(Draft: Comments and Suggestions Encouraged)

Telecommunications Infrastructure Development: The Evolving State and City Role in the United States

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INTRODUCTION

The passage of the Telecommunications Act of 1996 and the evolution of new telecommunications technologies make this a critical time for the study of telecommunications policy and the development of information infrastructure in the United States. As the Telecom Act sets the stage for national deregulation of telecommunications services, state and local governments are striving to implement and adapt to the pro-competitive thrust of the Act. While attempting to promote telecommunications competition, the Act makes clear that states must also preserve the longstanding aims of universal service.

Since the Act's passage, there has been an increased role for cities in communication policymaking. This is due, in part, to the evolving convergence of technology and services offered by telephone companies and cable television systems. The latter make cities' abilities to control (1) rights of way, (2) access to and siting of certain towers for wireless services, and most recently (3) how cable systems configure their cable modem services particularly pertinent.

In addition to their regulatory powers, state and local governments have launched public and private-public initiatives that foster advanced telecommunications infrastructure as a strategic investments to encourage economic development, strengthen education, enhance governmental services and information, revitalize the role of libraries, advance telemedicine, and bolster universal service. While there are scant data that quantify the precise benefits of telecommunications infrastructure, the discourse surrounding the information highway compels cities to ensure that they are a node on emerging networks.

BACKGROUND

This paper explores the initiatives of states and local municipalities that promote the development of advanced telecommunications infrastructure for their citizens, businesses, and institutions. It examines state and local endeavors that bear on the circumstances influencing competition for telephone-based voice and data services, as well as for advanced telecommunications services.

The aim of the study is to identify the evolving roles of state and local government in fostering advanced telecommunications infrastructure. In particular, the study highlights innovative programs at the state level that 1) promote competition through alternative regulation, or incentive programs to encourage competition 2) sustain universal service through the emerging state universal service funds, and 3) enhance regional telecommunications infrastructure with targeted funds or special regional (urban or rural) initiatives.

In addition, the research identifies the emerging role of state and municipal governments in developing innovative telecommunications infrastructure by building city-owned telecommunications networks, leveraging existing utility networks, or creating public-private partnerships.

METHODS

The study consisted of a review of current literature and secondary analysis of existing data that explore federal, state, and local policies directed at promoting the development of telecommunications infrastructure. Information was gathered from a variety of existing research reports, telecommunications trade publications, and state and municipal web sites. Follow-up email and phone interviews with selected individuals were conducted to clarify and expand on collected data.

This review allowed the discovery of the varying regulatory actions of state government in promoting competition in the mode they deemed most desirable. This process also identified the innovative programs that encourage regional telecommunications infrastructure development. Finally, details about state and municipally sponsored telecommunications projects and networks were collected.

Two databases were formed to collect data on (1) ***State Policies*** for all 50 states that included a summary of innovative policies or legislation dealing with telecommunications competition, universal service and regional telecommunications development; and (2) ***Telecommunications Networks***, which generated a listing innovative state and city sponsored telecommunications networks.

In the ***State Policy Database*** searches of every state legislative web site were conducted to discover recent bills that promote competition among telecommunications carriers and offer innovative programs or policies affecting telecommunications services within the state. Each state's utility commission web site also was visited to discover additional regulatory issues affecting competition. Follow-up email and phone interviews were conducted with state staff to clarify state policy or to obtain the status of pending legislation.

For the ***Network Database*** initial data were gathered from existing publications listing public managed networks—primarily The American Public Power Association's *1999 Annual Directory & Statistical Report* and the National Association of State Telecommunications Directors' 1998 State Report. Information from various articles in trade publications and web site searches of home pages for state municipal associations, utility associations, and states and cities provided the bulk of information. Email and phone interviews clarified collected data.

FINDINGS

State Policy

The passage of the Telecommunications Act of 1996 has presented a unique challenge for federal, state and local governments to work cooperatively on telecommunications policy issues. The state public utility commissions are required to open the local telecommunications market and encourage the deployment of telecommunications infrastructure. This forces state commissions to create a balance between promoting a business environment that is conducive for private investments while fostering competition among providers. At the same time, vendors anxious to enter new lines of business (e.g., local exchange companies desiring to enter long distance) chafe under the regulatory scrutiny and attempt to insure that their barriers to entry are as low as possible. As will be evident, competition from the public sector (such as in the case of city-owned infrastructure), is sometimes seen as threatening to incumbent

industries. Our results indicate several states in which this sort of potential competition has been stymied from the outset.

In addition to promoting competition, the Telecommunications Act of 1996 also directed the FCC to convene a Federal-State Joint Board to advise the FCC on how universal service issues, including those related to schools, should be addressed. The Joint Board Membership consists of three FCC Commissioners, four State Public Utility Commissioners, and one consumer utility advocate. To address particular needs of rural areas the Commission encouraged the Joint Board to establish a Rural Task Force (RTF) to "provide valuable assistance in identifying the issues unique to rural carriers and analyzing the appropriateness of proxy cost models for rural carriers."[1]

The Telecommunications Act of 1996 entrusts the state utility commissions with the primary responsibility of promoting deregulation and competition in the local telecommunications market. Towards this end, state commissions engage in arbitrations, mediations, and interconnection agreements between incumbents and new entrants, and provide incentives for deployment of telecommunications infrastructure. Most state policies include the establishment of rules for competition through the removal of traditional price regulation with incentives to spur local competition.

Recent FCC studies have shown the initial effect of these deregulatory policies has led to a small gain in market share by competitive local exchange carriers (CLECs), but their presence remains less than 5% of the local market and their services typically target businesses, not residential users. CLECs, however, have not moved rapidly in building their own infrastructure. As an FCC report indicates, CLECs currently provide a total of between 4 and 5 million switched lines, which is less than 3% of nationwide switched access lines.[2]

The FCC report on local competition, however, fails to highlight competition within markets. Because the study concentrates on the number of CLEC entrants within each state, it does not offer insight into head-to-head competition that might be developing within urban centers.

Due to the lack of competitive entrants into local markets, some states have implemented policies allowing, or encouraging, public initiatives in telecommunications infrastructure development (See Section II). Many public telecommunications initiatives are developed in response to the lack of private investment in advanced telecommunications infrastructure. Some public infrastructure initiatives are developed in order to meet the needs of particular constituencies whether governmental, educational, or institutional. Other states have formed special commissions or panels to broadly examine the telecommunications needs of state government, education, business and citizens--beyond the narrow regulatory mission of utility commissions.

In addition to the Telecommunications Act's provisions to promote competition, Section 706 of the Act requires the FCC to examine the availability of advanced telecommunications capability to all Americans. The Act defines "advanced

[1] Federal-State Joint Board on Universal Service, CC Docket No. 96-45, Report and Order, 62 F.R. 32862 (rel. May 8, 1997) (Universal Service Order).
[2] Federal Communication Commission. Local Competition Industry Analysis Division. Local Competition, December, 1998.
<http://www.fcc.gov/Bureaus/Common_Carrier/Reports/FCC-State_Link/IAD/lcomp98.pdf>

telecommunications capability" as a "high-speed, switched, broadband telecommunications capability that enables the users to originate and receive high-quality voice, data, graphics, and video telecommunications using any technology." This was later pinned down in 1999 as including a standard of at least a 256kbps connection to the Internet.[3] To promote advanced broadband services, the FCC has adopted an Order convening a Federal-State Joint Conference to provide a forum for ongoing dialogue between the Commission, state utility commissions, and local and regional entities regarding the deployment of advanced telecommunications.[4]

A. Competition

The Telecommunications Act of 1996 forces state regulators to take a much more active role in regulating telecommunications carriers. Every state is attempting to meet the demands of the Telecommunications Act by balancing policies to promote competition through rate deregulation with the desire to sustain universal service and encourage advanced infrastructure development. Table 1 highlights some of the state-level policies enacted to promote competition and develop advanced services.

Table 1

States with legislation, or utility policy promoting local telecommunications competition and/or infrastructure

STATE	POLICY
Alabama	Allows Electric Cooperatives to provide rural Telecom service
Alaska	Forms House Special Committee on future of Telecommunications
California	Requires Commission to hold proceedings to examine regulatory framework for competition
Colorado	Balances deregulation of rates with infrastructure fund to develop statewide infrastructure
Connecticut	Alternative rate regulation options considered by PSC
Florida	Counties and Cities can provide Telecom services in some instances.
Georgia	Allows municipalities to overbuild private cable systems
Indiana	Allows rural electric cooperatives to furnish Telecom services
Iowa	Municipally owned utilities allowed to offer Telecom services
Kentucky	Permits some cities with municipal utilities to provide Telecom services.
Maine	Allows water utilities to provide fiber optic telecom services
Maryland	Establishes Task Force on High-Speed Data Development
Mississippi	Provides CLEC's with flexible entry requirements
New Hampshire	Establishes a legislative oversight committee on telecommunications restructuring
North Dakota	Regulatory Reform Commission shall perform periodic review
Oklahoma	Regulates Rates until Feb. 2002--as competition emerges
Oregon	Deregulates rates and establishes telecommunications infrastructure fund to encourage advanced services

[3] Federal Communication Commission, Broadband Competition Report, 1999.

[4]Federal Communication Commission. In the Matter of Federal-State Joint Conference On Advanced Telecommunications Services, CC Docket No. 99-294, Order, (rel. October 8, 1999) <http://www.fcc.gov/Bureaus/Common_Carrier/Orders/1999/fcc99293.txt>

Pennsylvania	**Rate Deregulation with LEC's providing modernization plans to PUC**
Texas	**Deregulation of rates; rural municipal utilities not served by SBC may provide telecom services; establishes Telecommunications Infrastructure Fund.**

To promote competition, states have developed a variety of policies including 1) establishing alternative forms of regulation for private firms with incentives for competition or development of advanced telecommunications; 2) encouraging market competition by allowing cities, municipal utilities, or cooperatives to provide telecommunications service; and 3) implementing funding mechanisms that encourage network development by local governmental bodies--especially in underserved rural areas.

Not surprisingly, telephone companies and cable operators are alarmed by the growing interest in public telecommunications systems. Despite the evidence that Congress clearly expected municipal power utilities to be among the entrants in a competitive telecommunications market,[5] recent court battles and regulatory conflicts have decided against or have inhibited municipal telecommunications efforts. Many incumbent telephone operators have successfully lobbied state legislatures to pass bills preventing or limiting municipal involvement in telecommunications services. [6]

Table 2 lists the states that have passed legislation prohibiting or limiting public offering of telecommunications services (Other states, such as Ohio, failed to pass bills prohibiting public telecommunications networks, but it is likely many states will initiate or re-introduce these bills in future sessions.)

Table 2
States Prohibiting or Limiting Municipal Telecom Networks

STATE	POLICY
Arkansas	**Government entity may not provide basic local exchange service directly or indirectly.**
Florida	**Cities and Counties must separately account for telecom services and are subject to same requirements as private firms.**
Missouri	**Prohibits local governments from selling or leasing telecommunications services to the public or to other telecommunications providers.**
Nevada	**Prohibits Cities with over 25,000 residents from offering telecommunications service.**
Texas	**Prevents cities from direct or indirect involvement in providing telecommunications services.**
Virginia	**Generally, prohibits municipalities from offering telecommunications service or infrastructure.**

[5] Baller, J. & Stokes, S. The public sector's authority to engage in telecommunications activities. Journal of Municipal Telecommunications 1999; 1(1). <http://www.munitelecom.org> The author's argue Section 253 (a) of the Telecommunications Act of 1996 makes clear that no state or local law may prevent "any entity" from providing telecommunications service--suggesting cities, as "any entity" may provide telecommunications services.

[6] Harris, B. Telecom wars. Government Technology 1998; 11(3):1,38-39, 72.

B. Universal Service

The Telecommunications Act establishes joint regulation for Universal Service, with the FCC being responsible for national programs that fund connectivity for schools, libraries, and health care facilities, and the FCC and the states sharing a role in subsidizing low income and high-cost customers (through the High Cost Fund component of universal service). Much of the burden of Universal Service has shifted to the states as they are required to establish their own universal service funds (providing up to 75% of funding) and determine which carriers can receive subsidy payments. Table 3 highlights those states that have initiated their own Universal Service Fund as of July, 1999.

Table 3

States Implementing Own Universal Service or Infrastructure Fund (Status and Name of Fund)

STATE	USF
Alabama	Alabama PUC in process of establishing Fund
Alaska	Alaska Universal Service Fund
Arkansas	Arkansas Universal Service Fund
Arizona	Arizona Universal Service Fund
California	Universal Lifeline Telephone Service
	California High Cost Fund A (rural LECs)
	California High Cost Fund B (non-rural LECs)
	California Teleconnect Fund
Colorado	Colorado High Cost Fund
Florida	PSC to establish USF guidelines
Georgia	Georgia Universal Service Fund
Hawaii	State Universal Service Fund to be administered by PUC
Idaho	Idaho Universal Service Fund
Illinois	PUC examining intrastate Fund
Indiana	Indiana High Cost Fund
Kansas	Kansas Universal Service Fund, Act also defines "Enhanced Universal Service" such as broadband for schools.
Kentucky	Commission is holding hearings
Louisiana	PUC to establish Universal Service Fund
Maine	Examining High Cost Fund
Maryland	PUC examining options
Massachusetts	Concentrating on School discount programs
Minnesota	Lifeline service
Mississippi	Commission examining options
Missouri	Missouri Universal Service Fund
Montana	Montana Universal Service Fund
Nebraska	Nebraska Universal Service Fund
Nevada	Lifeline and Link Up programs
New Hampshire	Oversight Committee will examine
New Jersey	Utility Board holding hearings
New Mexico	New Mexico Universal Service Fund
New York	Commission examining options
North Carolina	Commission establishing rules
North Dakota	Universal Service needs to be addressed by regulatory commission

Ohio	**In early stages of establishing USF**
Oklahoma	**Oklahoma Universal Service Fund**
Oregon	**Universal Service Fund administered by Connect Oregon Community Board**
Pennsylvania	**PUC investigating cost models**
South Carolina	**State Universal Service Fund administered by PUC**
South Dakota	**PUC examining ways to balance competition desires with need for USF**
Tennessee	**Agency examining state role for USF**
Texas	**Educational Discount Rates**
Utah	**Universal Public Telecommunications Service Support Fund**
Vermont	**Lifeline**
Washington	**Fund for High Cost support**
West Virginia	**PUC investigating cost models**
Wisconsin	**Wisconsin Fund has biennial review**
Wyoming	**Intrastate Universal Service Fund established**

Most of the state Universal Service Funds are narrowly focused on telephone service, though some states such as Kansas and Texas recognize the need for "enhanced Universal Service" to meet the broadband needs of schools. Typically, the state utility commission establishes and manages state Universal Service, however, Oregon's fund is administered through an appointed community board.

C. Rural Telecommunications Infrastructure

To meet the needs of telecommunications customers in rural areas, including small cities and towns, many states have targeted rural areas in their state Universal Service program. Other states have established specific rural telecommunications policies or funding programs that encourage rural infrastructure development. Table 4 highlights those states with specific programs meeting the needs of rural areas. The intended role of utilities is particularly notable in some of these programs.

Table 4

States with Funds Earmarked for Rural Telecommunications through Universal Service Fund, Targeted Initiative or special recognition of rural telecommunications needs.

STATE	RURAL INITIATIVE
Alabama	**Electric cooperatives can offer telecom service in rural areas.**
Alaska	**Alaska Universal Service Fund recognizes rural needs.**
Arkansas	**Arkansas USF recognizes high cost rural areas**
California	**California High Cost Fund A (earmarked for rural LEC's)**
Colorado	**Colorado High Cost Fund and Colorado Rural Technology Project fund rural areas.**
Florida	**High Cost Areas highlighted in telecom legislation**
Georgia	**Municipal Cable possible in small rural towns neglected by private firms**

Hawaii	**USF guarantees rates will be affordable in rural areas.**
Idaho	**Limits interconnection requirements for rural operators.**
Indiana	**Allows rural electric corporations to furnish telecommunications services.**
Iowa	**Municipal utilities (including rural) allowed to offer Telecom services**
Kentucky	**Permits cities (including rural) with municipal utilities to provide Telecom services.**
Kansas	**USF attempts to keep rural rates comparable to urban rates.**
Michigan	**State Task Force to study USF rural telecom needs.**
Minnesota	**USF provisions to keep rates affordable in rural regions**
Montana	**USF fund to maintain affordable rates to rural region**
Nebraska	**Nebraska USF ensures access by rural areas**
New Hampshire	**Legislative Oversight Committee will examine issue of rural access and delivery**
New Mexico	**Rural Universal Service Fund established**
Oklahoma	**Universal service fund to keep rural rates affordable**
Oregon	**Infrastructure fund targets rural areas of state.**
Pennsylvania	**Legislation calls for rural, suburban and urban cost to be similar.**
South Carolina	**State Rural Infrastructure Fund provides telecommunications funding for rural cities**
South Dakota	**Interest in maintaining affordable rates to rural region**
Texas	**TIF specifically targets underserved rural regions of state.**
Utah	**Universal Public Telecommunications Service Support Fund serves high cost rural areas.**
Washington	**Interest in maintaining affordable rates in rural region**
Wyoming	**Interest in maintaining affordable rates in rural region**

II. State and Local Networks

Various state and local networks receive funding through public initiatives. Nearly every state sponsors some sort of educational telecommunications network for example, although the nature of the network can be quite different from state to state with some supporting data communications and other supporting radio, television and even satellite networks for distance education. Our database documents various aspects of these networks, particularly those dedicated to advanced telecommunications applications.

State and Municipal Telecommunication Initiatives

The vision of an information superhighway promulgated by the National Information Infrastructure initiative pronouncements and the promise of competition through the Telecom Act has prompted many states and municipalities to explore government owned or public-private partnered advanced telecommunications networks.

Many cities, like Glasgow, Kentucky simply have extended the technological capabilities of their existing municipal cable systems to allow high-speed Internet service. Other cities have sought a more advanced telecommunications system such as a switched broadband network providing two-way voice, data, and video. Currently a number of localities (See Table 5) have developed or are considering city-initiated telecommunications networks or advanced municipal cable systems.

There are several explanations for the increasing number of municipal telecommunications infrastructure projects. For cities, the expanding telecommunications market has potentially enormous consequences. Cities tend to be the electronic hubs for telecommunications networks and they often are concentrated centers of business and communication that demand advanced telecommunications systems and services. Telecommunications infrastructure has long been considered a strategic tool for economic growth, and in today's information economy rural towns as well as urban cities are well aware of the potential benefits that might be gained by possessing an advanced telecommunications network.[7]

Moreover, in many communities local government is the biggest user of telecommunications services and often has existing telecommunications infrastructure in place for city telephony and data needs. City-run municipal power utilities typically have supporting telecommunications infrastructure with abundant unused capacity. Leveraging existing telecommunications infrastructure investments makes it far easier and efficient for cities to develop an advanced telecommunications network for the entire community.[8]

Finally, universal service is not exclusively a federal or state government interest. Cities desire telecommunications services (particularly advanced telecommunications services) for every residence, business, and institution in the city in order to realize the economic development possibilities. However, the Telecommunications Act of 1996, while maintaining universal service goals and promoting discounts to schools and libraries, does little to promote access to *advanced* telecommunications services for residences, nor does it adequately make provisions for regions in which normal market forces of supply and demand translate into a paucity of services or service choices.[9]

A. State Networks

Every state has invested in some sort of telecommunications infrastructure to serve government agencies or the educational community. The infrastructure technology of these networks ranges from simple voice capable lines to high-speed, digitally-

[7] Graham S, Marvin S. Telecommunications and the city: Electronic spaces, urban places. London: Routledge; 1996.
[8] Berquist L, Grant AE. The emerging municipal infrastructure: The Austin experience. In: Hurley D, Keller J. editors, The first hundred feet: Options for Internet and broadband access. Cambridge, MA: MIT Press; 1999.
[9] Fidelman M. The new universal-service rules: Less than meets the eye. Civic.com 1997; 1(7):30-33.

switched networks for higher education and scientific research. Our database provides information on the targeted application of the state networks (i.e. education, state government, or comprehensive networks serving a variety of constituencies within the state). We discover that major issues for state network development include 1) public or private ownership and management; 2) "postalized" services that set specific use rates; and 3) determining how advanced the technological capabilities of networks should be. Highlights of representative statewide telecommunications networks follow.

CALNet

CALNet is the statewide publicly managed network (though operated by private telecommunications firms) that serves California state agencies with voice and data needs. Previously operated exclusively by the state, CALNet follows a trend among many states to outsource network operations to private carriers, and its transition highlights some of the questions sates ask in deciding who should own and manage such facilities dedicated to public use.

Iowa Communications Network

ICN is a state managed and operated fiber optic network for connecting government, education, and medical facilities with full motion video capabilities. It has come under fire for years from the private sector as an instance of unfair competition in telecommunications by virtue of the state “doing business” with its own programs.

Connecting Minnesota

Connecting Minnesota is a public/private partnership initiated by the departments of Transportation and Administration to bring fiber-optic communications to significant portions of Greater Minnesota and to increase telecommunications capacity in the Twin Cities metro area. The state contracted with a single vendor to build the network in return for exclusive use by the vendor of a number of fiber strands.

North Carolina Information Highway

The North Carolina Information Highway (NCIH) provides state government entities with a broadband network for high-speed data, voice, and video. One of the first statewide fiber optic networks, early users complained that little money was earmarked for “last mile” costs which hindered many institutions' ability to connect to the backbone.

TEX-AN

TEX-AN is the statewide consolidated telecommunications network for telephone, video, and data serving government and education in Texas. The state establishes the specifications for the network and allows the private vendor community to come up with infrastructure solutions to meet the demands of state agencies. For telecommunications services, the state has contracted for "postalized" rates with the state LEC. This means that the state will pay a set price for any circuit (56 Kbps, T1, etc.) ordered from the LEC within a LATA (Local Access and Transport Area, a geographical region that defines the boundaries of local versus long distance services). These contracted rates offer significant savings to the state.

NET.WORK.VIRGINIA

NET.WORK.VIRGINIA is an advanced, broadband network delivering ATM (asynchronous transfer mode) service statewide. In addition to serving government and

education, private industry and other entities can connect directly to NET.WORK.VIRGINIA for the purpose of participating with educational programs.

B. Regional and Local Networks

Cities also utilize networks for internal governmental purposes whether for simple telephony or for data networking. Some cities, particularly those that manage their own utilities, have developed or are considering advanced telecommunications systems in direct competition with their local telephone company or cable system. While there was no consistent definition of "advanced telecommunications network," the FCC originally defined broadband networks as any network that transmits data both upstream and downstream at a rate in excess of 200 kbps in the last mile,[10] and later stated that broadband conformed to at least 256 kbps. More generally, advanced telecommunications networks are those that can deliver advanced applications such as distance education, video teleconferencing, interactive entertainment, high-speed Internet connectivity, and telemedicine.

Cities and multi-city partnerships are developing more comprehensive networks to serve not only government communications needs, but also to provide public information, enhance local educational technology capabilities, and promote local economic development. Our research provides information on the applications of regional and local networks (municipal CATV, ISP, telephony, or comprehensive--capable of video services, high-speed Internet connectivity, telephony, and residential utility monitoring).

Most municipal telecommunications initiatives can be categorized as:

1) Cities expanding their current public telecommunications infrastructure (a municipal utility network or municipal cable system providing cable TV and Internet services) to serve residents, sometimes in response to perceived poor cable service by incumbent operators.

2) Cities issuing Requests for Proposals (RFPs) to partner with private firms in developing broadband networks to serve institutions, residents, and businesses.

CITIES EXPANDING TELECOMMUNICATIONS THROUGH RFP PROCESS TO PARTNER WITH PRIVATE FIRMS

Attempts to attract private investors to partner in the building of municipal networks have had limited success. Of the cities highlighted below, Anaheim offers the only successful case of actual implementation of a public-private telecommunications network (though it has recently filed a lawsuit against the private partner). The examples noted tend to be large cities that attract considerable attention when governmental action is initiated--leading to intense lobbying and political pressure from established private telecommunications firms.

[10] Federal Communications Commission. Inquiry Concerning the Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion, and Possible Steps to Accelerate Such Deployment Pursuant to Section 706 of the Telecommunications Act of 1996, CC Docket No. 98-146, < http://www.fcc.gov/Bureaus/Common_Carrier/Reports/fcc99005.txt>.

Anaheim, California

The City of Anaheim, with a municipally run electric utility and its own internal telephone system, has developed a public/private network with SpectraNet, Inc. (now First World Communication) that connects Anaheim's businesses, schools, residents, and government buildings utilizing 50 miles of the Public Utility Department's existing fiber optic cable.

Austin, Texas

The City of Austin explored the possibility of building its own telecommunications network in 1994; however, the Texas Legislature passed a comprehensive telecommunications bill that prohibited municipal "direct or indirect" involvement in the provision of telecommunications services. In response to this legislation, the City issued a Request for Strategic Partners for a public/private partnership with hopes that a private firm would offer advanced broadband services.

In April, 1996 the City Council voted to negotiate a franchise with CSW Communications to build a hybrid fiber-coax (HFC) network to interconnect all homes, businesses, and institutions in the city. The completed network has not developed into a sophisticated broadband system, and CSW sold the system to another company, ICG which currently only offers competitive telephone service.

Los Angeles, California

In 1996, the City of Los Angeles issued a request for information to build a public/private telecommunications infrastructure. They expect to build an advanced fiber optic network to serve internal city government needs as well as schools, businesses, and homes. Three years later they still are in the planning process.

San Diego, California

In 1996, San Diego issued an RFP to encourage private firms to partner with the city in building a "community-wide information infrastructure." During their deliberations, however, the Telecommunications Act of 1996 passed, and the city abandoned the process with the hope that competition among private sector telecommunications firms, touted by sponsors of the Act, would lead to the goals expressed in the original RFP.

Seattle, Washington

Seattle issued an RFP seeking investors/developers interested in building an information highway in Seattle in 1995, but abandoned the process when Viacom sold its Seattle cable franchise to TCI, and the city was able to leverage a major part of its stated goal—residential high speed Internet access—in negotiations with TCI.

CITIES LEVERAGING EXISTING INFRASTRUCTURE TO PROVIDE TELECOMMUNICATIONS SERVICES

Most successful cases of city telecommunications initiatives occur in smaller cities and towns with established municipal cable systems or municipally owned utilities.

This allows for upgrading existing networks with marginal investment. Often, newer municipal cable system development (with added high-speed Internet connectivity) is in reaction to the public outcry against poor service or high rates of incumbent private cable operators. It may be that these smaller venues are better able to manage the political problems that occur when industry performance does not meet public expectations.

Cedar Falls, Iowa

Voters approved the city's own utility telecommunications efforts in 1994. The municipally-owned utility has built a Hybrid Fiber-Coax system that can provide video, voice, and data services to every resident and business in Cedar Falls.

Eugene, Oregon

The Eugene Water & Electric Board plans to contract with a private company to install fiber-optic lines to municipal buildings, the University of Oregon, public schools and other institutions.

Glasgow, Kentucky

Since 1990, the Glasgow Electric Plant Board has offered a combined service (4 Mbps Internet link and 52 channel cable television) over its coaxial cable system. Primarily built to service Glasgow's utility, the coax system subsequently offered service to compete with the cable operator.

Lakeland, Florida

Over one hundred miles of fiber are being built in Lakeland to aid its utility efforts.

Palo Alto, California

The City of Palo Alto has developed a 26-mile fiber-optic ring to serve the City's internal needs as well as to connect schools, libraries, and medical clinics. Recently, the city has initiated a Fiber-to-the-Home Trial.

Tacoma, Washington

City-owned Tacoma City Light is building a fiber-optics network throughout the city that will compete head-to-head with the existing cable operator and phone company. Services anticipated include high-speed data transport, electronic meter reading, and a 65-channel cable television system.

Springfield, Oregon

The Springfield Utility Board began work in the summer of 1997 on an initial $1.5 million project to lay fiber-optic cable with plans to spend $20 million to connect every home and business in town.

Table 5 is a comprehensive list of cities providing data services through existing utility telecommunications networks, municipal cable services, or a city-initiated public-private network.

Table 5
City Initiated Networks with data services

CITY (BY STATE)	NETWORK
Alabama	

Scottsboro	**Scottsboro Electric Power Board**
Paragould	**City, Light, Water, and Cable**
Coway	**Con.nect**
California	
Alameda	**Alameda Fiber Network**
Anaheim	**Anaheim Universal Telecommunications System**
Palo Alto	**Palo Alto Fiber Backbone**
San Bruno	**San Bruno Municipal Cable TV**
Colorado	
Longmont	**Longmont Power & Communications**
Florida	
Gainesville	**GRUcom (Gainesville Regional Utilities)**
Ocala	**Ocala Electric Utility Fiber Network**
Georgia	
Fairburn	**Fairburn City Utilities**
Newnan	**Newnan Utilities Cable**
La Grange	**La Grange Advanced Telecommunications**
Marietta	**Marietta FiberNet**
Tifton	**City-Net**
Thomasville	**Community Network Services**
Iowa	
Cedar Falls	**CFU Net**
Coon Rapids	**Coon Rapids Municipal Cable**
Harwarden	**Harwarden Integrated Technology**
Harlan	**Harlan Municipal Utilities**
Indianola	**Indianola Municipal Utilities**
Lenox	**Lenox Municipal Utilities**
Kentucky	
Barbourville	**Barvourville Online**
Glasgow	**Glasgow Electric Plant Board (HomeLAN)**
Massachusetts	
Braintree	**BELD.net**
Easton	**Easton Online**
Holyoke	**HEG Net**
North Attleborough	**North Attleborough Electric Fiber Services**
Shrewsbury	**Shrewsbury Community Cablevision**
Michigan	
Coldwater	**City One Cable**
Sturgis	**Digital Community**
Minnesota	
Alexandria	**Alexandria Light & Power**
Moorhead	**Moorhead Public Service**
Nebraska	
Lincoln	**Lincoln Fiber Network Study (proposed)**
North Carolina	
Cary	**Fiber Optic Overlay Project**
Ohio	
Bryan	**Bryan Fiber Optic Network**
Lebanon	**Lebanon Electric Bureau**
Wadsworth	**Wadsworth Electric and Communications**

Oregon	
Ashland	**Ashland Fiber Network**
Eugene	**Eugene Fiber Optic Network**
Springfield	**Springfield Fiber Optic Network**
Tennessee	
Chattanooga	**EPB Telecommunications**
Tullahoma	**Tullahoma Network Resource Center**
Virginia	
Abingdon	**Electronic Village of Abingdon**
Blacksburg	**Blacksburg Electronic Village**
Lynchburg	**Lynchburg Fiber Optic Cable**
Washington	
Tacoma	**Click Network**

III. REGULATORY ISSUES

Based on our findings, the following issues are likely to be of primary concern for regulators at federal, state, and local level.

A. State Policy

As the Telecommunications Act of 1996 evolves, states must take a much more active role in promoting competition, developing advanced infrastructure, and ensuring telecommunications services continue to be available to all. It is much too early to declare which state policies will best lead to the goals set out by the Telecom Act, but the data offered in this report will benefit those seeking to understand the trends that are developing at the state and local level. In particular, as utilities continue to be deregulated, their legitimate role in providing telecommunications services should be addressed by state policy. The differences and similarities between public- and privately-owned utility systems with respect to providing advanced telecommunications infrastructure should be addressed. It may be the case the publicly owned systems should be accorded the legitimate right to provide services that simply are not emerging from the private sector.

Universal Service

As states develop their infrastructure and disburse their Universal Service Funds, examining successes and failures should provide lessons regarding the most efficient and equitable means of collecting and distributing these funds. If, as expected, increased competition among carriers leads to reductions in telecommunications prices, universal service policies will have to be re-examined at both the federal and state level.

Incentive Regulation

Comparing alternative state regulatory policies and infrastructure outcomes should provide answers as to what models are most effective at enhancing competition, holding down prices, or encouraging investment in advanced telecommunications capabilities.

Infrastructure Investment

In addition to comparing state regulatory policies' impact on infrastructure development, exploring the outcomes associated with increasing public investment in state networks offers an opportunity to evaluate private vs. public investment in telecommunications infrastructure and how states may benefit from either approach.

B. Role of Municipalities

As noted above, issues of public network ownership need to be explored recognizing the growing role of city and regional attempts to develop advanced telecommunications networks to meet the needs of local government, education, business, and residents. Although the nationwide residential deployment of broadband services through the private sector's cable modem and DSL services continues to grow, it offered an unimpressive penetration rate of approximately 0.4% according to early 1999 estimates. At the same time, estimates for public utility deployment showed that advanced fiber networks passed 122,000 homes.[11]

Anchor Tenants

Increasingly, city and county governments have economic incentives to develop internal communications networks to save taxpayer dollars. Local government's abilities to provide public information more efficiently online are enhanced with advanced telecommunications capabilities. In addition, cities with municipal utilities have existing telecommunications networks for utility management purposes. As the primary tenant of a public network, cities have the ability to share excess network capacity with other institutions, businesses, or residents.

Collaborations

The ability to share excess capacity with other institutions often leads to regional collaborations among local government, school districts, other government agencies, as well as businesses. This can be particularly important in rural areas where aggregated demand can draw services that single (small) users could not command. If competition among private carriers fails to offer advanced telecommunications at affordable rates, it is likely that collaborative public and public-private telecommunications networks will continue to grow as long as policymakers allow them to do so.

Debates on Municipally Owned Networks

As interest in publicly funded networks grows, competitive concerns among private carriers also will grow. As has been the case in many state legislative houses, more states will see legislation introduced that attempts to limit or prohibit cities and other governmental bodies from developing telecommunications networks.

IV. CONCLUSIONS AND SUGGESTIONS FURTHER RESEARCH

As the United States attempts to develop the much-touted Information Superhighway, researchers and policymakers need to focus on the regulations and

[11] According to the FCC, early 1999 figures estimate 350,000 cable modem subscribers and 25,000 DSL subscribers. From Inquiry Concerning the Deployment of Advanced Telecommunications Capability.

policies of states as well as the infrastructure projects of states, regions and cities. While the Federal government has a continuing and important role in developing information infrastructure, a great deal of policy and infrastructure development is occurring at the state and local level. Too often states are unaware of other states' efforts and whether they succeed or fail; states generally lack the resources to undertake their own broad-ranging studies, and certain parochial attitudes may hold sway. There is the additional problem at the state level of political influence by large industries. More shared information across states and across localities can yield a better understanding of the most viable approaches, and a produce a pool of experts who can work with each other in crafting the most effective programs.

The paper offers a first step in understanding the implementation of the Telecommunications Act of 1996 and the development of telecommunications infrastructure in a newly deregulated era. In order to fully interpret the significance of the Telecommunications Act continuing research and data collection are needed.

In particular, projects should examine the following questions:

1. What states and cities are most successfully at nurturing competition?
2. What policies improve the infrastructure available to rural regions?
3. Which states and cities have the most advanced telecommunications infrastructure and why?
4. Which states and cities have the highest and most equitably distributed telephone penetration?
5. Which states and cities have the highest and equitably distributed Internet connectivity?

The goal of further research should be to discover the policies, regulations, and practices that lead to advanced telecommunications infrastructure serving the entire population equitably.