Universal Service and Rural America

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Roughly 20% of the U.S. population lives in what is usually called rural America. Numbering approximately 54 million people, many live near a larger town or even within an hour of a major city, but many also may live in far more remote regions with limited driving access, much less access to air transportation. For some – such as people living in colonias on the border with Mexico - even having access to running water or sewage treatment facilities is a distant promise. Having access to basic infrastructure such as water, sewage, electricity, and telecommunications is taken for granted in most cities across the country, but in rural areas those facilities and their attendant capabilities have come later (or not at all), and they may be inadequate.

The telecommunications topography of the U.S. provides an insightful history into the development of telephone-based services. While people in major population centers might assume that their entire region is served by the dominant phone company serving their region, in fact many in the more rural and remote regions have for years relied on local independent or cooperative phone companies for their basic service. The national map of telephone services is a checkerboard of different companies interspersed between the broad territorial swaths served by the legacy Bell companies.[1] In spite of the rhetoric of universal service, the monopoly AT&T of the 20th century avoided serving many of the most expensive, least populated and remote regions of the country, leaving it to other vendors or the local population itself to figure out how to get phone service. The major carriers – the newly merged AT&T, Qwest (including the former US West) and Verizon[2] - currently do provide about 22 million access lines in nonmetropolitan regions while the independents and cooperatives provide another 24 million lines. These rural telephone companies are the "carriers of last resort," and sometimes represent a household's only communication link to the rest of the world.[3] For years they have relied on programs collected under the universal service label to help them maintain and upgrade their networks

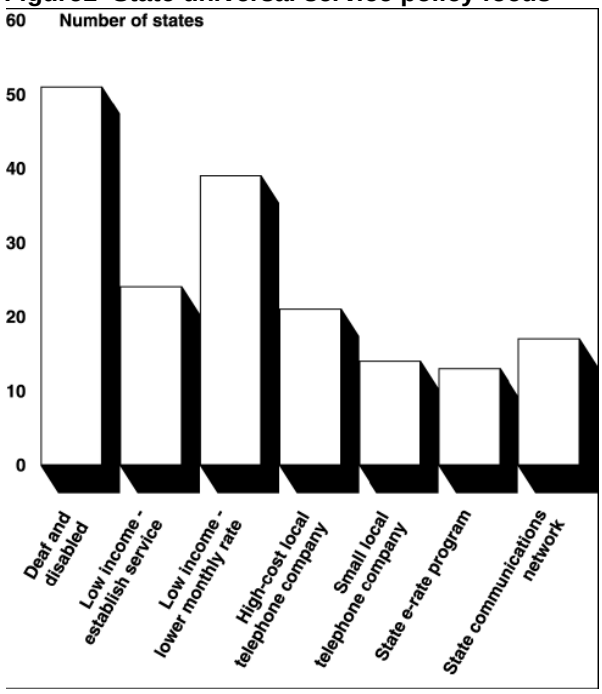
[1] GTE was the largest independent telephone company, rivaling some of the Bell companies in terms of size. It merged with Bell Atlantic to become Verizon in 2000.
[2] AT&T's merger with Bell South, although announced, has not been executed at this writing.
[3] Cell phone service is absent in many rural areas even if a carrier has the authorization to provide service in the region. A typical practice is to establish service in only the most populous town of a rural area licensed for mobile services.

The history of universal service is one of a regulatory tradeoff that almost inadvertently benefited rural populations; it is inadvertent in the sense that at no time was either the government or AT&T proactively committed to ensuring that rural areas would enjoy the same services common in towns and cities. Rather the policy grew out of interconnection disputes between AT&T and other companies, and became enmeshed with other practical problems involved in the rate of return regulation and internal cross subsidies that the company supported for decades (Horwitz, 1989). The upshot of a universal service policy meant that AT&T would interconnect with (or acquire) rival phone companies and sustain rates roughly comparable across its service locations. The company's arrangement with the FCC and state regulators kept local phone call costs extremely low while long distance calling was more expensive to users than its actual costs would have required. Under the pressures of AT&T's divestiture in the 1980s, however, universal service and these internal cross subsidies began to be subjected to closer economic scrutiny; as marketplace and deregulation rhetoric swept across the U.S. government agencies, and as the word "subsidize" became equated with inefficiency and government-mandated bloat, the universal service programs that transferred funds to higher cost networks in rural areas and that supported lower local calling became the target of reform.

Several states also initiated their own universal service programs, generally in response to changing competitive circumstances within their own regions and the prospect of reduced federal support to carriers. For the most part, they obtain funds directly from telecommunications customers or from telecommunications companies that in turn assess a fee on customers. Figure 1 reproduces the Government Accountability Office's finding that state universal service policy programs favor programs that support services for the deaf and disabled as well as programs that support services for lower income households, typically concentrated in central city and rural regions (GAO, 2002, p. 13). Such programs underscore the perception among more localized constituencies that programs targeting certain populations (the poor, the disabled, rural) are worthwhile and deserve public policy attention.

The 1996 Telecommunications Act sought to reframe universal service, directing funds gathered from telecommunications carriers to five federal programs: the High Cost program, the Schools and Libraries Program, the Low Income program (Lifeline and Link Up services), the Rural Health Care program, and the Telecommunications Relay Service for hearing- and speech-impaired users. Most of the $6.5 billion budget for these programs goes to the High Cost program (roughly 70% of outlays) and the Schools and Libraries Program (roughly 25% of outlays) according to the Congressional Budget Office figures for 2004 (CBO, 2005). Rural regions benefit significantly from the latter two programs.

Figure1 State universal service policy focus*



* Source: GAO (2005) based on survey of universal service programs in 50 states and the District of Columbia. GAO, 2002

Nevertheless, with shortfalls predicted (even though not all of the program receipts are always allocated) and with new technologies at once promising improved services to rural areas[4] but also displacing some of the services that traditionally contributed to the universal service program, profound changes in the philosophy and operations of the universal service program are necessary if rural areas are to keep pace with the rest of the country.

This paper will briefly summarize some of the economic factors that highlight the need for improved telecommunications in rural regions, framing the transformations associated with the information technologies of the past three decades as essential to cultivating economic vitality in rural areas. Data regarding the contemporary status of broadband services and e-rate benefits in rural areas will be presented. To revive rural regions through improved telecommunications services will mean reconceptualizing and

[4] Voice over Internet Protocol, for example, would substitute an "Internet" connection for a landline connection, and one type of service had contributed to the universal service fund while the other did not. In June, 2006, the FCC added VoIP to the list of universal service contributors; however, the same issue will be faced with other new technologies in the future.

reprioritizing communities and their abilities to determine their communication environments – in short, a reformulation of universal service that goes beyond an implicit "social contract."

Context: The Global Information Society

The Information Society in the United States is inextricably linked to economic development, both rhetorically and statistically. In sociologist Daniel Bell's original 1973 formulation of a post-industrial age, several factors suggested a fundamental economic and social transformation: shifts in employment away from manufacturing and towards producing information goods and services, more technological innovations, and the growing centrality of computers' capabilities and their pervasive application throughout the economy (Bell, 1973). While Bell did not give much thought to how these changes would percolate throughout society, he did understand that education, work and culture would eventually be reshaped, and while his vision was primarily utopian, even he anticipated some of the darker sides of the Information Society as it was taking shape. For example, not every person was destined to be a well paid computer engineer, and not everyone would complete a college education. With the onset of digital systems and technologies, the liabilities of assuming that the marketplace will rapidly and seamlessly diffuse technological benefits equally across population groups and across territories are increasingly apparent.[5] However Bell could not fathom the breadth and depth of the contemporary information texture to life, and how uneven that texture might be within a single country like the U.S.

Universal service policies have contributed to that texture, first as the mechanism, clumsy as it was, to bring affordable, basic telephone service to a broader swath of America, and later as an instrument to extend other telecommunications features such as Internet access into communities. If Charles Vail's first universal service pronouncements were little more than a way to negotiate with the government for advantageous status as the regulated monopoly AT&T, the term later achieved a life of its own as it came to embody a rhetorical openness that allowed it to mean many things to many people.

Bell's vision invited critics who warned that the uneven pattern of development associated with contemporary economic drivers of telecommunications technology, could lead to profound inequities in certain regions and for certain populations (Castells, 1996; Schement and Lievrouw, 1987; Hepworth and Robins, 1988; Mansell, 2000). Others argued that the "trickle down" effects of telecommunications-based capabilities would bring important benefits to even the most remote areas (Schmandt et al., 1991). In the 1970s and 1980s, the optimistic arguments around the so-called "death of distance" thesis were particularly popular (later publicized by Frances Cairncross, 1997); however, they have given ground to the more recent, spatially-based views of the society and the economy that can explain the geography of a new information economy with specific reference to some of the dynamics – including telecommunications inequities - evident in

[5] Several digital divide studies undertaken by the NTIA with the Bureau of the Census examine some of these issues.

rural America (indeed, in rural regions throughout the world) (Strover, Oden, and Inagaki, 2002; Castells, 1996). The distribution of telecommunications capabilities tracks that of other resources: where there is more wealth and more education, the resources tend to be more plentiful; where there is knowledgeable leadership, the capabilities increase; where multifaceted coalitions of groups or organizations join together to plan and share assets, they multiply.

Rural regions share with urban areas the broader economic trends that have incorporated information technology into all productive activities. If Goggle, AOL, Cisco and Dell epitomize contemporary information companies, in fact virtually all consumption and production sites in the U.S., from Wal-Mart to the local paper mill, from the grocery store to the concert theatre, incorporate computer-based information systems and technologies. Rural regions' traditionally resource-dependent industries are no exception. Indeed, as more retirement communities begin to flourish in rural regions, one can anticipate a migration of the information-intensive health industry will follow. Research in some of the most distressed region of Appalachia found that in locations where local businesses and services - whether health, education, banking, manufacturing or services - incorporated telecommunications capabilities, the communities enjoyed improved productivity (Strover and Oden, 2002). Telecommunications-intensive industries have a special role in bringing more infrastructure and knowledge to a community, and while many such industries are not located in rural areas, their influence is particularly striking when they do locate in less populous regions.

Information industries and technologies penetrate virtually all sectors of life, and they dynamically interact with local strengths to create new capabilities. This pattern renders pointless any policy-based separation of information and telecommunications technologies from activities in the normal domains of education, culture, and work. These technologies create access to opportunities on all fronts, and rural regions must be able to use them, to harness their power lest we move toward a two-tier society, with rural areas a true backwater.

Telecommunications in Rural Regions

What is the status of telecommunications infrastructure and services in rural regions? The deployment of Internet access systems and broadband capabilities has been widely studied. More generally, however, the broad issue of infrastructure deployment by the private sector raises the question alluded to earlier: is market-based diffusion adequate for rural regions? Do "market failures" exist in rural regions due to lower population levels or higher operating costs, and if they do, what should be done about them? Alternatively, is the perceived market failure a simple absence of supply in the face of an uncertain demand? Finally, does the notion of "market" capture the telecommunications services and opportunities desired in rural regions?

Vendors and "the market"

First, statistics on cell phone penetration in rural areas provide some evidence on the market issue. For example, the FCC's data demonstrate lower penetration of cell phone-only use in rural households than in central city households and a much high dependence on wireline than in other areas (Table 1). These results may be interpreted as the population's adherence to a known and trusted technology (wireline phones), as a reason that cell phone service is less available in rural areas, or as support for the notion that limited income discourages subscribing to both cell and wireline service (most common in suburban areas). Any one of those explanations might seem discouraging to a vendor contemplating investing in a rural area's infrastructure in order to provide broadband service.

TABLE 1 Percentage of Households with Wireline and Cellular Service By Rural and Non-Rural Demographics (February 2004)

Metropolitan Status	Percentage of Households			
	Wireline and Cellular	Wireline Only	Cellular Only	Total (Wireline or Cellular)
Urban: Central City	45.6%	39.0%	7.9%	92.5%
Urban: MSA (Non-Central City)	57.2%	33.7%	5.2%	96.0%
Rural: Non-MSA (Rural)	45.2%	44.3%	5.3%	94.8%
National	51.7%	37.2%	6.0%	94.9%

Source: FCC (2005) Trends in Telephone Service

A study by Gabe and Abel (2002) on the older technology of ISDN amplifies the vendor approach in deploying new technologies: telecommunications providers avoid the uncertainty of a rural market and will invest their resources in the location where more conventional market elements exist, i.e., urban regions. The authors analyzed telecommunications infrastructure statistics, notably ISDN lines per capita, for urban and rural areas, and they found (statistically) significantly more deployment of ISDN in metro areas. They argue that the high uncertainty of a return associated with the relatively high fixed cost investment of upgrading lines to be ISDN-capable did not warrant the cost of that deployment for the providers.

Deployment

Nevertheless the FCC's monitoring of broadband deployment under the requirements of the 1996 Telecommunications Act shows that broadband is now available across the nation. Their statistics, however, are not independently verified and are entirely reliant on vendor reporting using FCC Form 477.[6] Moreover, their zip code unit reporting is sometimes inadequate for rural regions in which zip codes can cover large geographic

6 Statistical data and summaries are available at Local Telephone Competition and Broadband Deployment (http://www.fcc.gov/wcb/iatd/comp.html).

areas. As well, the way their statistics are arrayed does not allow one to differentiate between one provider being available in a territory as opposed to two or three providers serving the same region – in short, the difference between a monopoly situation and a competitive situation. As well, the data do not differentiate between the presence of a single instance of a broadband connection in a zip code as opposed to one intensively used in a region, undercutting the interpretive power of their numbers.

The agency's July 2006 report High-Speed Services for Internet Access: Status as of December 31, 2005 presents information about deployment and subscribership to broadband, including advanced services from wireline telephone companies, cable operators, terrestrial wireless service providers, satellite service providers, and any other facilities-based providers as of December 31, 2005.[7] Their core findings include:

- 99% of Zip Codes have at least one high-speed service provider. The most widely reported technologies were satellite (with at least some presence in 88% of Zip Codes), ADSL (82%), and cable modem (57%);
- More than 99% of the country's population lives in the 99% of Zip Codes where a provider reports having at least one high-speed service subscriber; and
- High population density is positively associated with subscribership to high-speed Internet. In contrast, low population density shows an inverse association. High-speed subscribers are present in 99% of the most densely populated Zip Codes and in 88% of Zip Codes with the lowest population densities.

Tables 2 and 3 summarize their findings. These data would seem to illustrate widespread availability of broadband access, yet anecdotal and other surveys disagree with the findings. For example, the General Accounting Office (May 2006) issued a report to Congressional Committees (http://www.gao.gov/new.items/d06426.pdf) critical of the FCC's determination of broadband deployment in the US. It recommends improvements, and notes:

> For its zip-code level data, the FCC collects data based on where subscribers are served, not where providers have deployed broadband infrastructure. Although it is clear that the deployment of broadband networks is extensive, the data may not provide a highly accurate depiction of local broadband infrastructures for residential service, *especially in rural areas* (p. 3).[8]

7 Previous releases of additional broadband statistics are available at www.fcc.gov/wcb.stats.

[8] For example, under the present data collection scheme, FCC counts a Zip Code as covered by broadband service if it contains at least one broadband subscriber. Also, a Zip Code is counted as broadband service area even if carriers only serve businesses. As a result, the number of Zip Codes serving broadband services is likely overstated in terms of the availability of residential broadband services. Additionally, there is no consideration given to the price, speed or availability of connections across the Zip Code.

It is more costly to serve areas with low population density and rugged terrain with terrestrial facilities than it is to serve areas that are densely populated and have flat terrain. It also may be more costly to serve locations that are a significant distance from a major city. As such, these important factors have caused deployment to be less extensive in more rural parts of the country (p. 4).

Table 2 Percentage of Zip Codes with High-Speed Lines in Service

Number of Providers	2000	2001	2002	2003	2004	2005
Zero	26.8	20.6	12.0	6.8	4.6	1.0
One	22.7	19.3	17.3	14.9	12.5	5.6
Two	18.4	15.7	16.8	17.1	16.3	11.9
Three	10.9	13.1	14.4	14.9	15.1	14.8
Four	6.1	9.1	10.3	11.2	12.2	13.5
Five	4.0	6.1	7.3	7.8	8.9	10.3
Six	3.0	4.2	5.0	5.8	6.3	7.8
Seven	2.3	3.2	3.9	4.2	4.6	5.7
Eight	2.0	2.5	2.7	3.3	3.6	4.6
Nine	1.6	2.0	2.2	2.6	3.1	4.0
Ten or More	2.4	4.0	8.0	11.4	12.8	20.7

Table 3 High-Speed Subscribership Ranked by Population Density

Persons per Square Mile	Percentage of Zip Codes with at Least One High-Speed Subscriber					
	2000	2001	2002	2003	2004	2005
More Than 3,147	98.2	98.1	98.7	98.9	99.1	99.2
947-3,147	97.1	97.3	98.2	98.5	98.7	99.3
268-947	95.7	95.8	97.9	98.8	99.1	99.3
118-268	91.5	93.3	96.7	97.9	98.2	99.2
67-118	85.9	89.3	95.0	97.5	98.0	98.8
41-67	76.1	83.3	91.5	96.0	97.5	98.8
25-41	65.0	73.1	87.6	92.6	95.5	98.1
15-25	50.1	61.2	77.8	88.0	91.4	96.6
6-15	38.5	52.1	69.4	82.7	86.2	95.8
Fewer Than 6	27.5	43.3	59.7	73.5	74.8	88.3

Households residing in rural areas were less likely to subscribe to broadband service than were households residing in suburban and urban areas. Seventeen percent of rural households subscribe to broadband service, while 28 percent of suburban and 29 percent

of urban households subscribe to broadband service. We also found that rural households were slightly less likely to connect to the Internet, compared with their counterparts in suburban areas (pp. 12-13).

In two other studies examining deployment and competition, Grubesic and Murray (2004) examined the incidence of broadband competition in the U.S. across a year and a half period, concluding that there is a clear urban-rural hierarchy in broadband Internet access as a function of competition, and that although competition continues to increase at the national level, rural and smaller metropolitan areas often fail to benefit from high levels of broadband competition, compared to many metropolitan areas. Prieger (2003) analyzed comprehensive telecommunications services data covering technologies, demographics, language, market size, location, and telcos. His core findings include that while a rural location decreases availability of services, market size, education, Spanish language use, commuting distance, and a Bell Operating Company presence increase availability. He also found little evidence of inequality based on income or on black or Hispanic population concentration, and mixed evidence concerning availability on Native American or Asian concentration.

Access and Use

The National Telecommunications and Information Administration in the late 1990s and early 2000's statistically analyzed computer ownership and Internet access by race, household income, location, education and other demographic indicators, and became a short-lived benchmark for documenting a "digital divide" in the US (US Department of Commerce, 1995, 1998, 1999, 2000). However, the surveys never went much further than simply illustrating "lags" across ethnic and racial groups, age categories, income, education and location categories. While gaps between males and females, for example, in terms of computer and Internet use declined over time, the gap between urban and rural regions in terms of Internet use – though reduced – endured. More current results from the Pew Internet and American Life Project (2006) provide data summarized in Tables 4-6. As is evident, rural households report less access to home broadband, less access to broadband at work, lower frequency of using the Internet and fewer online activities compared to urban and suburban regions (Table 4).

Table 4 Internet Access and Use by Community Type – all Internet users

	Urban	Suburban	Rural
Access to home broadband	38%	40%	24%
Access to high-speed Internet at home or work	49%	49%	35%
Frequency of Internet use 1: "online yesterday"	64%	67%	57%
Frequency of Internet use 2: "online several times a day"	44%	43%	35%
Number of online activities	2.2	2.2	1.9

According to the Pew Internet and American Life Project's statistics, the share of Americans who have broadband connections at home has now reached 42% (about 84 million), up from 29% (about 59 million) in January 2005 (Pew, April, 2006). However, rural penetration lags urban penetration. Pew's data from earlier in 2006 shows a 15%

difference between the two regions in terms of broadband subscription, in spite of the fact that the populations' interesting in having broadband appears to be equivalent. As well, some rural telephone companies report lower subscription rates for broadband compared to urban DSL, although in many of those cases the price of the service also is higher in rural than in urban areas. Finally, some studies illustrate that various Internet use divides – the geography-based digital divide as well as those related to age, education and race/ethnicity - are linked to opportunities for understanding the applicability of Internet-based resources to daily life and for training with computers.

A lower penetration rate of broadband Internet may be a key factor to distinguish the difference in Internet use (as opposed to access) between rural and urban people. As the following table from the Pew data indicates, there is a small difference in Internet use for broadband users in rural and those in non-rural areas. We observe that with respect to both frequency and intensity of Internet use, rural broadband Internet users are nearly as likely as non-rural counterparts to use the Internet.

Table 5 Internet Use by Community Type – home broadband users

	Urban	Suburban	Rural
Frequency of Internet use 1: online yesterday	79%	75%	73%
Frequency of Internet use 2: online several times a day	54%	55%	49%
Number of online activities	2.8	2.8	2.7

As to Internet use in general, the differences in lifestyle prevalent in locations may be carried over to online activities.

Table 6 Online Activities by Community Type – all Internet users

	Urban & Suburban	Rural
Buy or make a reservation for travel service	65%	51%
Online banking	43%	34%
Online classified	37%	30%
Read a blog	28%	21%
Download screensavers	22%	28%
Download computer games	20%	25%
Class for credit	11%	15%
Fantasy sports	7%	9%

The possible explanations for differences in Internet use related to lifestyle include:

- The distance from transportation services (airports, train stations) makes travel costlier for rural Americans and hence the Internet is more attractive.
- A combination of less availability of online banking and traditional habits (in-person banking) in rural areas decreases the likelihood of rural Americans to use online banking.
- Since online classified services are organized around specific cities, rural Americans may have less interest.

- The absence of large electronic stores selling computer game software in rural areas encourages rural Americans to download such software online.
- Greater distances from colleges or educational institutions increases rural Americans taking classes online.

Other research on the business use of broadband in rural areas also has found core differences between rural and urban settings. Pociask's (2005) Broadband Use by Rural Small Businesses found the small business uses of broadband differed substantially. Oden and Strover (2002) likewise noted major differences in rural business operations when broadband access to the Internet was incorporated into operations compared to other rural businesses not using the Internet or broadband connections.

The broader outcomes associated with computer and Internet access are presented in muddy, ambiguous ways in much of the literature. Assumptions regarding the need for certain skills and the implicit benefits abound, but there is little research on the actual life-changing force of such "improvements." In general, we lack strong empirical results that provide compelling evidence that economic and community development goals can be realized through programs of computer and Internet access. If one broad social goal in the U.S. over the past ten years has been to facilitate access, the more important goal of ensuring that access is *meaningful* for communities and individuals has slid off the agenda. Put another way, there is scant evidence that telecommunications can transform lives in the absence of change in other structural features.

In this regard, rural communities have frequently been in the vanguard in actively attempting to mold their communications environments through locally-based efforts such as municipal Wi-Fi, public computer and Internet access or cable television services. Universal service programs, specifically the e-rate program benefiting schools and libraries, have been helpful to these institutions such as schools and libraries, which in rural areas often lack funding for such technology.

Rural regions and the E-rate program

What can be done to enable rural America to keep pace with the rest of the country? What measures might help these regions to participate in the economic, social and political endeavors that have migrated to the Internet? What mechanisms can stimulate the provision of multiple, competitive telecommunications offerings in rural America?

The schools and libraries program, commonly referred to as "E-rate," is established as one of four universal service programs designed to ensure that schools and libraries have access to affordable telecommunications and information services. In adopting this program, Congress acknowledged the importance of new technologies in the nation's schools and libraries: "The availability of … access to advanced telecommunications services is critical to ensuring that these services are available on a universal basis. The

[E-rate program] will help open new knowledge, learning and education to all Americans-rich and poor, rural and urban."[9]

The E-rate program provides up to $2.25 billion in discounts available to eligible applicants of schools, school districts, libraries and consortia of these entities or reimburses service providers on eligible services provided to schools and libraries. Eligible schools and libraries may receive discounts on equipment and services ranging from 20 percent to 90 percent. The level of discount is based on economic need (the percentage of students eligible for participation in the National School Lunch Program) and location of the entities (rural or urban).[10] The E-rate discounts can be applied to commercially available telecommunications services, Internet access, and internal connections. Each year, the Schools and Libraries Division (SLD) of the Universal Services Administration Corporation approves approximately 30,000 applications from schools and libraries seeking discounts of those services.

Empirical studies have found that the E-rate program has provided a significant support to provide schools and libraries with technology and services in the nation.[11] Findings about the E-rate program include:

- E-rate discounts allow schools and libraries to leverage the expansion of technology into education.
- E-rate discounts help bring technology to schools and libraries in many under-served communities.
- Demand for the financial assistance for telecommunications services is increasing in educational institutes across the nation.
- E-rate discounts help expand overall investment in technology by allowing schools and libraries to reinvest the savings in other important technology needs

Nevertheless, the program has not been exempt from controversies. Indeed, various aspects of the E-rate program have been criticized and questioned by researchers and government agencies, [12] particularly the management oversight of the program, the scope

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[9] H.R. CONF. REP. NO.458. 104th Cong.. 2d Sess. 132 (1996).

[10] For detailed mechanisms calculating the discount level, see "Discount Matrix" available at USAC's website (http://www.universalservice.org/sl/applicants/step05/)

[11] Carvin, A, *The E-Rate in America: A Tale of Four Cities* (Washington DC: The Benton Foundation, 2000); EdLiNC., *E-Rate: Connecting Kids and Communities to the Future* (Education and Library Network Coalition, 1999); EdLiNC, *E-Rate: Keeping the Promise to Connect Kids and Communities to the Future* (Education and Library Networks Coalition, 2000); EdLiNC, *E-Rate: A Vision of Opportunity and Innovation*, (Education and Library Network Coalition, 2003); Brian Staihr & Katharine Sheaff, *The Success of the E-Rate in Rural America*, (Center for Study of Rural America, 2001); Michael J. Puma et al., *E-Rate and the Digital Divide: A Preliminary Analysis From the Integrated Studies of Educational Technology* (Washington DC: The Urban Institute, 2000); John Carlo Bertot et al., *Analysis of Public Library E-rate Data: 1999-2002* (Talahassee, FL: Information Use Management and Policy Institute, 2003).

[12] Government Accountability Office, Schools and Libraries Corporation: Actions Needed to Strengthen Program Integraity Operations Before Committing Funds (Washington DC: GAO, 1998); Angele A. Gilroy, *Telecommunications Discounts for Schools and Libraries: The "E-rate" Program and Controversies* (Washington DC: Congressional Research Service, 2004).

of funding, the failure to distribute the fund, and abuses of the fund by some recipients. Most recently, for example, the General Accountability Office (GAO)[13] and Congress[14] issued reports, in February and October 2005 respectively, both criticizing the program for millions of dollars worth of waste, fraud, and abuse, as well as criticizing the FCC for its poor management of E-rate.

E-rate data was used to examine funding trends across different types of applicants (schools, districts, libraries, consortia) and different states and to dissect the fund's relationship to rural locations. To understand how the E-rate program has been operated, this study investigates the E-rate related dataset from the Schools and Libraries division, including which entities requested and received discounts on which type of services; the amount they applied for and received; and how the funds were distributed in different states. The E-rate dataset supplied by USAC provides various types of information about the schools and libraries program in this study. The data contain information about the funding process, including applications commitments and disbursements, available from the first funding year of the program (1998) to the most recent funding year (2005). The level of analysis in the study is limited in its description of the entities participating in the E-rate program because the data from the SLD does not contain the complete population of the eligible pool of applicants. Despite this, the analysis identifies some trends and variations related to the E-rate program from its origins to the most recent year. Most pertinent here is the finding that there is little relationship between rurality, at least at the state level, and the fund's disbursements.

Demand for E-rate discounts has been high, and applicants have requested more than the $2.25 billion cap on E-rate funding available each year. Overall trends of requested amounts have been similar throughout the entire funding period, with around a third of the total amount of requests coming from school districts.[15] Most requests are for improved internal wiring (Table 7).

Over the 5 year period of requests, ten states—Washington DC, New Mexico, New York, South Carolina, Texas, Alaska, Arizona, Oklahoma, Mississippi, and Arkansas—have annually requested more than $20 per capita across the years, accounting for half the national amount requested. (Washington DC and New Mexico have requested

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[13] Government Accountability Office. *Telecommunications: Greater Involvement Needed by FCC in the Management and Oversight of the E-Rate Program*. A Congressional Report to the Committee on Energy and Commerce, HR. (Washington DC: GAO, Feb. 2005).

[14] The Subcommittee on Oversight and Investigations. *Waste, Fraud, and Abuse Concerns with the E-Rate Program*. A Congressional Report, HR (Washington DC: The Committee on Energy and Commerce, Oct. 2005). The reports outlined key recommendations on how to improve the program which could lead to an E-rate reform, which may cause many funding problems and disruptions for schools and libraries that have been supported by the program. These controversies and external pressures surrounding the E-rate program require for policy researchers to pay more attention to a comprehensive assessment of the program.

[15] The largest recipient of E-rate has been the school district, accounting for about 80 percent of total funding annually across the 1998-2004 period of the program. Schools and libraries consortia received about 11 percent, schools about 7 percent, and about 3 percent of total fund has been committed to libraries or library consortia.

exceptionally high amounts per capita, especially in 2002 and 2003.) The ten states with the lowest requests—New Hampshire, Vermont, Delaware, Hawaii, Iowa, Nebraska, Washington, Virginia, Indiana, and Idaho—requested less than $5 per capita on average during the application period, accounting for under six percent of the total.

Table 7 Amount of Request by Service Type (in $1,000)

Year	Telecom Services	Internet Access	Internal Connections	Total
1998	683,925	122,646	1,429,108	2,235,679
	(30.6%)	(5.5%)	(63.9%)	(100%)
1999	885,851	184,610	1,605,367	2,675,828
	(33.1%)	(6.9%)	(60.0%)	(100%)
2000	981,889	303,180	2,824,222	4,109,291
	(23.9%)	(7.4%)	(68.7%)	(100%)
2001	1,106,093	381,106	3,301,669	4,788,868
	(23.1%)	(8.0%)	(68.9%)	(100%)
2002	1,364,696	397,343	3,715,254	5,477,294
	(24.9%)	(7.3%)	(67.8%)	(100%)
2003	1,360,446	433,098	2,883,946	4,677,490
	(29.1%)	(9.3%)	(61.7%)	(100%)
2004	1,277,721	328,667	2,705,035	4,311,423
	(29.6%)	(7.6%)	(62.7%)	(100%)

Wide variances among different states appear to be related to the SLD's discount formula, which favors those with higher proportion of children in poverty and those in rural areas (see table in Appendix 1). To examine this pattern, the current study tested the relationship between the amount of funds received by each state and (1) the proportion of low-income children; and (2) the proportion of rural population in the state.

Table 8 Correlations between SLD Funding and low income children and rural density

Annual Funding (per capita)	% of Low-income Children[16]	% of Rural Population[17]
2000	.321**	-.137
2001	.470**	-.010
2002	.440**	-.163
2003	.545**	-.028
2004	.473**	.046

** Pearson correlation is significant at the 0.01 level (2-tailed; N = 51).

As shown in Table 8, the analysis has found that the amount of funding is significantly related to the poverty level of children across the five year funding years. However, there is no significant relationship between the amount of funding and rurality.

Considering that the E-rate program is targeted at schools and libraries in poor communities and in rural areas, the results of this analysis show that the program's objectives are met in terms of the program's commitment to schools and libraries serving children from low income households. Although the analysis was unable to identify an element in the distribution scheme favoring rural states, it requires careful interpretation. With respect to the funding decision, it is necessary to keep in mind that the amount of funding is not determined at the state level but at the individual *applicant* level. Furthermore, the E-rate discount formula favors the level of poverty. When following the formula, entities with more than 50 percent of their students qualified for the National School Lunch Program will be assigned to the same discount band (80 to 90 percent) regardless of their locations. Moreover, the SLD funded internal connections *only* for those meeting these discount levels, and almost half the total fund is dedicated to paying internal connections. As a result, it becomes very difficult to identify the contribution of location—being rural or urban—to the E-rate funding decision based on the state level distinctions.[18]

So what can we say about universal service and telecommunications in rural areas?

- The demand for "advanced" services is more uncertain in rural regions than in metro areas.

[16] The data were retrieved from National Center for Children in Poverty. Original data were calculated from the Annual Social and Economic Supplement of the U.S. Current Population Survey (CPS) from 2002, 2003, and 2004.
[17] Based on the 2003 Rural-Urban Continuum Codes by ERS, USDA.
[18] All the individual applicants would need to have a locational code in order to investigate this further; we are compiling that data in 2006-07.

- First, the broadband deployment data are problematic, and connectivity in rural areas is still questionable;
- Although the FCC appears to believe that broadband connectivity is sufficient, it is a necessary but not sufficient element required to exploit the powers of new technologies.
- Access and use data suggest rural populations do not have home or work-based access to broadband on a basis comparable to that of metropolitan regions.
- Small businesses in rural areas do not incorporate access to the Internet into their operations as ably as do small businesses in metropolitan regions.
- The E-rate program doubtless has benefited rural areas, but there appears to be no special advantage to rural states (those with lower population densities) in terms of garnering these funds. It remains an open question as to whether, in the absence of E-rate funds, rural schools and libraries would be able to maintain their educational technology infrastructure.

The broad question for rural regions with respect to telecommunications concerns the ability of communities to avail themselves of opportunities for improving their lives – whether through improved health and education services, through better jobs, through any means that can empower them. If some critics are overly concerned with constructing telecommunications technologies' potential contribution to improved work place performance, it is by no means the core concern here. Rather, telecommunications and the new media affordances realized through them should focus on an environment of capabilities.

Drawing on economist Amartya Sen's capabilities approach, an alternative vision of universal service and its contribution to rural populations must focus on cultivating peoples' ability to improve their lives – with the specific nature of those improvements to be determined by people themselves. This in turn requires renewed focus on self determination in the communications/telecommunications environment, a process made more viable with the onset of new media, networks, and varieties of telecommunications services. Public policy that acknowledges not just parity with urban regions but also self determination is what could revitalize the applications of telecommunications to life in rural regions. While reformulated the principles of universal service is no small undertaking, the time could not be better to do so: the legacy models of regulation, of technology definitions (information services, telecommunication services), of regulability, and of accountability are splitting apart and becoming unmanageable. A new valuation methodology that is technology neutral but <u>outcomes sensitive</u> is what can shape telecommunications services to the varied needs, strengths and opportunities resident in rural areas – indeed all area of the country.

<u>Revising universal service with rural regions in mind</u>

A capabilities approach to universal service would alter the terms of how we think about this constellation of priorities. It implies at minimum (1) a *process* of ascertaining needs

and localized constructions of priorities and (2) broadening the range of what could be supported under this program.

For example, infrastructure availability, content applicability, pricing, and training are the four pillars affecting rural Internet subscription and use. Viable programs influencing these factors can take several forms. Since simple deployment alone, however, appears to be an insufficient driver, any programs stimulating deployment must be linked to investments in training and use. Continuous formative and summative evaluations are essential in order to monitor the utilities of these programs for individuals and communities. The following options focus on building community capabilities; they are premised on the notion as well that cultivating them will ultimately draw additional vendor interest. In other words, a capabilities approach to public policy enhances social goods and can work with a market-based approach to telecommunications.

Option 1: Grants for Internet training. These could be block grants and must be outcomes-oriented and outcomes-dependent. The target populations could be not only individual users but also small businesses. Increasing small business use of the Internet could have tremendous economic impact on rural regions. Grants within states themselves could go to various entities, including non-profits, towns, county and local government units, etc.

Option 2: Universal service funds should enhance communities' projects for extending their telecommunications capabilities. They could be used to match local investment in infrastructure, connectivity, public access and similar access technologies. Provide broadband infrastructure development and use incentives to communities that can demonstrate they are ready to develop both their own facilities/expertise as well as their abilities to use these facilities. Communities should match federal investment in some manner. Communities could purchase broadband services or develop their own infrastructures.

Option 3: Invest in community college-based Internet applications capabilities classes for individuals and small businesses. Create incentives for colleges that enroll small business owners, with some outcome-based measure being the trigger for an incentive "subsidy" or payment.

Option 4: Create "Rural Leadership Academies" that select aspiring or actual rural leaders for two-three weeks of leadership training, which would include training in not only using the Internet but also training in running computer education clinics or courses, in "nuts and bolts" of broadband infrastructure, and in resource-sharing across institutions. The Leaders would be charged with catalyzing Internet availability and use in their respective communities, leaving it to them to decide what makes most sense for their own unique circumstances.

References:

Bell, D. (1973). The Post industrial society.

Bell D. (1983). The information society: The social framework of the information society. In Forester (Ed.), The microelectronics revolution. Cambridge: MIT Press, 500-549.

Cairncross, F. (1997). The Death of distance: How the communication revolution will change our lives. Boston: Harvard Business School Press.

Castells, M. (1996). The Rise of the Network Society. Oxford: Blackwell.

Congressional Budget Office (2005). Financing Universal Service. Available at http://www.cbo.gov/showdoc.cfm?index=6191&sequence=0. Last accessed 9/12/06.

FCC. (2005) Trends in Telephone Service. Industry Analysis & Technology Division, Wireline Competition Bureau.

FCC (2006). High-Speed Services for Internet Access: Status as of December 31, 2005.

General Accountability Office (2006). Broadband Deployment Is Extensive throughout the United States, but It Is Difficult to Assess the Extent of Deployment Gaps in Rural Areas. Available at: http://www.gao.gov/new.items/d06426.pdf.

Gabe, Todd M., and Jaison R. Abel. (2002) Deployment of advanced telecommunications infrastructure in rural America: measuring the digital divide. American Journal of Agricultural Economics, Vol. 84 (5), pp. 1246-1252.

Grubesic, Tony H., and Murray, Alan T. (2004) Waiting for Broadband: Local Competition and the Spatial Distribution of Advanced Telecommunication Services in the United States. Growth & Change, Vol. 35 (2), pp. 139-165.

Hepworth, M. and K. Robins (1988). Whose information society? A view from the periphery. Media Culture and Society, 10, 323-343.

Horrigan, John. (2006) Home Broadband Adoption in Rural America. A report from the Pew Internet & American Life Project. Available at: http://www.pewinternet.org/pdfs/PIP_Rural_Broadband.pdf

Horwitz, R. (1979). The Irony of regulatory reform.

Mansell, R. (2000). New media competition and access. New media & society, 1 (2), 155-182.

Parker, E., H. Hudson with D. Dillman, S. Strover, and F Williams. (1992). Electronic byways : state policies for rural development through telecommunications. Boulder: Westview Press.

Parker, E. (2001). Closing the digital divide in rural America. Telecommunications Policy 24: 281–290.

Pew Internet and American Life Project, (2006, April). Internet Penetration and Impact. Last accessed 4/28/06 at http://www.pewinternet.org/pdfs/PIP_Internet_Impact.pdf.

Pew Internet and American Life Project (2006, February). Rural Broadband and Internet Use. Last accessed 4/29/06 at http://www.pewinternet.org/pdfs/PIP_Rural_Broadband.pdf.

Posiask, S. (2005). Broadband Use by Rural Small Business. Small Business Administration, last accessed 4/28/06, http://www.sba.gov/advo/research/rs269tot.pdf.

Prieger, James E. (2003) The supply side of the digital divide: is there equal availability in the broadband Internet access market? Economic Inquiry Vol. 41 (2) pp. 346-363.

Schement, J., Lievrouw, L. (1987). Competing visions, complex realities, Norwood, N.J.: Ablex.

Schmandt, Jurgen., Frederick Williams, Robert Wilson and Sharon Strover (Eds.) 1991. Telecommunications and Rural Development. New York: Praeger, 262 pp.

Strover. S., M. Oden and Nobuya Ingaki. (2002). Telecommunications and rural economies: Findings from the Appalachian Region. In Cranor, L. and S. Greenstein, Communication policy and information technology: Promises, problems and prospects. Cambridge: MIT Press, 317-346.

Strover, S. and M. Oden, 2002. Links to the Future: The Role of Information and Telecommunications Technology in Appalachian Economic Development Washington, D.C: Appalachian Regional Commission.

US Department of Commerce, National Telecommunications and Information Administration. (1995) Falling through the net: A survey of the "have nots" in rural and urban America. Washington, D.C.: NTIA. World Wide Web page <http://www.ntia.doc.gov/ntiahome/fallingthru.html> Accessed July, 2003.

US Department of Commerce, National Telecommunications and Information Administration. (1998). Falling through the net II: New data on the digital divide. Washington, D.C.: NTIA. World Wide Web page <http://www.ntia.doc.gov/ntiahome/net2> Accessed July, 2003.

US Department of Commerce, National Telecommunications and Information Administration. (2000). Falling through the net: Toward digital inclusion. A report on Americans' access to technology tools. Washington, D.C.: NTIA. World Wide Web page <http://www.ntia.doc.gov/ntiahome/fttn99.contents.html> Accessed July, 2003.

U.S. Government Accountability Office (2002). Federal and state universal service programs and challenges. Report to the Ranking Minority Member, Subcommittee on Telecommunications and the Internet, Committee on Energy and Commerce, House of Representatives.

Appendix 1

E-rate funds: Amount Committed per capita over time (US$)

State	2000	2001	2002	2003	2004	State	2000	2001	2002	2003	2004
Alaska	20.1	17.8	22.5	23.1	28.6	Montana	3.5	4.1	4.5	4.4	5.2
Alabama	4.8	5.0	5.8	8.2	5.5	North Carolina	3.4	3.2	5.8	6.3	5.5
Arkansas	6.3	7.9	7.9	10.2	7.1	North Dakota	2.7	2.7	7.0	6.2	7.5
Arizona	9.2	11.8	8.9	13.7	10.3	Nebraska	3.7	3.6	4.4	4.5	4.5
California	12.8	10.1	6.9	10.4	7.6	New Hampshire	1.0	1.0	1.4	1.9	1.9
Colorado	3.4	3.9	5.5	3.7	5.6	New Jersey	5.0	6.1	5.6	6.5	6.1
Connecticut	7.0	5.2	7.2	7.1	6.9	New Mexico	10.5	31.1	28.2	51.4	21.0
Washing-ton DC	10.9	13.0	72.6	26.2	17.8	Nevada	2.0	1.8	2.8	2.4	2.1
Delaware	2.1	2.3	2.1	1.8	1.0	New York	14.5	19.1	20.3	23.0	17.8

Florida	3.7	3.5	3.4	4.6	4.9	Ohio	5.3	8.6	5.5	6.4	6.0
Georgia	6.2	8.8	7.2	9.5	7.3	Oklahoma	8.2	8.6	10.4	15.4	15.1
Hawaii	2.1	2.4	2.5	3.3	2.6	Oregon	3.2	3.9	4.1	4.7	4.5
Iowa	1.8	2.7	3.6	3.8	4.8	Pennsylvania	4.4	6.0	6.9	7.3	6.4
Idaho	2.2	3.4	3.6	3.4	3.1	Rhode Island	4.5	4.8	9.4	9.3	5.9
Illinois	8.8	6.0	6.8	5.8	8.8	South Carolina	13.0	12.0	16.7	14.6	10.2
Indiana	3.4	3.7	4.1	4.2	2.9	South Dakota	2.6	10.6	3.8	6.8	8.6
Kansas	3.1	4.1	5.0	5.6	5.6	Tennessee	8.2	8.0	6.2	9.4	4.7
Kentucky	5.8	5.1	7.8	8.6	8.5	Texas	7.3	11.3	12.4	19.5	15.6
Louisiana	5.2	6.4	5.2	12.0	10.6	Utah	2.3	2.5	3.3	6.0	7.7
Massachu-setts	7.3	6.8	6.2	4.2	4.3	Virginia	2.5	3.0	3.6	4.4	3.8
Maryland	3.5	2.9	3.6	2.9	3.6	Vermont	2.9	2.8	2.7	2.8	2.9
Maine	2.7	5.0	5.4	6.4	5.8	Washing-ton	3.1	3.1	3.1	3.7	3.5
Michigan	5.4	7.6	5.6	4.5	4.5	Wisconsin	4.7	4.8	5.9	4.1	4.5

Minnesota	3.7	4.6	4.6	5.4	4.6	West Virginia	3.1	4.5	4.5	5.6	5.1
Missouri	13.0	6.1	11.6	7.8	6.7	Wyoming	2.4	3.4	5.7	3.1	1.9
Mississippi	10.6	12.2	12.3	13.7	16.2						