Rural Internet Connectivity

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Abstract

This research investigates Internet connectivity in rural regions of four states. Access to the Internet has assumed new significance for commercial and political reasons. Even as E-rate provisions bring Internet connectivity into the universal service fold for certain institutions, more general Internet access to a broader community constituency seems to have consequences for regional economic development. However, the deployment of the types of networks and points of presence that can deliver toll-free Internet favors urban regions. This research examines Internet service providers' operations in rural portions of Texas, Iowa, Louisiana and West Virginia in order to determine the disparity between urban and rural regions for Internet access and the factors that influence ISPs' operations in rural areas. The significance of state Extended Local Calling plans also is examined insofar as this mechanism can reduce the calling penalty associated with ISP access for some rural areas.

Rural Internet Connectivity

Introduction

Without adequate connections to advanced telecommunications infrastructure and services, rural communities may not be able to fully participate in the emerging information economy. Several studies have explored the link between economic development and the presence of different levels of telecommunications infrastructure, most concluding a positive relationship between access to telecommunications capabilities and improvement in certain economic.[1] With the arrival of the Internet in the 1990s, access to this new tool has assumed huge importance, although we hasten to add that empirical evidence specifically attesting to the efficacy of Internet access at this point is scant. The change in universal service policies under 1996 federal legislation recognizes the importance of the Internet for education and information access, and catapulted the ability to use it to national significance.

However, the Falling through the Net series of studies by the Department of Commerce investigates the demographic correlates of access to the Internet and has repeatedly concluded that some segments of the population are "falling through the net," to their economic peril (http://www.ntia.doc.gov/ntiahome/digitaldivide/). With respect to rural areas, the most recent report in the series notes:

- At almost every income level, those households in rural areas are less likely to own computers than households in urban or central city areas.
- At every income level, households in rural areas are significantly less likely -- sometimes half as likely -- to have home Internet access than those in urban or central city areas.
- Black households in rural areas are 1/3 less likely to own a computer than the average U.S. Black household, and are 2/5 less likely to access the Internet than the average U.S. Black household.

[1] Parker, E., H. Hudson,D. Dillman, S. Strover and F. Williams (1995). Electronic Byways: state policies for rural development through telecommunications. Washington: The Aspen Institute.

- For rural areas, the Kindergarten-12th grade school is a popular point of Internet access: 30.0% of rural persons use the school for Internet access outside the home, compared to a national average of 21.8%. (http://www.ntia.doc.gov/ntiahome/digitaldivide/factsheets/rural.htm)

These findings echo a 1998 report's conclusions that rural citizens are far less likely to use computers and digital networks, including the Internet, than average Americans.[2] This disadvantage is exacerbated by lower income education levels characterizing most rural regions, and is most prevalent among non-white populations.

The U.S. telecommunications infrastructure supporting the information economy is unequally deployed in the US, and in this respect too rural regions are at a disadvantage. One of the more notable infrastructure disjunctures is between urban and suburban communities and small rural communities.[3] Although good data on this disjuncture are difficult to obtain, many service vendors and other businesses claim that poor telecommunications infrastructure inhibits their abilities to do business in more rural regions.[4] Competing local exchange companies (CLECs) are disproportionately clustered in metropolitan areas.[5] The growing availability of cable modem service likewise is concentrated in urban markets where larger cable operators have made the necessary investment in hybrid fiber coax to offer Internet connectivity. Digital subscriber line (DSL) services have inherent distance limitations that render them urban technologies; they cannot extend far enough from a central office to characterize them as truly

[2] See Falling Through the Net II, 1998, NTIA, Department of Commerce, available at http://www.ntia.doc.gov/ntiahome/net2/falling.html.

[3] See the FCC's Report on the availability of advanced telecommunications systems in CC Docket No. 98-146, 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 99-5).

[4] Consumer's Union issued a report in February, 1999 that documents a digital divide based on consumer profiles. It is well known that rural communities conform to fairly modest income or socio-economic status profiles for the most part. The Digital Divide Confronts the 1996 Telecommunications Act: Economic Reality v. Public Policy. February, 1999.

[5] FCC (1998). Local competition report. Available online at www.fcc.gov/ccb/stats/lcomp98.

rural, and low population density regions are not the first areas targeted by telephone companies deploying DSL.

Finally, one 1999 study is highly critical of the near-term results of deregulation in both urban and rural areas. It concludes: "Instead of becoming vigorously competitive, the telecommunications and cable industries have become highly concentrated. Instead of significant declines in prices, we have sharp increases in cable and in-state long distance, and stagnation in local telephone and interstate long distance rates. Instead of rapid deployment of advanced technologies from increased private sector investment, we have a growing 'Digital Divide' between those who make intensive use of the telecommunications network and those who do not."[6]

The current significance of Internet access highlights the importance of the industries and policy structures that affect it. The current debates surrounding "open access" to cable modem services illustrate some of the stakes, although the local communities prompting the access claims are in urban areas, which is where cable modem services are most likely to be offered in the near term. With respect to rural areas, for the near term Internet access services are most likely to be provided by independent Internet Service Providers, who in turn rely on telephone companies, particularly the incumbent local exchange companies, for their links to Internet backbones. The end user's connectivity to the Internet is defined by the quality of service an ISP can provide at a specific cost. Cost factors are related to state regulations and exchange boundaries relative to the user's location. Accessing the Internet through a dial-up ISP can mean only a $20 or so monthly fee for unlimited access if an ISP is located nearby. If, however,

[6] Consumers Union, 1999, The Digital Divide Confronts the 1996 Telecommunications Act: Economic Reality v. Public Policy. February, 1999, p. 12.

reaching an ISP entails a toll call or joining a flat rate calling plan to reach a broader geographic region, the cost can be considerably higher.

The Internet Service Provider industry has undergone a great deal of consolidation in 1997-99 even as large companies such as Time-Warner, AT&T and the Bell Operating Companies (BOCs) have jumped into the provision of Internet connections.[7] AOL and MSN have been the largest ISPs, AOL dwarfing MSN's operations. (In fact, MSN has lost market share during 1999.) Trade journals such as Boardwatch and The List estimate there are over 5000 ISP companies in the U.S., and the vast majority of them are local. ISP service is dependent on reaching telephone company points of presence (POPs), the large switches that connect long distance carriers to local traffic. The distribution of POPs around the country in turn is a determining factor in where ISPs focus their business. Downes and Greenstein (1998) examined the geographic distribution of ISPs using a database that listed the POPs used by different ISPs.[8] They found that 92% of the population had "easy access," while 5% had costly access. Their procedure located 247 counties that lacked an ISP, and another 141 counties that had only one ISP. They usefully point out that while establishing ISP service can be relatively easy, providing high quality and high speed connections can be rather expensive; the latter also can depend on the lines and switches at the local telephone provider. NTIA found that 69% of all households accessing the Internet use a national service provider, followed by 14% using a local phone company.[9] Issues of service quality, and the extent to which ISP services are available throughout the regions served by POPs and at what cost have not been addressed to date.

[7] AOL alone has 18 million Internet subscribers, although clearly it provides more than Internet access.
[8] Unfortunately, this source no longer makes POP information available for ISPs. Downes, T. and Greenstein, S. (1998). Do commercial ISPs provide universal access? Unpublished paper.
[9] NTIA (1999), Falling through the Net III, available at www.ntia.doc.

Telephone services in rural areas traditionally have been nurtured or protected through various federal and state policies. The early rationale for such policies focused on ensuring that rural areas were served by telephone networks. Consequently, for example, the Rural Electrification Administration (now the Rural Utility Service) made low or no cost loans to parties willing to establish phone services in such areas. Cooperatives emerged as significant service providers in rural areas, their non-profit orientation leading them to provide telephone service in spite of limited prospects for profitability. Over the years, the development of the high cost fund ensured that service to higher cost areas - which typically include most rural regions - would be supported. The early goals of building the telephone network through a definition of universal service that emphasized widespread availability evolved into a definition that emphasized equitable costs for basic telephone services. The high cost fund was supported through various implicit cross-subsidies.[10] In addition, many states support policies that exempt telephone companies serving rural areas from a variety of regulatory obligations. The net effect of such policies has been the growth of a national telephone system that provides adequate connectivity to most rural areas, except for certain geographic pockets (e.g., Indian reservations). However, the demands of new communications capabilities ranging from accessing the Internet to linking institutions for video conferencing tax the infrastructure broadly available in rural areas, and deregulation will alter the circumstances under which the high cost fund operates. Consequently, how network connectivity unfolds in rural areas is a pressing policy issue.

How do the deregulation initiatives prompted by the 1996 Telecommunications Act influence telecommunications infrastructure in rural areas? Are there improved choices and

[10] High-cost rural carriers receive 98.5% of current high-cost funding, which supports 31.4 million of the approximately 170 million total U.S. access lines, according to the Universal Service Administrative Co. Carriers

opportunities for services in these regions as a result of new competition policies? How do state or federal polices influence Internet availability in rural regions? How do they influence the structure of the ISP industry? We lack broadly available empirical evidence on most of these questions. The focus of this paper is to provide some preliminary information in order to begin to address some of these questions. To date, the benefits of deregulation for rural areas are unclear. We attempt to provide a snapshot of Internet access in some rural areas in order to comment on the current problems such services face. How a competitive environment may influence those problems will be taken up in the conclusion of this paper.

Design of the Study

The goal of this study was to assess the status of dial-up Internet connectivity in selected rural counties. Over the past year, we examined rural areas of Texas, Iowa, West Virginia and Louisiana with respect to Internet access options. The study of one region in west Texas was completed initially and provided baseline questions and a mode of inquiry for our work in Louisiana and West Virginia. Our investigation of Iowa relied entirely on secondary statistics provided by that state's regulatory commission. These states were chosen because they include different BOCs and because each includes a high proportion of rural territory. Our primary research questions were:

1. Who provides Internet service to our target regions?
2. How can we characterize the availability of Internet service in rural areas? What factors influence its presence?
3. What are some of the impediments to expanding Internet service in these regions?
4. How do state or federal policies influence Internet service to rural areas?

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pay in about 2% of interstate and international revenues to support the fund (Engebretson, J. (March 15, 1999). The schools and libraries--and ISP—saga. Available at www.internettelephony.com).

A combination of research tools provided data: secondary statistics and reports, original telephone-based surveys of Internet Service Providers for the relevant area codes of our target regions, and web-based investigation of ISP services. Appendix A provides a sample questionnaire that illustrates the range of questions we sought to answer for ISPs serving our target areas in Texas, Louisiana and West Virginia. One important goal of the study was simply to document the conditions of access to Internet service providers in our target regions.

Definitions

Internet Service

Internet service amounts to access at various speeds and through different modes. For example, some ISPs offer only 28.8 baud rates, while others offer T-1 or T3 lines and DSL. We requested information regarding the types of connections ISPs maintained with their telephone companies (T-1, PRI, type of switch, etc.) and the components of a "typical" service package (dial up access, web space, designing web pages, etc.). We investigated the nature of service relationships between the ISP and the telephone company.

Service availability

We sought to determine the service territories of ISPs listed as serving our target counties. Because our interests focused on rural areas, we defined service availability in terms of whether or not a set of small towns within the area code could reach an identified ISP without a toll or special calling plan in place. For counties in Texas, West Virginia and Louisiana, we enumerated several small towns to use a "test cases" in order to ascertain the penetration of ISP service. See the questionnaire in Appendix A for a sample listing of Louisiana towns.

Impediments

We queried the ISPs about the problems they face in providing service in their region. Those problems revolved around the responsiveness of the local telecommunications provider and local market conditions including the size of the customer group able to reach them on a toll-free basis.

State level policy

In some states, toll calling charges are relieved through Extended Local Calling (ELC) policies (the names of such programs vary from state to state).[11] Basically, ELC policies allow households to pay a flat rate for placing calls within a geographic region larger than that allowed by their normal monthly flat rate service. Citizens can use ELC to connect from their rural telephone exchange to a nearby exchange without paying toll rates. In theory, people living in areas that lack services, including Internet access,[12] or that run the risk of numerous toll calls because their schools or businesses are located outside their local calling area can potentially subscribe to such services at reasonable rates under ELC. ELC policies may enhance the opportunity for low cost Internet access. We sought to examine how ELC policies might influence Internet access opportunities in our target regions.

ELC policies are different from state to state, reflecting regulators' evaluation of the need to balance ELC against the lost toll revenue to rural telephone companies. In Texas, for example, eligibility is based on showing that a community of interest crosses exchange boundaries and on an election process by telephone subscribers.[13]

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[11] Several states have slightly different names for suburban programs versus rural programs that facilitate extended calling regions.

[12] Internet access has been accepted as an ELC rationale by the PUC on some occasions. Frequent calling to proximate medical facilities, educational institutions and similar sites also can help build the case that justifies ELC.

[13] At least 100 verified signatures of customers residing in their exchange area (or 5% of total customers if the exchange has fewer than 2,000 customers) must be submitted to the PUC along with a petition for ELC. If verified, the PUC requests that the local exchange company conduct an election. If more than 70% of those returning ballots

Internet Service Providers

Internet Service Providers (ISPs) can provide a variety of services and often target specific constituencies. In this study we were interested in ISPs that offer access to a broad range of customers. Consequently we eliminated services that advertised that they worked only with businesses. Like most telecommunications service providers, ISPs tend to cluster in populated areas. We sought to ascertain which ISPs claim to serve the rural areas we targeted as per their public listing in two trade journals, Boardwatch and The List (http://boardwatch.internet.com and http://thelist.internet.com). These journals focus on commercial businesses providing service, and it is these businesses in which we are primarily interested in any case. In those journals, ISP companies are listed by the area codes they serve. One other source for listings in Texas was the state Internet Service Provider association, called the Texas ISP Association or TISPA. They provided us with a list of member ISPs for the state. We also contacted telephone companies in West Virginia and Louisiana and asked them about the ISPs to which they connect. We assessed whether ISPs actually reach throughout the areas they claim to serve through their listing in publicly available sources, our concern being that providing service in a region actually meant that the service was available on a local call basis only to the larger cities of that region and that using it from elsewhere would necessitate toll calling.

Sample and Data-gathering

elect for ELC, and all other conditions are met, the PUC will grant ELC between petitioned and petitioning exchanges. Extended Local Calling is subject to Public Utility Regulatory Act, Title II (Sub-chapter C, Section 55.041, 23.49-6 through 23.49-12) of the Texas Utilities Code (1997).

Our target areas for studying Texas, Louisiana and West Virginia were counties (or parishes) identified on the basis of their rural status. While we would have preferred to select study areas on the basis of telephone exchanges, the availability of county-level data and the non-availability of detailed maps of telephone exchanges made the county unit preferable.[14] We used the urban influence continuum code to identify nonmetro counties and to select rural sites. The classification scheme describes the degree of urbanization and proximity to a metropolitan area, assigning codes of from one to nine with "one" referring to central counties of metro areas with one million or more people, and "nine" representing a completely rural county with no town exceeding 2,500 in population. Seven counties in Texas (Pecos, Jeff Davis, Brewster, Terrell and Presidio in west Texas, and Blanco and Llano in central Texas), three in Louisiana (Red River, Tensas, and Cameron parishes), and four in West Virginia (Roane, Wirt, Ritchie and Calhoun) were selected. Figures 1 and 2 illustrate the locations and codes (all 8 or 9) for these counties for West Virginia and Louisiana. Figure 3 illustrates the classification for the state of Iowa, demonstrating that most of the state is very rural.

Within each county we identified both the larger and the smaller population clusters. As we contacted ISPs claiming to serve the area codes overlapping our target counties, we queried whether the ISP provided service throughout the area code. If they did not (and we found that most did not), the interview was terminated. Most ISPs provide service only in the largest cities. If they said they did provide service throughout the region, we recited the names of a few of the smaller towns in our target areas in order to learn precisely where their systems operated.

For all of the ISPs claiming to provide services to our target regions, we sought to ascertain to what extent they served the smaller towns in the counties. We also sought

[14] We found that even state utility commissions lacked up-to-date maps of telephone exchanges and service providers. The dominant telephone companies provided all the maps we were able to obtain from regulatory bodies.

information about the types of connections they obtained from telephone companies as well as any difficulties they may have experienced with them. The types of customers served, typical service packages, rates, whether ELC figures in their company's reach, and company size and revenue information also were sought. These in-depth questions were asked only of ISPs actually serving the most rural areas. Telephone-based surveys were conducted with the eligible ISPs, supplemented by web site-based information.

We also had numerous interviews with state-based utility commission personnel. They helped us to obtain some information about local telephone companies and also interpreted their state's calling plans. In the case of Iowa, the staff furnished us their own study of ISP access in the state, which is summarized below. In Texas, we filed a Freedom of Information Act request in order to obtain ELC information.

Information about each of the study areas is presented below.

IOWA

In 1997 the Iowa legislature directed the Iowa Utilities Board to establish a consortium of telecommunications providers to "develop and establish a plan to provide non-toll dial-up Internet access."[15] The group assembled by the Board took the first step of gathering data on toll free access to the Internet. Their data-gathering used the exchange as the basic unit of analysis, and they sought to learn whether or not each of Iowa's 811 exchanges had toll-free dial-up access to the Internet. Any exchange with at least one provider constituted an "exchange with access." Their initial data from the end of 1997, reproduced in Tables 1 and 2, illustrate that 11% of the state's exchanges lacked toll free access, representing about 3% of the population. The exchanges lacking toll free access are primarily rural, and most of them represented locations served by GTE Midwest, Inc. (79 of the 87). One year later (4th quarter 1998) the

number of exchanges without access dropped from 87 to 64 even without any public policy remediation.[16]

Table 1: Summary of Data by Exchange

	Iowa-Based Exchanges	Percent
Exchanges with Access	724	89%
Exchanges without Access	87	11%
Total Iowa-Based Exchanges	811	100%

Local Telephone Service Provider	Exchanges Without Access	Percent
GTE Midwest, Inc.	79	91%
U S West Communications	1	1%
Frontier Communications of Iowa, Inc.	1	1%
Independent Telephone Companies	6	7%
Total	87	100%

Source: Iowa Utilities Board report, 1998. Data from 4th quarter 1997.

Table 2: Summary of Data by Access Lines

	Number of Access Lines	Percentage
Without Nontoll Access	38,324	3%
With Nontoll Access	1,449,072	97%
Total Access Lines in Iowa	1,487,396	100%

Source: Iowa Utilities Board 1998. Data from 4th quarter 1997.

In their study the Board noted that ELC (or Extended Area Service or EAS as it is known in Iowa) was an important factor in ISPs deciding to provide service. One conclusion the Iowa Utilities Board considered based on this observation was whether they might make it easier for exchanges to obtain EAS. Broader EAS services would translate into more customers being able to reach an ISP without placing a toll call, although the toll revenue local providers lost would have to be factored into an equation that attempted to remedy the situation. Fundamentally,

[15] The specific language is found in House File 730, Section 5

however, the low rate of toll-based access suggested to the Board-assembled group that Internet accessibility was not in dire straits in Iowa.

In seeking explanations for the difficulties in the exchanges lacking toll–free access, the Board noted that the costs of establishing Internet service warrant a subscriber base of at least about 200 households, and some small exchanges in the state are too small to yield an ISP penetration base of that size. Another important factor they identified included the limitations of telephone company facilities, including the need for additional phone lines, the need to upgrade to digital switches and the inability of some ELC trunk lines to handle Internet traffic volumes.

The policy solutions Iowa enumerated in making its assessment included expanding ELC routes, designing optional calling plans that would expand callers' ability to reach larger geographic areas for a flat or measured rate, investing in the costs of providing the ISP facilities for exchanges that lack access, and using the state network, Iowa Network Communications, to offer access.

TEXAS

The Western five-county region (Pecos, Jeff Davis, Brewster, Terrell and Presidio) examined in Texas is extremely remote, as evident from the population per square mile figure in Table 3. In contrast, the two counties in Central Texas are closer to the state capital, Austin, as well as several other small regional towns with lively trade functions; their population density is considerably higher. While both regions have numerous farms, the central Texas region is characterized by more manufacturing and service occupations.

Table 3: Texas County Data

COUNTY	POPULATION (1997)	POPULATION/SQ Mi (1990)	Median Household Income (1993)	% High School Graduates

[16] Statistics were provided to the author from the Iowa Utilities Board.

Pecos	16549	3	$24,078	58
Jeff Davis	2185	1	$24,306	69.5
Brewster	9318	1	$21,338	73.2
Terrell	1215	1	$22,969	66.3
Presidio	8123	2	$13,920	43.9
Blanco	8004	8	$24,533	68.9
Llano	13,013	12	$21,627	71.6

These regions are served by several different telephone companies, including Southwestern Bell, GTE, Big Bend Telephone Company, Contel, Dell Cooperative, and the Central Texas Telephone Cooperative, and represent 19 exchanges. Texas has fewer telephone companies overall than Iowa but has 1300 exchanges, many of them as large of other states. The counties we examined comprise about 54,000 square kilometers, and fall into two area codes, 830 and 915.

The total "universe" of Internet Service Providers claiming to serve the 915 and/or 830 area codes in Texas numbered 180 as of fall, 1998. However, we found that even the largest towns in the counties had fewer than four potential providers; many small towns had none. In all, only a handful of providers operate in our seven counties.

We gathered data from all the 180 ISPs in our counties. Based on that information, 114 ISPs actually serve some portion of the area codes and meet our criteria for offering commercial dial-up service to any customer. Of those, 106 serve only the major cities or those customers who can dial-up a major city with a local call.[17] For populations beyond the major cities,

[17] Abiline, El Paso, Lubbock, Midland, Odessa and San Angelo.

currently only six companies serve the five county area of west Texas and two offer service in central Texas.

Following the typical pattern, ISPs are concentrated in relatively populated areas. Currently, six cities in the west Texas counties have no ISP who claims to serve them. Those towns -- Lajitas, Study Butte, Bakersfield, Girvin, Sheffield, and Shafter -- cannot connect to the Internet via dial-up, dedicated access or any other traditional connection without a toll call. A single ISP reaches most other towns. However, the financial health and service quality of the ISPs is questionable. One ISP in Ft. Stockton is managed by a ham radio club; an Alpine ISP operates out of a radio supply store. In all our target areas, the ISPs are side businesses or one of multiple income streams for a rural businessperson. The long-term viability of these operations is an open question.

All ISPs offer flat rate pricing for basic services of between $15.95/month with a student discount in Ft. Stockton to $31.39/month in Terlingua and Presidio. Those prices generally include dial-up access and an email account; some include 1MB of Web server space. All but one ISP claimed to offer 56bd bandwidth to dial-up customers. Some reported difficulties obtaining certain sorts of services (e.g., PRI) from local telephone companies, and one reported that GTE's T1 lines were multiplexed into several lines that supported less than 28.8 K bandwidth, meeting the tariff for voice but "inadequate" (according to the respondent) for data traffic. Contrary to anecdotal evidence and the experience in Louisiana and West Virginia, we heard no reports of systematic problems with the local telephone providers. However one ISPs noted that a portion of their geographic regions is served by radio and therefore not able to get Internet service.

ELC in Texas

We found some evidence that ELC worked to expand Internet access in Texas, although when we asked ISPs if they were aware of ELC only one of the eight answered affirmatively. In Texas, petitioners in a single exchange may request ELC for up to five neighboring exchanges in a single ballot.[18] Customers may elect any or all five of the exchanges for a single flat rate, generally $3.50 per month for residential customers and $7 per month for businesses. The advantage to electing all five is to create a local calling region. The costs to the total customer base rise incrementally, however. Eligible costs (including lost toll revenues, lost access charges, switching costs) not recovered through the flat monthly rate are distributed among all customers.[19] Connecting to five exchanges raises fees more than would connecting to a single exchange, and customer bills rise in response. The owner of ISP 142, located in central Texas (Marble Falls), says without extended calling his costs would rise considerably. ISP 142 operates in three area LATAs and has avoided inter-LATA problems by employing Remote Call Forwarding (RCF) devices. ELC will replace the need for some RCFs in ISP 142's network since it was approved early in 1999.[20]

Across the state as of fall 1998, petitions had been filed for a total of 5, 478 ELC elections, with 3,029 (55%) successful elections.[21] About 19% (1, 023) of the elections failed to garner 70 percent of the electorate. The remaining 26% (1,426) election petitions were

[18] For the purposes of analysis, each electable exchange is counted as a separate election. Therefore, petitioners may hold up to five "elections" on a single ballot.

[19] The costs passed on to the customer base vary according to the total customer base of the petitioned exchange. Currently, Southwestern Bell charges about 26 cents per customer, however, Sprint complained to the PUC that they would have to charge more than $6 per customer to create similar discounts.

[20] For instance, they have an RCF in Kingsland serving Llano and Tow exchanges. Customers calling in from north and west of Kingsland are transferred via RCF to the Granite Shoals exchange, then routed through to their Marble Falls headquarters. With ELC (which was implemented in Kingsland the week of February 8, 1999) the Kingsland calls can be routed directly to Marble Falls, across the LATA, at the flat monthly ELC rate. This will save ISP 142 costs associated with purchasing, operating and maintaining RCFs. Many ISPs consider the time and costs associated with maintaining equipment to be a significant growth inhibitor and a drain on cash flow.

dismissed, sometimes the result of something as simple as failing to provide required documents, sometimes because the required number of customers (100, or 5% in smaller exchanges) has not signed the petition, or because a community of interest has not been demonstrated.[22]

Two ELC results stand out in the context of Internet access for west Texas. Coyanosa, which is served by two ISPs, can dial-in to Ft. Stockton, which has four ISPs. Imperial, served by a single ISP, can dial-in to Ft. Stockton and Odessa, much larger cities served by several national and regional ISPs. Valentine, in Jeff Davis County, posted the most disappointing petition results: the state regulatory commission dismissed all five of Valentine's petitions because they failed to articulate a COI in three cases; one exchange was too far away to qualify for ELC, and Big Bend Telephone exercised its exemption (fewer than 10,000 lines) in the fifth case.

In the central Texas counties, the Kingsland exchange was the only successful petitioner, the net result being that Kingsland customers are connected to three other exchanges, all of which are outside our target counties but which provide better ISP service. The Granite Shoals exchange, which spans parts of Llano and Burnet counties (and therefore is partially within our target region) was successfully petitioned by Buchanan Dam exchange and so enjoys reciprocal ELC calling rates.

These examples illustrate some of the advantages and disadvantages of ELC in the state. Clearly the extended calling plan can make an ISP's services available to a larger populations. However, as was the case with Big Bend Telephone, the smallest and most rural telephone companies are exempt from ELC obligations. Therefore, this public policy mechanism may have no effect in those communities.

[21] Recall that each exchange may conduct up to five "elections" on each ballot; exchanges often file more than one petition, and thus hold more than one ballot.

LOUISIANA and WEST VIRGINIA

As was the case for Texas, we located ISPs on the basis of the area codes serving our target counties. Area code 318 served all three target counties in Louisiana, and area codes 225 and 504 serve other parts of the state. As will be explained below, both states support banded calling zones that enable people to pay an additional flat, monthly fee to call greater geographic areas. This program has an effect similar to EAS except that it makes it difficult for an ISP to know exactly where its customer base is. It also meant that for this study's purposes the idea of a "local" ISP was broadened considerably. Consequently, we examined ISPs in area codes other than 318 for Louisiana. West Virginia has only area code 304.

The banded calling plan offers a customer a "home" rate of $15.00 per month, plus Tier 1 and Tier 2 regions. Tier 1 includes exchanges in the adjacent local areas and Tier 2 includes all central offices within 22 air miles of the local central office, working out to a diameter of about 50 miles. The cost for Tier 2 service is $29.00 per month, and about 10% of all customers opt for this plan in the state. Roughly 50% opt for Tier 1 service.[23] Bell South also offers an Area Plus plan that allows callers to call anywhere within their LATA for a flat rate of $35 per month. Two of our parishes, Tensas and Red River, are in the same LATA as Shreveport, for example, and therefore subscribers to this plan would have access to up to 113 ISPs.

Across the four area codes for the two states, we located 502 ISPs that claimed to serve the areas. Of those 502, only 99 had phone numbers in the local area codes, suggesting the probability that they would serve more remote regions. Of those 99, again we found just a handful serving the most rural regions of the states that we had targeted. In our selected Louisiana counties, we found one local ISP plus four ISPs offering services to that area on a

[22] Because COI is distance sensitive (only those petitioning exchanges separated by more than 22 miles are required to demonstrate it) the burden of proving COI falls disproportionately on rural exchange customers.

local basis even though their POPs are not in the area. In West Virginia, we found three ISPs with POPs in the locality and two additional ISPs with customers in the region even though their POPs are outside of the area.

While those numbers are quite low, the availability of the banded calling and intra-LATA calling plans means that access at an additional flat rate is available although it represents an additional monthly charge for households or businesses and therefore may be a disincentive. What was consistently cited as a problem among these ISPs however was their relationship with the local telephone companies. Charges were high for some, higher than they had had with service providers who had in some cases been bought out.

In West Virginia, service from the telephone companies was almost uniformly reported to be a problem, particularly the length of time it took to get lines or other service from Bell Atlantic. Nevertheless, one West Virginia ISP commented that there seemed to be "enough business to go around," at prices ranging from $12.95 to $29.95. However, the smallest local ISP – which was a combination ISP and Radioshack – offered only dial-up access and site hosting, whereas the others offered dedicated access, sometimes web design services, and better connections with local phone companies (digital switches, SS7 or CCS&, BRI and PRI, frame relay, etc.). Of the three local ISPs,

In Louisiana, the only local ISP was a division of the local telephone company, and predictably, it offered no critical comments concerning service or relationships with them. We also tried to interview the ISPs with customers in the area as well as an additional seven that could serve customers in this area through banded calling plans. Of those, two declined to be interviewed. All but two of the rest had extremely negative comments about Bell South,

[23] Telephone conversation with Billy Jack Gregg, Public Advocate and member of the Rural Task Force, March, 1999.

primarily having to do with the quality of their switches, their charges, and their service. One ISP doing business in both Texas and Louisiana commented that his ISDN line costs $585 in Texas but $1410 per month in Louisiana.

The strong finding in these states is that access is available but at an additional cost. However, the prospect of a lively, competitive ISP industry expanding services and perhaps driving prices down does not appear to be on the horizon largely because the local telephone companies are not meeting the ISP's needs.

Conclusion

In these rural states, commercial investment in telecommunications infrastructure has followed a typical pattern: rapid, high investment in highly populated areas and slower, weaker investment in sparsely populated rural areas. As a result, rural communities suffer a "distance penalty" that increases communication costs and makes it more difficult to attract businesses and growing families. Rural communities can use advanced telecommunications services, particularly the Internet, to help them bridge the gap. Several of the ISPs we spoke with noted that there is demand for their services and expressed an interest in expanding <u>if</u> the cost structure were more favorable. However, commercial telecommunications providers are often reluctant to invest in rural areas because of the high sunk costs necessary to reach what can be relatively few rural customers, and the difficulties in achieving economies of scale in rural areas. This means that ISPs wishing to serve rural areas also cannot do so without becoming telephone companies themselves. ISPs' dependence on the local telephone infrastructure defines their pricing structure and their service offerings. The ISPs in these regions had no choices in terms of which provider they could use.

The extent to which competition may emerge in rural areas to redress the access problems remains to be seen, but currently the conditions in rural areas do not appear to be conducive to entry. First, the 1996 Communications Act defines an exemption for incumbent rural telephone companies from the requirement to unbundle their networks to would-be competitors.[24] In essence, unless a new company deploys an entirely new infrastructure in the rural area, the exempt rural companies maintain a virtual monopoly in their area.

Those criteria apply to virtually all rural exchange areas and most small independent companies and cooperatives. On the state level, the public policy measures designed to enhance telephone calling areas and possibly aid in Internet access present contradictions when it comes to rural areas. In Texas, for example, telephone companies that serve fewer than 10,000 total lines in Texas, that are cooperatives, that lack a digital switch (necessary for ELC billing), or where local calling already is available, are exempt from the requirement to provide ELC.[25] The most rural communities cannot petition for the distance calling provision. These exemptions include many exchanges that might potentially benefit from ELC. Cooperatives and small carriers cover large parts of rural Texas.

There is no formal method of publicizing ELC. Sometimes local telephone companies lead the way. Local Economic Development coordinators may get wind of the policy and discuss it with local officials and community leaders. In Texas, the PUC has conducted one single ELC workshop, at the request of a local legislator, in the entire time since ELC was enacted. Even after a community member has discovered ELC and committed to it, the burden of communicating the election rests mainly on the community. The local phone carrier is required

[24] The Federal Communications Commission has interpreted this exemption as based in four criteria, and two of them are that (1) the exchange area includes no incorporated place with more than 10,000 inhabitants, and (2) the company provides exchange service to fewer than 50,000 access lines. See Section 3(37) of the Federal act. For a full discussion of the exemptions, see Part 51.5 of FCC Rules.

to publish a legal notice in the local paper. But unless the election captures the attention of the editorial staff, it is unlikely to receive much mass media attention.

Combined with the small company exemption to ELC, federal policy creates rural telephone monopolies wherein no competitor can interconnect and no customer can dial out at a toll-free rate. Compounding this situation in Texas is the fact that companies that did not opt for competition under SB2128[26] -- including all cooperatives and most small independent companies -- are not required to schedule digital upgrades to their infrastructure.[27] As a result, rural communities fall into the divide where advanced services have difficulties getting into or out of the last service mile.

Finally, federal deregulation of the telecommunications sector at the moment advanced telecommunications is so important creates an era of uncertainty. Competition has been advanced as the mechanism to improve services, lower prices and extend infrastructure. However, regulators and industry continue to joust over the dismantling of old regulatory regimes, while new technologies seek to enter the fray. Most consumers have seen little competition to date and few of its fruits. Meanwhile, deregulatory rulings may erode traditional universal service supports, and new financing and distributions schemes' effectiveness for a reconfigured universal service is unclear. Without low cost connectivity, basic phone service is difficult or impossible to maintain for many rural citizens.[28] Moreover, our data suggest that

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[25] "Metropolitan" areas are defined in the ELC handbook as Austin, Corpus Christi, Dallas, Ft. Worth, Houston, San Antonio and Waco.

[26] Also known as PURA95, this redegulation act passed in 1995 established a schedule for rural upgrades for the larger LECs in exchange for various pricing advantages.

[27] Many rural telcos and coops have implemented digital technologies in their backbone. However, "last mile" technologies in many cases are so crude that customers cannot acquire even the most basic computerized services, e.g., call forwarding. The FCC reported on the issue in early February, 1999 in CC Docket No. 98-146 (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 99-5)).

[28] Economic support for poor and rural citizens has not disappeared entirely, however, new proxy models adopted by the FCC have uncertain implications for many rural areas.

upgraded infrastructure will not be as plentiful from the BOCs in their rural exchanges as new service providers such as ISPs would like it to be. Although coops and small independents often invest in their infrastructure regularly – indeed, they led the BOCs in moving to digital switches in the 1980s - and might even accept ELC if their local subscribers want it, the BOCs and larger telephone companies tend to prioritize metropolitan areas, leaving their rural customers waiting for digital switches.

How then will rural regions acquire access to advanced services, such as the Internet, that require industry investment in expensive infrastructure upgrades? Current policies may not be sufficient to encourage conditions guaranteeing that all citizens enjoy access to advanced infrastructure. Even where infrastructure exists, ISPs may not enter a rural market because it is uneconomical or because they do not accurately perceive the market. Second, rural citizens often lack the skills or knowledge to realize the importance of digital information and communication to their lives and to navigate the public agencies and negotiate with private entities to assure digital infrastructure in their areas. They also may be less aggressive in shaping new public policies and taking advantage of existing rules to enhance their prospects for connection. Third, public policies and patterns of investment at both the state and national level influence the digital capacity of rural areas, and currently those patterns generally do not favor investment in rural regions.