estimates (Bureau of the Census, 2005-d), the state's range is 10.5 percent in Parker County to 23.4 percent in Pecos County. Three counties, Coryell, Hunt, and Montague, have the same all ages in poverty rate as the state average. Of these three, the county of Montague is selected because its median household income, $31,475, is lowest of the three and because of its urban-rural split: 46.3 percent urban and 53.7 percent rural population; 41.7 percent urban and 58.3 percent rural housing (Bureau of the Census, 2005-d; TSDC, 2004-c,

2004-d). Coryell has a $35,841 median household income and Hunt's is $36,133. Ten counties have a median household income between $39,000 and $41,500, within which range the state average, $40,063, falls.

In the 1980s low income assistance programs, explicit subsidization, are inaugurated for telephone service to help offset some of the vulnerabilities of the poor, programs like Lifeline and LinkUp (FCC-CCB, 2004). These programs are first offered in 1984-1989 and Texas begins participating in 1988 (FCC-CCB, 1996, 2004). A 1991 study finds only about 10 percent of eligible households in Texas receive assistance (FCC-CCB, 1996, p. 23).

Table 3.13 Comparison of Texas with and without Lifeline Assistance, and All States

	Low Income Households			All Households		
	Mar-84	Mar-97	4-Mar	Mar-84	Mar-97	4-Mar
Texas Households	74%	80%	86%	88%	91%	92%
with assistance	79%	86%		92%	94%	
w/out assistance	84%	87%		93%	93%	
Average, All States	80%	86%		92%	94%	

Note: Total Federal and State Lifeline Support April 2001 (Texas) = $11.35 (local rate reduction); Average State financial aid per telephone line in March 2004 is $3.19.

Source: FCC-CCB, 2004, Table 7.1, p. 7-5

As indicated in Table 3.13 Comparison of Texas with and without Lifeline Assistance, and All States, even with low participation assistance appears instrumental to higher penetration rates. Texas low income household penetration, without quite a decade of participation, is up in 1997 6 percent over 1984 and increases another 6 percent during the subsequent seven years. All Texas households have rates of increase of 3 percent and 1 percent at the same points in time.

Assistance does not eliminate concerns about the vulnerability of the low income and the poor, not least because trends indicate the numbers of population falling into the categories of working-poor and poor are increasing. Studies indicate that the greatest extent of households without telephone service is found among those with household income below the $20,000 bracket (FCC-CCB, 2004). One poverty-related analysis profiles poor households without telephone service as greatest among (1) adult heads of household between 15 and 24, (2) African-Americans in that same age group, (3) welfare and public assistance recipients, (4) those with an income of $15,000 or less, and (5) households headed by females-with-children living at or below the poverty line (FCC-CCB, 1996, p. 11). Related to low income concerns are findings that renters and persons in non-permanent living situations, a group also termed in-transit persons, have more nonsubscribers than home owners (FCC-CCB, 1996, p. 10). Mobility (persons in-transit) is said to be highly correlated with nonsubscribers, particularly if households have lived at their current residence for less than one year and are near or below the poverty line (FCC-CCB, 1996, p. 12).

Low income is often defined by participation in assistance programs such as Medicaid, food stamps, Supplemental Security Income (SSI), federal public housing assistance (Section 8), Low Income Home Energy Assistance Program (LIHEAP), BIA general assistance, Head Start (income-qualifying standard), or the National School Lunch Program (free lunch program). Codification of mortgage insurance for group practice facilities and medical practice facilities defines the low-income sections of urban areas as the sections of the larger urban area in which median family income is

substantially lower than median family income for the area as a whole as determined by an appropriate official (U.S. Code, 2003). The FCC (2003-a) uses a definition which arrays by median household income the approximately 30,000 American zip codes and then sorts the arranged codes into deciles of equal number. The lowest deciles represents low income, which is median household income of less than $21,645, and the highest deciles represents high income, which is median household income of more than $53,478.

3.5.1 Critical Indicators

Montague County's 2000 telephone penetration rate is 95.3 percent. In 1940, 43 percent of the County's occupied housing units have electric lights and 64.9 percent have radio. The County's population growth from 1970 to 2000 is 24.7 percent and from 1990 to 2000 is 10.7 percent. Its undeflated 2002 median household income is $31,475; its undeflated 2000 median household income is $31,048; and its 1990 median household income is $19,054. Its poverty rate of 18.5 percent in 1990 decreases to 14 percent in 2000. Population density in 2000 is 20.5 per square mile; land area is 930.7 square miles. Its housing is 41.7 percent urban in 2000 and its population indicates increasing urbanization over time: 16.3 percent urban in 1930, 29.7 percent urban in 1940, and 43.6 percent urban in 2000. There appears a steady development and adaptation of infrastructure. Bowie has a telephone penetration rate of 94.3 percent in 2000, down from its 1990 rate of 95.5 percent. In 1940, 87.8 percent of Bowie's occupied housing units had electric lights and 78.3 percent had radio. Its 2000 undeflated median household income of $29,452 is an increase from its 1990 median

household income of $18,806; its 2000 per capita income is $14,950. Its poverty rate falls to 14.4 percent in 2000 from 19.4 percent in 1990. Bowie is 3.2 percent rural; its poverty rate and income levels are at neither the high end or the low end of the cases already discussed. Bowie's 2000 telephone penetration is similar to Blanco and Livingston.

3.5.1.1 Race-Ethnicity, 1940 and 2000

In 1940 Bowie and Montague County report no Nonwhites at all in occupied housing. Owner occupancy is 51.3 percent in Bowie and 47.3 percent at the County level. In 2000 in Bowie, Whites represent 97 percent of occupied housing units. White males represent 95.9 percent of Bowie's male population and 43.3 percent of the total population. Overall, Bowie is nearly 54.8 percent female in 2000 with White females accounting for 96 percent of the female population and 52.7 percent of the total population.

3.5.2 Low Income Case Example

By population, Montague County ranks 120th of Texas' 254 counties with a population of 19,503 in 2004. In 2000, 98.8 percent of its population report only one race with 0.2 percent of those reporting African-American and 0.7 percent reporting AIAN while, overall, 5.4 percent report Hispanic of any race. Montague ranks 112th in the state by households (2000 enumeration), 154th by poverty rate (15.4 percent, 2002 estimation), and 162nd by unemployment rate (5.2 percent, 2003 enumeration). In 2003, 41.2 is the median age. Nationwide, Montague ranks 2,205th (of 3,141 counties or county equivalents) by percent of adults with a high school diploma or more education

(2000 enumeration) and 1,879th by per capita personal income (2003 estimation). Of grandparents living with grandchildren, 60 percent have responsibility for those children (2000 enumeration).

3.5.2.1 Bowie city

In 2000, 98.5 percent of Bowie city report only one race with 0.1 percent reporting African-American and 0.7 percent reporting AIAN. Overall, 4.7 percent report Hispanic of any race. A total population of 5,219 is reported with 2,106 households, 68.5 percent adults age 25 and older with a high school diploma (including equivalency) or more education, and a 5.7 percent unemployment rate. That portion of the population in the labor force equals 55.7 percent. Average household size is 2.38, with a median age of 39.6.

3.5.3 Data

It is not until 1990 that there is telephone data.

Table 3.14 Low Income Case – Montague County

	1930	1940	1990	2000
Owners and Renters With Telephones	---	---	---	7,403
Overall Telephone Penetration	---	---	---	95.3%
Total Population	19,159	20,442	17,274	19,177
% Urban Population	16.3%	29.7%	---	43.6%
Total Housing Units	---	5,689	---	9,862
% Urban Housing	---	---	---	41.7%
Total Households-Occupied Units	4,752	5,433	---	7,770
Median Household Income	---	---	$19,054	$31,048
Total Owner Occupants	2,281	2,568	---	6,124
Owner Occupancy % of Total	49.2%	47.3%	---	78.8%
Owners Without Telephone Service	---	---	---	178
Owners Without Telephone Service %	---	---	---	2.9%
Owners Below Poverty, No Telephone	---	---	---	69
Owners, Poverty, No Telephone, %	---	---	---	1.1%
Poverty Rate	---	---	18.5%	14%

Note: All decennial census data from each source was said to be drawn directly from volumes of U.S. Census of Population and Housing, some numbers may not match because of recalculations at source and because some numbers may be based on sample data.

Source: Bureau of the Census 1943-a, 1943-b, 1943-c, 1952-a, 1952-b, 1952-c, 2003, 2004-b, 2004-d, 2004-e, 2004-f, 2005-a, 2005-c, 2005-d, 2005-g; IBRC, 2004; University of Virginia Library, 2005; TSDC, 2004-a, 2004-b, 2004-c, 2000-d.

From Table 3.14 Low Income Case – Montague County, total population in 1930 and 2000 are similar although there are fluctuations inbetween. Its owner occupancy indicates steady growth, its poverty rate is in the mid-ranges, and its overall telephone penetration is high.

Table 3.15 Low Income Case – Bowie city

	1930	1940	1990	2000
Owners and Renters With Telephones	---	---	1,916	1,985
Telephone Penetration	---	---	95.5%	94.3%
Total Population	3,131	3,471	4,990	5,219
% Rural	---	---	---	3.2%
Total Housing Units	892	1,042	2,442	2,476
Total Households-Occupied Units	---	1,011	2,006	2,106
Median Household Income	---	---	$18,806	$29,452
Total Owner Occupants	---	---	---	1,461
Owner Occupancy as % of Total	57.1%	51.3%	74.4%	69.4%
Nonwhite Owners	---	0.0%	1.1%	3%
Owners Without Telephone Service	---	---	---	35
Owners Without Telephone Service %	---	---	---	2.4%
Occupied Units Below Poverty %	---	---	---	15.9%
Owner Occupants Below Poverty %	---	---	---	10.7%
Owners Below Poverty, No Telephone	---	---	---	25
Owners, Poverty, No Telephone, %	---	---	---	1.7%
Renters Without Telephone Service %	---	---	---	12.7%
Poverty Rate	---	---	19.4%	14.4%

Note: All decennial census data from each source was said to be drawn directly from volumes of U.S. Census of Population and Housing, some numbers may not match because of recalculations at source and because some numbers may be based on sample data.

Source: Bureau of the Census 1943-a, 1943-b, 1943-c, 1952-a, 1952-b, 1952-c, 2003, 2004-b, 2004-d, 2004-e, 2004-f, 2005-a, 2005-c, 2005-d, 2005-g; IBRC, 2004; University of Virginia Library, 2005; TSDC, 2004-a, 2004-b, 2004-c, 2000-d.

Table 3.15 Low Income Case – Bowie city indicates that, in 1990, 4.5 percent of all Bowie's occupied housing units lack telephones. Ten years later, nonsubscribers rose to 5.5 percent. From 1990 to 2000 telephone penetration in this case experiences a drop of 1.2 points and falls behind national estimates. Exceeding the national level by .7 percent in 1990, it lags it by 3.3 percent in 2000. Owners with telephones are 10.3 percent greater than renters with telephones. Bowie has a growing population, declining poverty rates, a high level of unsubscribed renters, and a high overall

penetration rate. Its unusual owner occupancy pattern may be related to its lack of diversity. Nonwhite owner occupancy increases from zero prior to 1990 to 3 percent in 2000; general owner-occupancy grows to a 1990 peak after which it declines. Indicators relevant to the 1934 Act are limited.

3.6 Inner City Case

Because inner city (central city) connotes large urban concentrations, counties with historically large populations were reviewed. In Texas, 15 counties had both an urban population and urban housing of 90-99 percent, only Dallas was 99 percent (TSDC, 2004-a, 2004-b, 2004-c, 2004-d; University of Virginia Library, 2005; Bureau of the Census, 2004-b, 2004-e, 2004-f, 2005-a, 2005-c). Also, the Milken Institute ranks Dallas second, behind San Jose in the Silicon Valley, in its 1999 rankings of areas attractive as "Tech-Poles" (Norton, 2003, p. 67, citing DeVol), and this suggests Dallas might be a particularly poignant example of the digital-divide. Milken's rankings are established by multiplying an area's percentage of U.S. high-tech output by its U.S. high-tech output location quotient. Distribution of population and economic activities in contrast to other Texas counties housing large metropolitan areas supports selection of Dallas. Within a narrower focus, the 1934 and 1996 inner city are not the same. Census blocks change over time, the built environment changes over time, and identifiable landmarks are not consistent going back in time. Census maps were reviewed and this case became more particularly defined as that portion of Dallas city which is only within Dallas County. This delineation recognizes that (1) the chief centralized area of business and government activity has historically remained near the

Trinity River and in or near what is the contemporary Dallas Central Business District (CBD) area, and, (2) there is a higher than average minority population and poverty rate in Dallas city. The stricture of a White and Nonwhite composition limits the importance of an identifiably dominant minority population after place specification although ordinarily dominant minority type would continue as a critical inner city parameter.

Inner cities lack precise definition because most are characterized by unique, place-specific features which reflect less favorable positions within the overall metropolitan area, older infrastructure, higher unemployment, and lower income, as well as an identifiably dominant minority population. Neither of the two most commonly used definitions of urban, the Census Bureau's Urban-Rural classification of population and the Office of Management and Budget's (OMB) Metropolitan-Nonmetropolitan system, includes inner city distinctions. The two definitions do not completely overlap, apply to different geographies, and are meant for different purposes (Federal Office of Rural Health Policy et. al., 1998). OMB (2000) states that a formal definition of inner city might be useful in classifications of settlement types and land uses whose patterns below the county level describe the distribution of population and economic activity but is not necessary for classification of functional ties between geographic entities. In the same notice, OMB (2000, p. 82233) acknowledges that settlement structure has become "unreliable as an indicator of metropolitan character" because of changes in communications technologies, commuting patterns, and settlement itself. Census Bureau definitions include those of metropolitan areas which

are a central city surrounded by economically integrated communities with economic integration measured by commutes: residents of surrounding cities commute in and out of a central location. Since inner cities are rarely the destination of a commute although they may be adjacent to such a destination, this definition does not describe inner cities. The proximity of inner cities to business and industrial areas where demand for telephone access and advanced capability is great might "positively affect availability" in inner city areas but fails to provide meaningful access or capabilities to inner cities (FCC, 2003-a, p. 93).

3.6.1 Critical Indicators

Dallas County generally indicates that large metropolitan areas are trendsetters and front runners in adapting modern structural amenities and conveniences, including telephones. Dallas County's 2000 telephone penetration rate is 97.4 percent. Its population growth from 1970 to 2000 is 67.1 percent and from 1990 to 2000 is 18.1 percent. Its undeflated 2002 median household income is $41,271; its 2000 undeflated median household income is $43,324; and its 1990 median household income is $31,605. Its poverty rate of 13.5 percent in 1990 decreases to 13.4 percent in 2000. Population density in 2000 is 2,522.6 per square mile; land area is 879.6 square miles. Its housing is 99.1 percent urban in 2000; its population is predominantly urban through most of the 20th century: 83.9 percent urban in 1930, 90.2 percent urban in 1940, and 99.1 percent urban in 2000.

City density in 2000 is 3,469.9 per square mile. The city is not wholly urban, .2 percent is identified as rural. Dallas city has a telephone penetration rate of 96.6

percent in 2000, up from 88.4 percent in 1990. Telephone penetration in 1960 in Dallas city is 82.4 percent with a rate of increase between 1960 and 1990 of six percent for the entire 30 years; the same 30 years rate of increase at the national level is 16.3 percent. These 1960 data indicate that 17.6 percent of Dallas's occupied housing units lack telephones (Bureau of the Census, 1963). Thirty years later, nonsubscribership has fallen to 11.6 percent and by 2000 it drops to 3.4 percent. Early and rapid adaptation of modern infrastructure is indicated. In 1940 93.6 percent of Dallas' occupied housing units have electric lights and 87.1 percent have radio. Nonwhites reporting electric lights is lower than the overall estimate, ranging from 71 percent to 79 percent. The city's 2000 undeflated median household income is $37,628, an increase from that of 1990; the 2000 per capita income is $22,183. In 1990 median household income and poverty are split between northeast and southeast Dallas areas. Northeast Dallas median household income is $28,758 and southeast Dallas median household income is $22,733. The city's poverty rate is 17.8 percent in 2000; in 1990 its northeast rate is 16 percent and southeast rate is 24.4 percent.

3.6.1.1 Race-Ethnicity, 1940 and 2000

In 1940, Dallas reports being 16.5 percent Nonwhite in occupied housing with owner occupancy at 34.9 percent. In 2000, Nonwhites hold 42.3 percent of occupied housing units; overall owner occupancy is at 43.2 percent. White males represent 51.6 percent of the male population and 26 percent of the total population. Overall, Dallas is nearly 49.6 percent female in 2000 with White females accounting for 50 percent of the female population and 24.8 percent of the total population.

3.6.2 Inner City Case Example

By population, Dallas County ranks 2nd of Texas' 254 counties with a population of 2,294,706 in 2004. In 2000, 97.3 percent of its population reports only one race with 20.3 percent of those reporting African-American and 0.6 percent reporting AIAN while, overall, 29.9 percent report Hispanic of any race. Dallas ranks 2nd in the state by households (2000 enumeration), 169th by poverty rate (14.8 percent, 2002 estimation), and 50th by unemployment rate (6.8 percent, 2004 enumeration). In 2003, 31.9 is the median age. Nationwide, Dallas ranks 2,001st (of 3,141 counties or county equivalents) by percent of adults with a high school diploma or more education (2000 enumeration) and 124th by per capita personal income (2003 estimation).

3.6.2.1 Dallas city

In 2000, 97.3 percent of Dallas city report only one race with 25.9 percent reporting African-American and 0.5 percent reporting AIAN. Overall, 35.6 percent reported Hispanic of any race. A total population of 1,188,580 is reported with 451,833 households, 70.4 percent adults age 25 and older with a high school diploma (including equivalency) or more education, and a 6.7 percent unemployment rate. That portion of the population in the labor force equals 65.1 percent. Average household size is 2.58, with a median age of 30.5.

3.6.3 Data

Telephone data first became available in 1960.

Table 3.16 Inner City Case – Dallas County

	1930	1940	1990	2000
Owners and Renters With Telephones	---	---	---	786,278
Overall Telephone Penetration	---	---	---	97.4%
Total Population	325,691	398,564	1,852,810	2,218,899
% Urban Population	83.9%	80.2%	---	99.1%
Total Housing Units	---	---	---	854,119
% Urban Housing	---	---	---	99.1%
Total Households-Occupied Units	---	113,020	---	807,621
Median Household Income	---	---	$31,605	$43,324
Total Owner Occupants	---	44,643	---	424,847
Owner Occupancy % of Total	---	39.5%	---	52.6%
Owners Without Telephone Service	---	---	---	3,797
Owners Without Telephone Service %	---	---	---	0.9%
Owners Below Poverty, No Telephone	---	---	---	944
Owners, Poverty, No Telephone, %	---	---	---	3.8%
Poverty Rate	---	---	13.5%	13.4%

Note: All decennial census data from each source was said to be drawn directly from volumes of U.S. Census of Population and Housing, some numbers may not match because of recalculations at source and because some numbers may be based on sample data.

Source: Bureau of the Census 1943-a, 1943-b, 1943-c, 1952-a, 1952-b, 1952-c, 2003, 2004-b, 2004-d, 2004-e, 2004-f, 2005-a, 2005-c, 2005-d, 2005-g; IBRC, 2004; University of Virginia Library, 2005; TSDC, 2004-a, 2004-b, 2004-c, 2000-d.

In Table 3.16 Inner City Case – Dallas County, a high overall penetration rate, lower than state average poverty rate, and steady growth is evident. However, owner occupancy levels seem low.

Table 3.17 Inner City Case – Dallas city

	1930	1940	1990	2000
Owners and Renters With Telephones	---	---	355,421	436,477
Telephone Penetration	---	---	88.4%	96.6%
Total Population	260,475	294,734	1,006,877	1,188,580
% Rural	---	---	---	0.2%
Total Housing Units	67,119	89,512	465,600	484,117
Total Households-Occupied Units	---	84,091	402,060	451,833
Median Household Income	---	---	$28,758(NE)	$37,628
	---	---	$22,733(SE)	---
Total Owner Occupants	---	---	---	195,227
Owner Occupancy as % of Total	38.6%	34.9%	44.1%	43.2%
Nonwhite Owners	---	9.8%	35.4%	42.3%
Owners Without Telephone Service	---	---	---	2268
Owners Without Telephone Service %	---	---	---	1.2%
Occupied Units Below Poverty %	---	---	---	14.5%
Owner Occupants Below Poverty %	---	---	---	8.1%
Owners Below Poverty, No Telephone	---	---	---	691
Owners, Poverty, No Telephone, %	---	---	---	0.4%
Renters Without Telephone Service %	---	---	---	5.1%
Poverty Rate	---	---	16% (NE)	17.8%
	---	---	24.4% (SE)	---

Note: All decennial census data from each source was said to be drawn directly from volumes of U.S. Census of Population and Housing, some numbers may not match because of recalculations at source and because some numbers may be based on sample data.

Source: Bureau of the Census 1943-a, 1943-b, 1943-c, 1952-a, 1952-b, 1952-c, 2003, 2004-b, 2004-d, 2004-e, 2004-f, 2005-a, 2005-c, 2005-d, 2005-g; IBRC, 2004; University of Virginia Library, 2005; TSDC, 2004-a, 2004-b, 2004-c, 2000-d.

Table 3.17 Inner City Case – Dallas city indicates that, from 1960 to 1990, there is a rate of change far less than that of the national estimates, but, from 1990 to 2000, the rate of change is higher. This case experiences increases between the enumerations and exceeds the national level by 3.9 percent in 1960 while falling behind 6.4 percent in 1990 and 1 percent in 2000. Although general owner occupancy grows less than 6 percent during the 70 years depicted, Nonwhite owner occupancy increases

substantially. In 2000, owners with telephones are 3.9 percent greater than renters with telephones. Indicators relevant to the 1934 Act are limited.

3.7 Benchmark

One county which is the antithesis of the five foci is necessary for the Benchmark. The selection must be largely non-rural, non-low income, non-minority, non-inner city, and non-tribal. Counties which approximated various state indicators are given especial attention for benchmarking purposes. Deaf Smith, Harris, Parker, and Tarrant counties stand out, and the county of Harris is selected (Bureau of the Census, 2003, 2004-b, 2004-d, 2004-e, 2005-a, 2005-c, 2005-g; University of Virginia Library, 2005; TSDC, 2004-a, 2004-b, 2004-c, 2004-d).

3.7.1 Critical Indicators

Harris County's 2000 telephone penetration rate is 97.3 percent. Its population growth from 1970 to 2000 is 95.2 percent and from 1990 to 2000 is 20.7 percent. Infrastructure appears to be substantially in place early on and with little room for growth. In 1940, 82.4 percent of county units had radio and 88.2 percent had electric lights. Its undeflated 2002 median household income is $42,704; its undeflated 2000 median household income is $42,598; and its 1990 median household income is $30,970. Its poverty rate of 15.7 percent in 1990 decreases to 15 percent in 2000. Population density in 2000 is 1,967.0 per square mile; land area is 1,728.8 square miles. Its housing is 98.3 percent urban in 2000; its population is 83.8 percent urban in 1930, 77.7 percent urban in 1940, and 98.2 percent urban in 2000. West University Place is wholly urban with a telephone penetration rate of 99.8 percent in 2000, up from

98.3 percent in 1990. In 1940, 99.9 percent of West University Place's total dwellings are electrically lit and 97.9 percent of occupied units have radio. Its undeflated 2000 median household income of $130,721 is an increase from its 1990 median household income of $68,783; its 2000 per capita income is $69,674. Its poverty rate decreases to 1.7 percent in 2000 from 1.9 percent in 1990. This Benchmark has affluence, little land, and a density level indicating it to be mostly residential.

3.7.1.1 Race-Ethnicity, 1940 and 2000

In 1940, West University Place reports 91 Negro, 1 Other Nonwhite, and 2,803 White occupied housing units, resulting in occupied housing being 96.8 percent White. Owner occupancy at that time is 74.5 percent with only four Nonwhite owner occupants. Harris County, by comparison, is an overall 80/20 split: 79.902 percent of its occupied housing is White and 20.098 percent is Nonwhite with Negroes accounting for more than 99 percent of the 20 percent. Owner occupancy in the County at that time is 41.6 percent, more than 30 percent less than West University Place's estimated rate. In 2000, Whites represent 94 percent of occupied housing units in West University Place. White males represent 92.6 percent of the male population and 45.2 percent of the total population. Overall, West University Place is 51.2 percent female in 2000 with White females accounting for 92.1 percent of the female population and 47.2 percent of the total population; less than 10 percent of the total population is Nonwhite.

3.7.2 Benchmark Overview

By population, Harris County ranks 1st of Texas' 254 counties with a population of 3,644,285 in 2004. In 2000, 97 percent of its population reports only one race with

18.5 percent of those reporting African-American and 0.4 percent reporting AIAN while, overall, 32.9 percent report Hispanic of any race. Harris ranks 1st in the state by households (2000 enumeration), 171st by poverty rate (14.6 percent, 2002 estimation), and 66th by unemployment rate (6.4 percent, 2004 enumeration). In 2003, 31.9 is the median age. Nationwide, Harris ranks 2,049th (of 3,141 counties or county equivalents) by percent of adults with a high school diploma or more education (2000 enumeration) and 131st by per capita personal income (2003 estimation).

3.7.2.1 West University Place city

In 2000, 98.6 percent of West University Place city reports only one race with 0.5 percent reporting African-American and 0.1 percent reporting AIAN. Overall, 4.7 percent report Hispanic of any race. A total population of 14,211 is reported with 5,286 households, 97.96 percent adults age 25 and older with a high school diploma (including equivalency) or more education, and a 1.5 percent unemployment rate. That portion of the population in the labor force equals 70.6 percent. Average household size is 2.69, with a median age of 39.3.

3.7.3 Data

Telephone data is available for 1960 but is predicated on the Urban Balance of the SMSA area which makes it a larger data set than that of solely West University Place dwellings and/or households (Bureau of the Census, 1963).

Table 3.18 Benchmark Estimates – Harris County

	1930	1940	1990	2000
Owners and Renters With Telephones	---	---	---	1,173,053
Overall Telephone Penetration	---	---	---	97.3%
Total Population	359,328	528,961	2,818,199	3,400,578
% Urban Population	83.8%	77.7%	---	98.2%
Total Housing Units	91,411	154,628	---	1,298,130
% Urban Housing	---	---	---	98.3%
Total Households-Occupied Units	91,411	146,403	---	1,205,516
Median Household Income	---	---	$30,970	$42,598
Total Owner Occupants	37,123	60,914	---	667,129
Owner Occupancy % of Total	41.9%	41.6%	---	55.3%
Owners Without Telephone Service	---	---	---	5,799
Owners Without Telephone Service %	---	---	---	0.9%
Owners Below Poverty, No Telephone	---	---	---	1,711
Owners, Poverty, No Telephone, %	---	---	---	0.3%
Poverty Rate	---	---	15.7%	15%

Note: All decennial census data from each source was said to be drawn directly from volumes of U.S. Census of Population and Housing, some numbers may not match because of recalculations at source and because some numbers may be based on sample data.

Source: Bureau of the Census 1943-a, 1943-b, 1943-c, 1952-a, 1952-b, 1952-c, 2003, 2004-b, 2004-d, 2004-e, 2004-f, 2005-a, 2005-c, 2005-d, 2005-g; IBRC, 2004; University of Virginia Library, 2005; TSDC, 2004-a, 2004-b, 2004-c, 2000-d.

In Table 3.18 Benchmark Estimates – Harris County, high overall penetration, average poverty, and growth are observed. Owner occupancy growth is less than might be expected. Indicators relevant to the 1934 Act are limited.

Table 3.19 Benchmark Estimates – West University Place city

	1930	1940	1990	2000
Owners and Renters With Telephones	---	---	5,157	5,275
Telephone Penetration	---	---	98.3%	99.8%
Total Population	---	9,221	12,920	14,211
% Rural	---	---	---	0%
Total Housing Units	---	3,169	5,680	5,543
Total Households-Occupied Units	---	2,895	5,246	5,286
Median Household Income	---	---	$68,783	$130,721
Total Owner Occupants	---	---	---	4,780
Owner Occupancy as % of Total	---	74.5%	85.6%	90.4%
Nonwhite Owners	---	3.2%	2.4%	6%
Owners Without Telephone Service	---	---	---	11
Owners Without Telephone Service %	---	---	---	2%
Occupied Units Below Poverty %	---	---	---	2.1%
Owner Occupants Below Poverty %	---	---	---	1.8%
Owners Below Poverty, No Telephone	---	---	---	0.0%
Renters Without Telephone Service	---	---	---	0.0%
Poverty Rate	---	---	1.9%	1.7%

Note: All decennial census data from each source was said to be drawn directly from volumes of U.S. Census of Population and Housing, some numbers may not match because of recalculations at source and because some numbers may be based on sample data.

Source: Bureau of the Census 1943-a, 1943-b, 1943-c, 1952-a, 1952-b, 1952-c, 2003, 2004-b, 2004-d, 2004-e, 2004-f, 2005-a, 2005-c, 2005-d, 2005-g; IBRC, 2004; University of Virginia Library, 2005; TSDC, 2004-a, 2004-b, 2004-c, 2000-d.

Again in Table 3.19 Benchmark Estimates, in 1960, 8,565 housing units in the Urban Balance of the SMSA lack telephones. Thirty years later, West University Place units lacking telephones and below poverty are 1.7 percent of total occupied units and, in 2000, nonsubscribers are less than 1 percent. In 2000, there are 99.8 percent (11 enumerated units) subscribed in West University Place. In 1990 and 2000 this Benchmark has a telephone penetration rate greater than that of the national average, exceeding 98 percent at both enumerations as shown in Table 3.12b. From 1990 to

2000 telephone penetration has a lesser rate of change than that of the national estimates, experiencing an increase between enumerations, and exceeding the national level by 3.5 percent in 1990 and by 2.2 percent in 2000. Owners with telephones are slightly exceeded by renters with telephones, the latter being at 100 percent and the former at 99.8 percent. Owner occupancy increases substantially yet Nonwhite owner occupancy, although nearly doubling in the 70 years depicted, is still less than 10 percent in West University Place in 2000. In 1940, 98.1 percent of West University Place's total dwellings have running water and 99.1 percent have indoor bathing; by 1950, 99.9 percent of occupied housing units in West University Place have indoor bathing. Comparing this plumbing trend to the County's 1940 indicator of 87.1 percent of occupied units with running water, West University Place appears also to be a trendsetter.

CHAPTER 4

ASSESSMENT OF THE CASE STUDIES

The descriptions of the cases in the previous Chapter indicate income and urban-rural dissimilarities to be of chief importance. Income and distinctions between owner-occupancy and tenant-occupancy populations appear influential in the number of telephone subscribers. Generally speaking, the findings have greater similarity to the widespread adoption of electricity than to that of radio even though the spread of radio is most often identified with that of telephones and other means of communications. This similarity is most likely because the diffusion of electricity from its urban inceptions throughout the countryside required decades as well as specially created agencies, specially designed financial arrangements, and specially crafted intergovernmental relationships (Brown, 1980). In the late 1920s, the electric industry reports slightly more than 30,000 customers, by 1980 more than 90 million customers are reported, and, by 1998, about 124 million customers are reported (Bureau of the Census, 2004-e; University of Virginia Library, 2005). As noted under Table 2.1 Telephone Development in the Aggregate, the extent of households having radio ranged from 39 percent in 1930 to 73 percent in 1940 to 89 percent in 1947.

The quality of estimates relevant to the 1996 Act are better than those relevant to the 1934 Act. This being readily evident, this assessment emphasizes the 1990 and

2000 estimates[26] but does not altogether omit consideration of 1930 and 1940. Telephone penetration of the five case places and one Benchmark, West University Place, are contrasted, including comparison to national and state estimates. The table which follows includes the national and state estimates.

Table 4.1 Telephone Penetration, National and State Estimates

	1930	1940	1990	2000
National				
Telephone Penetration Rate	40.9%	36.9%	94.8%	97.6%
State				
Overall Telephone Penetration Rate	---	---	---	96.8%
Owners With Telephone Service	---	---	---	98.4%
Renters With Telephone Service	---	---	---	94.1%

Source: Bureau of the Census, 2003, 2004-e, and 2004-f.

From Table 4.1 Telephone Penetration, National and State Estimates, in 2000, the overall state penetration rate was below that of the national rate while the state owner penetration rate exceeds and the state tenant penetration rate lags it. In contrasting the estimates above with the cases and Benchmark, the only cases at or exceeding same-year national penetration rates are the low income case of Bowie and the Benchmark in 1990, and the inner city case of Dallas and the Benchmark in 2000. The state rate is met or exceeded by Reservation tenants, Dallas owners and tenants, and the Benchmark.

[26] An effort made to identify Census Bureau estimates for the 1960 to 1990 time frame has inconsistent results: in 1960, only the largest places are surveyed about telephones; in 1970, there is an enumeration of 40,252 in Dallas and of 120 in West University Place but not for the other cases, and in 1980 an enumeration is found for each case except Blanco.

Penetration rates are similarly considered within the contexts of the case places. If evenly distributed across all the nation's counties and county equivalents, unsubscribed households in 2000 equal about 1,981 per county. Contrasted to that estimate, a wide actual range is found. Only the largest places, Dallas County, Dallas city, and Harris County, exceed 1,981, and the next closest estimates are below 1,000.

Table 4.2 No Telephone Service – Counties, Case Places, and Benchmark, 2000

	No Telephone Service	
	# Housing Units	% Housing Units
Place Name	2000	2000
Polk [Tribal County]	676	5%
Alabama-Coushatta Reservation	20	12%
Livingston town	140	7%
Blanco [Rural County]	115	4%
Blanco city	32	6%
Waller [Minority County]	595	6%
Hempstead city	213	13%
Montague [Low Income County]	367	5%
Bowie city	46	6%
Dallas [Inner City County]	21,343	3%
Dallas city (part)	15,220	6%
Harris [Benchmark County]	32,463	3%
West University Place city	11	0%

Source: Bureau of the Census, 2004-f.

In Table 4.2 No Telephone Service – Counties, Case Places, and Benchmark, 2000, unsubscribed households nationally were estimated at 5.9 percent in 2000. Contrasted to that estimate, and considering 6 percent not substantially distinguishable from 5.9 percent, Table 4.3 indicates the Reservation, Livingston, and Hempstead exceed the 2000 estimation of unsubscribed households. Blanco city, Waller, Bowie,

and Dallas city are at 6 percent; West University Place has few unsubscribed households.

Table 4.3 Telephone Penetration, Cases and Benchmark

	1930	1940	1990	2000	Change
Alabama-Coushatta Reservation (Tribal)					
Overall Telephone Penetration	---	---	90.2%	88.4%	<1.8%>
Owners With Telephone Service	---	---	---	87.3%	
Renters With Telephone Service	---	---	---	100%	
Livingston (Tribal Neighbor)					
Overall Telephone Penetration	---	---	93.7%	93.2%	<0.5%>
Owners With Telephone Service	---	---	---	96.9%	
Renters With Telephone Service	---	---	---	88.7%	
Blanco (Rural)					
Overall Telephone Penetration	---	---	61.4%	94.4%	+33.0%
Owners With Telephone Service	---	---	---	97.3%	
Renters With Telephone Service	---	---	---	89.5%	
Blanco Farm (1945)					
Farms with Telephone		258			
As % of Total Farms		38.3%			
Hempstead (Minority)					
Overall Telephone Penetration	---	---	90.8%	87.5%	<3.3%>
Owners With Telephone Service	---	---	---	94.4%	
Renters With Telephone Service	---	---	---	76.8%	
Bowie (Low Income)					
Overall Telephone Penetration	---	---	95.5%	94.5%	<1.0%>
Owners With Telephone Service	---	---	---	97.6%	
Renters With Telephone Service	---	---	---	87.3%	
Dallas (Inner City)					
Overall Telephone Penetration	---	---	88.4%	96.6%	+8.2%
Owners With Telephone Service	---	---	---	*98.8%*	
Renters With Telephone Service	---	---	---	*94.9%*	
West University Place (Benchmark)					
Overall Telephone Penetration	---	---	98.3%	*99.8%*	+1.5%
Owners With Telephone Service	---	---	---	*99.8%*	
Renters With Telephone Service	---	---	---	*100%*	

Source: Chapter 3, Tables 3.6 to 3.12 and 3.14 to 3.19; Bureau of the Census, 2003, 2004-e, 2004-f.

In the preceding Table 4.3 Telephone Penetration, Cases and Benchmark, those estimates which meet or exceed the national rate, regardless of category of estimate, are underlined. Those which, in matching categories, meet or exceed the state rate, are italicized. All case incidents not underlined or italicized have lower penetration rates than the aggregates. Rates of change in 1990-2000 range from <.3.3 percent> in Hempstead (minority case) to +33 percent in Blanco (rural case) with a mean case and Benchmark rate of change of +5.16 percent. Blanco is far beyond the rates of change of the other cases. The specific dispensation for rural areas in the 1996 Act might have a bearing on Blanco's unique growth. The range without Blanco is Hempstead's <3.3 [percent> to +8.2 percent in Dallas (inner city case) with a mean of +.517 percent. By individual case, from 1990 to 2000, the trend in penetration is decreasing except for the rural case of Blanco, the inner city case of Dallas, and the Benchmark.

The Benchmark's affluence exceeds that of all the cases. Closest to the Benchmark's overall penetration in 1990 is Bowie, the low income case, while, in 2000, closest to the Benchmark's overall rate is Dallas, the inner city case. Dallas is nearly ten percentage points lower than the Benchmark in 1990. These cases are early frontrunners in modernizing their built environments and that trend-setting might have been important in establishing a long-lasting level of telephone penetration. Furthest from the Benchmark's overall rate in 1990 is Blanco while Hempstead is furthest at the 2000 enumeration. These cases are primarily differentiated from the Benchmark in race-ethnicity, rural-urban split, and infrastructure modernization.

Location quotients are calculated to contrast the percentage of national or state penetration rate achieved by each case's overall penetration rate. This is done by basing an index on the case overall penetration rate to the national or state overall penetration rate.

Table 4.4 Location Quotients – Case Places and Benchmark, 1990-2000

	Overall:National 1990	Overall:National 2000	Overall:State 2000
A-C Reservation (Tribal)	0.95	0.91	0.91
Livingston (Tribal Neighbor)	*0.99*	0.96	0.96
Blanco (Rural)	**0.65**	0.97	0.98
Hempstead (Minority)	0.96	0.90	0.90
Bowie (Low Income)	<u>1.01</u>	0.97	0.98
Dallas (Inner City)	0.93	*0.99*	**1.00**
West U. Place (Benchmark)	<u>1.04</u>	<u>1.02</u>	<u>1.03</u>

Source: Table 4.1 Telephone Penetration, National and State Estimates; Table 4.3 Telephone Penetration, Cases and Benchmark

Table 4.4 Location Quotients – Case Places and Benchmark, 1990-2000, indicates that the full index decreases in a range of .02 to .06 contained within five cases and increases .06 to .32 contained within two cases. Indexed, Hempstead has the largest decrease in penetration between 1990 and 2000. Just as Bowie (low income case), Dallas (inner city), and the Benchmark stand out as high achievers in the earlier tables, so they do here, also. Case rates in excess of the national or state rate are underlined while those indexed at .99 are italicized. Only the rural case of Blanco indexes at less than nine-tenths of the national or state rate. The quotients indicate that Dallas, the inner city case, has a one-to-one ratio with the state rate although it lags the national rate in both 1990 and 2000.

The location quotient index indicates the least penetrated place is Blanco (rural) in 1990 and the Reservation (tribal) in 2000. The earlier analyses indicate (1) the lowest rate of change is Hempstead, the minority case, followed by the Reservation, (2) Blanco, the rural case, in 1990 and Hempstead in 2000 have penetration rates most distant from the Benchmark, and (3) Hempstead and the Reservation are the most unsubscribed.

Because Hempstead, the minority case, makes such an especial showing of poor penetration and because the extremely low rate of 1990 penetration in Blanco stands out, case estimates of Nonwhite owners, all owners below poverty, poverty rate, and median household income are re-assessed for all cases. Hempstead's Nonwhite owners range from 53.7 percent in 1990 to 59.2 percent in 2000, followed by Dallas with 35.4 percent to 42.3 percent and Livingston with 21.8 percent to 24.7 percent. The Reservation, 100 percent to 97.1 percent, had the highest range because it is a predominantly Nonwhite locale by specification. The other cases each have less than 10 percent Nonwhite owners in 1990 and 2000. Hempstead's rate of owners below poverty in 2000 is second only to the Reservation's and is followed, respectively, by Livingston, Blanco the rural case, Bowie the low income case, Dallas the inner city case, and the Benchmark. Hempstead's poverty rate in 1990 and 2000 is higher than any other case. The tribal areas are closest, followed by Dallas, Bowie, Blanco, and the Benchmark. Hempstead's undeflated median household income is the lowest of the cases in both 1990 and 2000. While Hempstead might have been the minority case because of its unique racial configuration, it becomes evident that it also has unique

income considerations. The case write-ups generally imply that wealth and income might be a commonality of penetration in all the cases.

Rogers (2003) stated repeatedly that diffusion of innovation could decrease the extent of equality in a social system and this research finds indications that declining penetration follows passage of the Acts. The older Act is preceded by unremarkable growth and has long term increases in penetration after the period of decline. National aggregate penetration change is 5.9 percent in 1920-1930, <4 percent> in 1930-1940, 24.9 percent in 1940-1950, 16.5 percent in 1950-1960, and 12.2 percent in 1960-1970. Between 1930 and 1940 the national rate decrease of 4 percent might reflect consumer preferences as much as record-keeping modifications and catastrophic world events like the Great Depression. After 1970, the national penetration rate is never less than 90 percent yet takes about 20 years to near the 95 percent mark. The individual cases and Benchmark indicate declining penetration between 1990 and 2000 in five of seven instances. The ITU (2003) indicates a 0.7 percent decrease in national penetration to a 2000 rate of 94.1 percent from a 1990 rate of 94.8 percent although Census Bureau data indicate that national penetration increased 2.8 percent to a 2000 rate of 97.6 percent. The general view is one of slow realization of Universal Service throughout all population segments. Since one of the other 1996 goals is rapid deployment, this slowness might be a hindrance in realizing objectives of the Acts, especially for population groups already reported as underserved. This issue of deployment is in some ways a consumer concern pre-dating the 1996 Act, particularly for citizens distant from urban centers but not distant from news of technological developments. Grasping the

tug of tension between economic spheres and urban-rural dimensions is indispensable. The broad importance of consumer income points out the function which telephone penetration has come to have as a social indicator. When explored from the perspective of factors which consumers might include decisions about subscribing, the composition of penetration demonstrates the social fabric and emphasizes the importance of the theoretical construct of Universal Service.

4.1 Conclusions and Recommendations

The research question stated at the beginning with its focus on vulnerable populations brought to the fore the anomaly of Universal Service. It is admirable to adopt a public policy for everyone everywhere to have a means of direct communication with the environment beyond their immediate households and, in more recent times, their individual persons, even if the original impetus for that aspiration might have been developed in response to industry interests. Substantively, however, many people are omitted from the telephony link according to the available data described herein. While it is likely that some part of those omissions are by individual choice, it is also likely that a larger part are not by personal preference. This distinction between choice and circumstance is particularly important in matters of marginalization. Residential[27] telephones are one means of securing the bi-directional communicative link between household or person and greater environment. Modern American society has come to place such great importance on having a home telephone

[27] Historical data indicates the residential and non-residential service distinction was an afterthought not originally made in enumerations. Additionally, the 1934 Act's *Introduction* and *Purpose* draw no such service distinctions.

and dependable transportation that many employment and aid applications inquire as to their availability, sometimes linking their availability to consideration of the applications. Residential telephones have fulfilled many functions, such as becoming integral to household economic activities like job-hunting, aid-seeking, and securing necessary resources. An aspect little explored here is the distinction between lack of service and lack of access. If a person with no household or personal telephone can go half a block to a public library which includes communicative services in its available offerings or the person has enough pocket change for the nearest pay telephone, is that person truly unserved? For several reasons, that aspect seems more appropriate for a future indepth examination of the influence of income on telephone penetration. First, this research is limited to conventional telephones and, second, it seems the troublesome ambiguity of that aspect is nested in the language of telecommunications.

4.1.1 Implications of Comparison of 1934 and 1996 Acts

The case studies indicate income plays a large role in telephone penetration and that rural populations are slowest in being connected to the public telephone system. The highest poverty rates in both 1990 and 2000 are in the minority and tribal cases, their rates range from 22 percent to nearly 30 percent. The inner city, low income, and rural cases show substantial declines in poverty rates from 1990 to 2000 although the rates are still substantial: each is in the 15 percent to 21 percent range in 1990 and in the 13 percent to 18 percent range in 2000. The importance of income is supported by other reports, cited in preceding Chapters, which found that at high income levels there is little to no disparity in telephone subscribers but at low levels of income the

disparities reflect long-standing social stratification. The rural-urban split is also supported by other previously cited studies.

4.1.2 Implications of Theoretical Underpinnings

The 1934 Act states Universal Service as a goal of every American citizen having affordable, quality telephone service. Because it states that intent, Universal Service in 1934 seemed a component of the ideology of improving individual well-being, the demand side, via mechanisms of government oversight and regulation. However, Chapter One's story of the birth of the Bell System in which the head of AT&T offered to trade a simple, affordable for every person, and ubiquitous telephone for a government mandated monopoly did not necessarily reflect corporate altruism. Universal Service began in the early 1900s as a marketing strategy thematically expressing a corporate policy of eliminating rivals, survived antitrust litigation, and became national telephone policy in 1934. The establishment of industry oversight had an evident supply focus but had to also consider matters of consumer demand and interest. That issue of balancing industry and consumer interests emphasized the importance of the public interest standard. By 1996, the legislative and rulemaking language of essentiality, majority consumer choice, concern for populations vulnerable to being un- or under-served, and eliminating implicit subsidies could not ideologically clothe revisions to Universal Service in concerns for individual well-being. The 1996 Act specifically stated Universal Service was whatever the FCC said it was upon periodic reviews, which made contemporary Universal Service appear very much a

component of the ideology of improving corporate well-being, the supply side, via mechanisms of deregulation and unspecified market forces.

By Congressional intent, the intent being stated in the 1996 Act, the two NeoClassical Acts were melded into one Act, the Keynesian strategy of the earlier Act succumbing to the NeoLiberal strategy of the later Act. The impact of that melding on Universal Service must surface in configurations of consumers and providers, especially since the two Acts were 62 years apart in their overseer function and supply orientation. The importance of these distinctions was evident in the first Chapter's simple comparison in which was said that (1) the emphasis on regulating in 1934 became an emphasis on reducing regulation in 1996, (2) rapid, efficient service with adequate facilities at reasonable charges in 1934 became lower prices and higher quality, rapidly deployed in 1996, and (3) centralizing authority in 1934 became promoting competition in 1996. This implied a focus in 1934 of creating and meeting demand by concentrating on supply and, in 1996, of bolstering and boosting supply. The cases similarly indicated that, without attention to underserved populations and unmet need, the ultimate melding of Universal Service would retain aspects of its inceptive legacy as an industry marketing strategy. This might be why some experts decried modern Universal Service as little more than a price-setting ploy (Crandall and Hausman, 2003). However, it is cultural norm, industry supply, and advertising which largely dictate modern must-haves of home telephones, daily newspapers, televised entertainment, radio broadcasts, and other conveniences. If cultural outsiders (Babe, 1995, p. 155, citing Veblen, 1964, p. 227) include those who cannot or will not bear the cost of

service, the obstruction to all people in the nation having affordable if basic telephones and telephone service might be more deeply rooted in the nexus of Universal Service and rational decision making than consumer concerns about persuasive influences, rates, affordability, and supply can impart.

The dilemma of the anomaly lies in the general absence of conflict and power in NeoClassical concepts, in the absence of overarching commoditization[28] in Political Economy, and in the poor fit of Universal Service to public service concepts. Preceding Chapters suggested the 1934 expression of Universal Service and the 1996 expression of Universal Service diverged at the concept of public good[29], even with the lift of the assistance programs put in place after the break-up of the AT&T behemoth in the 1980s. This divergence roughly corresponded with the rise of NeoLiberal policy within the NeoClassical paradigm during the last 25 years: the break-up was about 22 years ago and the assistance programs became available 16 to 21 years ago with low participation evident 14 years ago. NeoLiberal was strongly influenced by subjective NeoClassical precepts of rational agency as well as by Reaganomic ultra-conservatism with its supply-side focus (Arvidson, 2005). Keynesian ideology was discernible in New Deal legislation such as the *Communications Act* of 1934 in areas like its promotion of active government intervention (Feiner, 1994).

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[28] Drawn from Babe (1995), this term conceptualizes "the process by which a product reaches a point in its development where one brand has no features that differentiate it from other brands, and consumers buy on price alone" (Encarta, 2005).

[29] Elizabeth Martinez and Arnoldo Garcia of the National Network for Immigrant and Refugee Rights describes in *CorpWatch* the elimination of concepts of public good as incurring revisionist concepts of individual responsibility with which the poorest people in society are pressured to find their own solutions to lacks of services and resources (Cornehls, 2005).

As mentioned in the first Chapter, the shift from Keynesian to NeoLiberal dominance in policy became apparent during the 1970s and 1980s. Those were turbulent times of grappling with the aftermath of crises of the 1960s and 1970s. Harvey and Reed (1996, p. 296) commented that the same 1960s cultural revolution which gave birth to anti-Modernism also gave birth to Chaos Theory in both its mathematical[30] significance and its use as justification for the subjectivism and anti-rationalism of PostModernism. In part, Chaos Theory was only a permutation of Quantum Theory[31]. Chaos, PostModernism, and Quantum might reflect environmental catapults by which Keynesian dominance shifted into NeoLiberal dominance, however, the import of the shift itself was most evident in the conceptual modification made to the mandate of Universal Service from the 1934 Act's "make available…to all" to the 1996 Act's "evolving level" of services established periodically by the FCC. The view that this shift represented also a liberalizing of telecommunications marked by decades of incrementally partial deregulation leading to the 1996 Act as a purposeful move away from behavioral regulation such as rate-setting and licensing (Messere, 2002) was a view focused mostly on corporate providers of telephone services rather than on populations of subscribers to telephone services. Behavioral regulation was part of the regulatory apparatus which existed prior to the Keynesian dominance of the 1934 Act;

[30] In formal theory, Chaos occurs only in deterministic, nonlinear, dynamical systems. The original publication setting the math stage for Chaos Theory is said to be Sinai (1970).

[31] In the spring of 1925, Werner Heisenberg formulated the system of mechanics which became known as quantum (or matrix) mechanics. Heisenberg, Max Born, and Pascual Jordan evolved classic physics into the quantum basis of modern physics. One of Heisenberg's key contributions was his Uncertainty Principle, which limited the precision of measurement of the dynamic variables of a system (Price and Chissick, 1979, p. xiii).

economic competition, also termed structural regulation, existed prior to the 1934 Act as well.

While economic competition might be preferable to behavioral regulation in service provision matters, if it does not translate into consumer benefits then it is inadequate and incomplete. At this time, it does not seem to have made a consumer-benefiting transition. This lack of consumer benefit was evident also from the perspective of urban ecology, which is similar to that of NeoClassical economic theory. Gottdiener and Feagin (1988) associated urban population analysis with the mainstream ecological approach and linked the ecological view to "institutional dominance." Like methodological individualists mentioned in earlier sections, ecologists were described by Gottdiener and Feagin as too often espousing concepts which led to theoretical derivations of "externally induced, internally experienced" views in which development was a balancing process (1) seeking equilibrium among spheres of population, social structure, environment, and available technology (2) in which only the introduction of technological innovations external to the social structure could result in development. The legislative touchstone of this study and the cases portrayed institutional dominance like that mentioned by Gottdiener and Feagin (1988) in their discussion of transitions from urban ecology to urban sociology. The ecological approach can depict well but cannot explain well.

4.1.3 Directions for Future Research

Competitive services did not assure the poor and disenfranchised of having service. Further developing this Universal Service concentration might accentuate

availability, accessibility, affordability, presumptions about competition driving prices down, and presumptions that competition alone cannot make Universal Service a fact of life for everyone in the nation. This latter presumption could stress the importance of societal distribution of its resources – fiat, force, chance, custom, fraud, deceit, the competitive market, auctions, sealed bids, voting, bargaining, and contract (Fiorentini and Peltzman, 1995). The cases also evoked ideas of conventional diffusion of innovation theories. For instance, Rogers (2003, pp.130-135, 457) said that diffusion of innovations often has been shown to widen the socio-economic gap between higher- and lower-end status segments in a social system. Inequity became an important consideration because, in Rogers' view (2003, p. xxiii), the diffusion of innovations explained social change, which he described as one of the most fundamental of human processes. He (2003, p. xix) suggested that innovative advanced telecommunications might be causing fundamental change in diffusion processes by their affect on spatial distance in who talks to whom about new ideas.

Additionally, the elements of trend-setting, race-ethnicity, rural-urban split, and infrastructure modernization might readily work with considerations of density to more deeply examine the importance of income's influence on telephone subscribership. Race-ethnicity was not particularly emphasized by telephone penetration but in tandem with density, as in tandem with income, it might be more pronounced. Density was not a critical factor here but could be of interest for several reasons. First, reports found positive correlation between population density, subscribers to advanced telecommunications, and availability of services as well as substantial disparity between

subscribers and availability in areas where both number of population and density is low and those where small numbers of population are densely clustered together (FCC, 2003-a, pp. 40-87). Density was also relevant to the index of crowding which was important in detailed examinations of income-related measures such as poverty. Second, telephone development requires spatial consideration (notably for physical plant involved in transmission) and such easements are important to persons and households occupying places. Of particular interest, Gottdiener and Feagin (1988, pp. 180-181) said developmental capital had "the primary role of shaping and equipping space in order to increase the efficiency of commercial, industrial, and financial capital." Investments and subsidization (transfers of value through regulatory programs) could be more coherently presented by new urban sociology's balance of structure and agency with its explorations of links between place and "the role of world finance capital in modulating investment" (Gottdiener and Feagin, 1988, pp. 182). A focus on density could draw readily from the new urban sociology paradigm. This paradigm typically has better explanatory capability than the ecological approach. This would be important because links with digital divide and uneven developments in a stratified society could be probed (Gottdiener and Feagin, 1988). From this perspective it might be feasible to explain phonelessness in America as well as to depict it.

Universal Service was linked in Section 254 of the 1996 Act to services to which there was subscription by a substantial majority of residential consumers through the operation of market choice, as well as which were essential, deployed in public networks, and met the public interest standard. This connection of Universal Service

goals and measures by legislation and rulemaking to consumer choice included vaguely described concepts of market forces and principles said to comprise competitive effort. This deregulatory attitude is a consequence of prevailing NeoLiberal strategies which have precipitated less inclusiveness and less participation. Designating the unspecified market forces and principles by which new entrants to telecommunications markets and existing providers of telecommunications services were to proceed would have been an important step towards hastening diffusion of telephone service innovations to the least served and most vulnerable population segments in accord with public policy objectives[32].

[32] Although globalization is not crucial in this research, a starting point might be in the market openness and efficient regulation principles of the Organization of Economic Cooperation and Development, Trade Directorate (OECD, 1999, p.9). The OECD report indicates that competition is an entry consideration, market power is a distortion consideration, and public interest is impacted by national security, law enforcement, trade issues, and other policy areas. It seems the base of economic principles vaguely described in the available literature must exist in specifically enunciated terms somewhere because particular analyses are being conducted multilaterally. The report mentions also that there seems a reticence among regulatory agencies to openly share domestic regulations information because of distrust of the trade policy community and fear that lowering regulatory barriers to trade might result in lowered standards.

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BIOGRAPHICAL INFORMATION

Phyllis I. Behrens received her Ph.D. in Urban and Public Administration from the University of Texas at Arlington's School of Urban and Public Affairs. She earned her Master of Public Administration from Texas Tech University in Lubbock, TX., and her Bachelor of Arts cum laude from Midwestern State University in Wichita Falls, TX. She was a part of diverse research teams while at the University of Texas at Arlington, co-authored a *P.A. Times* article while at Texas Tech University, worked for the school newspaper and other employers while at Midwestern State University, and is a published poet. She gave one undergraduate semester to East Texas State University in Commerce, TX, which has since become Texas A&M. Born in Mississippi, raised as a U.S.A.F. dependent, she settled into Wichita Falls in June 1966 and considers there her hometown because she lived there longer than she lived anywhere else. Through the years she worked for a variety of employers in Illinois, Missouri, Texas, and Virginia. She anticipates relocating to Virginia, Oklahoma, Ohio, Missouri, or Mississippi, and looks forward to working and traveling about the U.S.A. again.