CHOICES
a publication of AAEA Agricultural & Applied Economics Association
The Magazine of Food, Farm and Resource Issues

4th Quarter 2010 | 25(4)

THE STRUGGLE FOR BROADBAND IN RURAL AMERICA

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JEL Classifications: L96, R11, R58
Keywords: Broadband, Digital Divide, Economic Development, Infrastructure, Rural Development

"Policy in touch with today's rural America would focus on issues related to efficiency and new competitive advantages, as well as equity and public goods. It would be place—rather than sector—based. It would support investment in human capital, entrepreneurship, risk taking, and advanced communications infrastructure".
(Salant and Stauber, *Choices*, 17(4), 2002)

Rural America stands to be left behind much of the developed world without substantial investments in advanced telecommunications infrastructure. Communities require core infrastructure to attract and retain firms and to meet the needs of local businesses and entrepreneurs. Today, communities should consider robust and affordable Internet access a critical component of core infrastructure along with more traditional elements of water, sewer, power, transportation networks, and educational services. The rapid pace of technological change and globalization has forever changed the necessary infrastructure requirements for businesses and individuals to stay competitive. Competitive businesses and productive people increasingly need access to the most up-to-date, high-speed telecommunications networks to ensure on-demand access to suppliers, customers, branch plants, and others. As a result, communities and businesses without the most up-to-date advanced telecommunications infrastructure will likely suffer economically and socially. Improving the supply of, and demand for, broadband Internet access in rural America is crucial for future economic development opportunities. This article highlights some of the main issues concerning current and future investments in advanced telecommunications infrastructure; emphasizing the geographic and socio-economic digital divide, the benefits of rural broadband, and policy options for improving both the supply of and demand for broadband technology.

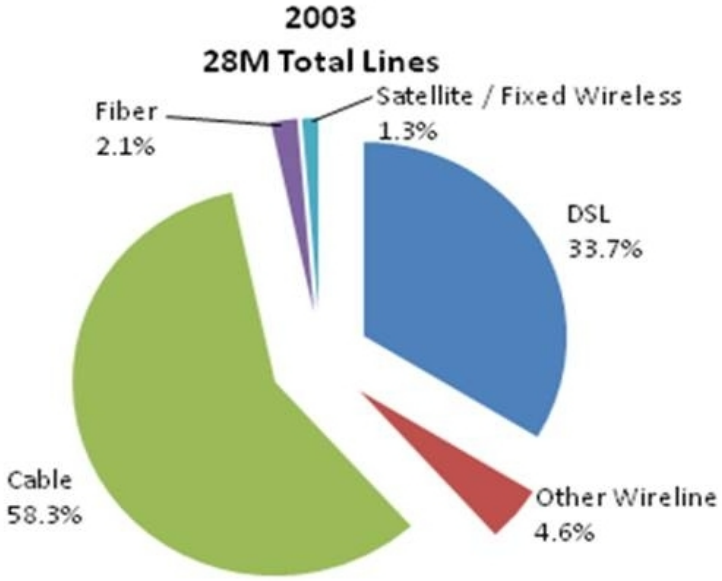
"Broadband" refers to high-speed data transmission over the Internet. It is important to differentiate between broadband "access," or supply, and broadband "adoption," which is one measure of demand. The Federal Communications Commission (FCC) has historically defined broadband access as providing 200 kilobits per second (kbps) of data transmission; roughly four times faster than older, dial-up connections. However, the desire for higher standards was recently acknowledged by the FCC which now defines "basic broadband" as 768 kbps, and also defines faster tiers ranging up to 100 megabytes per second (mbps) (FCC, 2008). Figures 1 and 2 display the different types of technologies that make up all U.S. broadband connections as of 2003 and 2008. While cable connections and Digital Subscriber Lines (DSL—provided by phone companies) are still dominant sources, mobile wireless connections have dramatically increased over this five-year period; in fact, they were not even measured in 2003. The total number of U.S. connections increased 260% from 2003 to 2008; from 28 million lines to over 102 million lines. This significant increase in the supply of broadband connections underscores the increasing importance of broadband in American lives.

A Digital Divide?

While the latest survey data suggest over 63% of the general U.S. population has a broadband connection at home, there are substantial state and regional broadband gaps across America (NTIA, 2010). High speed broadband availability is nearly universal across most American cities' and suburbs, but the evidence of regional and demographic digital divides persists. While traditional telecommunications providers uphold that they have expanded nationwide broadband coverage five-fold from 2001 to 2006 (Stoel and Ernst, 2008), the

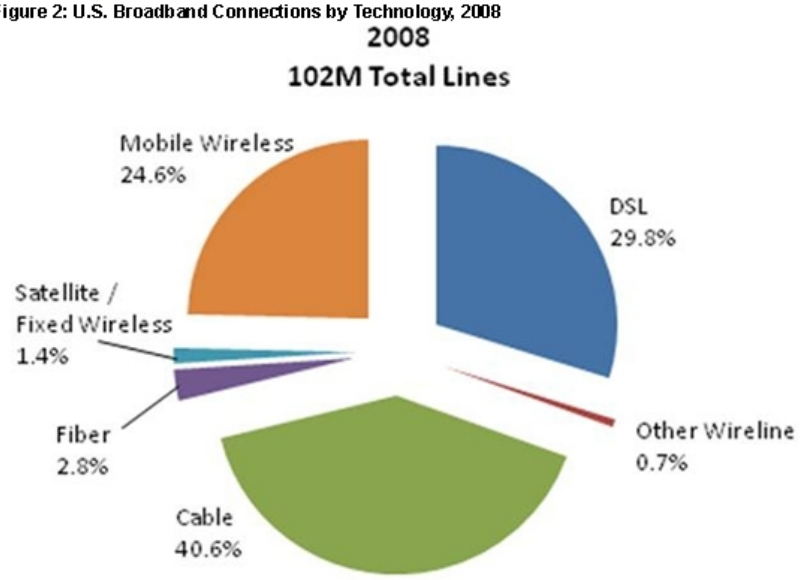
gap in broadband adoption rates between rural and urban areas has continued since the early 2000s. Table 1 illustrates the dramatic increase in household broadband adoption from 2001 to 2009 (Economics and Statistics Administration, 2010). It also confirms a sizeable difference in rural/urban broadband uptake. Table 1 illustrates only slight variation in regional differences of broadband adoption rates.

Figure 1: .S. Broadband Connections by Technology, 2003



Source: High-Speed Services for Internet Access: Status as of December 31, 2003. FCC: Industry Analysis and Technology Division, Wireline Competition Bureau. June 2004.

Figure 2: U.S. Broadband Connections by Technology, 2008



Source: High-Speed Services for Internet Access: Status as of December 31, 2008. FCC: Industry Analysis and Technology Division, Wireline Competition Bureau. February, 2010.

However, Table 2 provides evidence of a much wider variation among individual states (Economics and Statistics Administration, 2010). This table illustrates the 10 states with the highest average household

broadband usage and the 10 with the lowest. The percent of average home broadband usage ranges from a low of 45% in Mississippi to a high of 73% in Utah. It is worth noting that most of the states with low adoption rates are relatively more rural.

Table 1

Broadband Internet Adoption Rates by Region and Urban and Rural Location, 2001 and 2009

	2001	2009
All Households	9.2	63.5
Region		
Northeast	11.3	67
Midwest	7.2	62.2
South	7.9	60
West	11.7	68
Urban/Rural		
Urban	10.5	65.9
Rural	3.8	51

Source: U.S. Census Bureau, Current Population Survey (CPS) and CPS School Enrollment and Internet Use Supplement, October 2009, CPS and CPS Computer And Internet Use Supplement, September 2001, and ESA calculations.

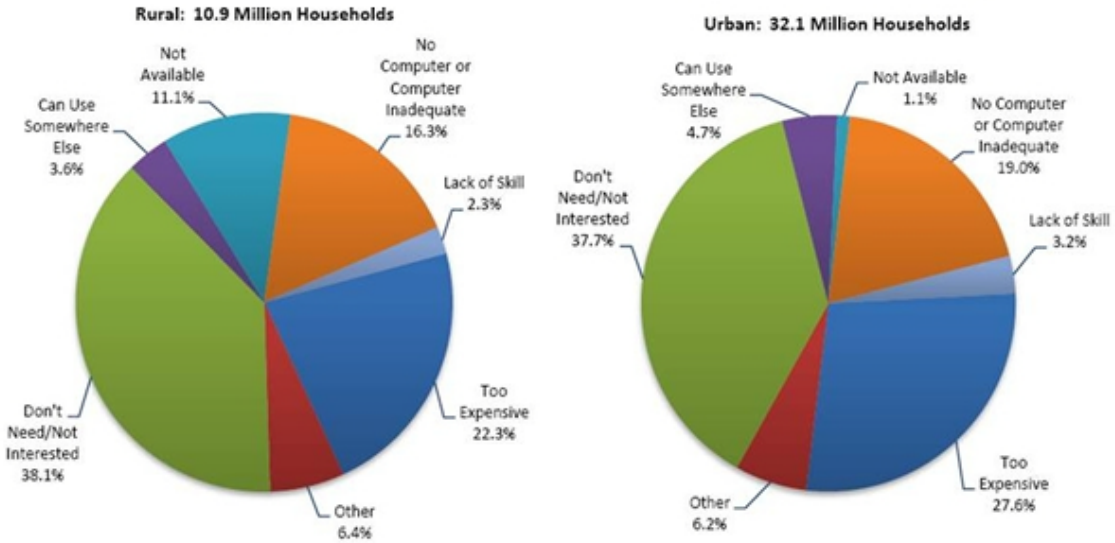
Table 2

Top and Bottom Ten States Ranked by Broadband Internet Adoption, 2009

Top Ten States		Lowest Ten States	
States	Percent	States	Percent
Utah	73	Mississippi	42
New Hampshire	73	Alabama	48
Alaska	73	Arkansas	51
Massachussetts	73	West Virginia	52
New Jersey	72	South Carolina	53
Washington	72	Kentucky	54
Connnecticut	71	New Mexico	55
Oregon	70	Tennessee	55
Hawaii	70	Oklahoma	56
Maryland	70	Indiana	56

Source: U.S. Census Bureau, Current Population Survey (CPS) and CPS School Enrollment and Internet Use Supplement, October 2009.

Figure 3: Main Reason for No Broadband Internet Use at Home, by Rural/Urban Residence, 2009



Source: National Telecommunications and Information Administration, 2010

The national average rural-urban gap in broadband adoption rates is measured at 12 percentage points in 2009 (Table 1). Sometimes referred to as a rural-urban “digital divide,” the gap is likely due to many reasons, including lack of available infrastructure, cost, lack of a computer, or simply absence of perceived need for broadband access. Surprisingly, even among rural areas, not having available broadband service ranks only

fourth on the most recent list of reasons why households choose not to adopt (Figure 3). The number one reason, by far, is a lack of perceived need for broadband access. It is uncertain whether these perceptions would change as a result of educational programs designed to clarify the benefits of broadband. However, if these perceptions are due to a lack of information on the part of rural residents and/or businesses, as opposed to lifestyle or preference issues, rural education programs could conceivably produce important benefits for these communities. Such programs could entail demonstrating the benefits of agricultural-oriented websites to farm households, promoting Internet sales as a way to capture larger markets for rural businesses, or introducing community websites as a way to stay connected locally.

Another commonly cited reason for lack of broadband access among rural households is price. Recent research suggests that competition among broadband providers can vary greatly from state to state, but approximately half the states are characterized by duopolistic, (two dominant providers) rather than truly competitive markets (Elliott and Settles, 2010). Improving competition among providers should lead to lower prices and higher reliability, positively impacting adoption rates in rural areas.

While lack of availability only comes in fourth as the main reason rural households do not adopt broadband, this reason still rates significantly higher than in urban areas. And, for some especially difficult-to-reach areas, availability is certainly a more pronounced issue. This means that closing the rural-urban broadband digital divide will continue to rely heavily on strategies to develop infrastructure in these areas.

In order to more clearly understand the extent and status of the digital divide, several states have begun to collect their own data on statewide broadband access and diffusion. Twenty states now have some sort of state broadband task force, commission, or advisory board (National Conference of State Legislatures, http://www.ncsl.org). California's Broadband Task Force, Connect Kentucky, and E-NC (North Carolina) are examples of state-level organizations actively involved in increasing their states' understanding of which regions have access to broadband, what types of services are available, and at what price. California's task force found that in the northern, rural Sierra region of the state, only 57% of households had access to broadband service. They also found that approximately 2000 communities did not have any broadband service availability across the state (The California Broadband Task force, 2008). A 2008 analysis of Connect Kentucky's data indicated that over 85% of households in most areas of the state have broadband access (Renkow, 2008). A recent message from Connect Kentucky's executive director argues that Kentucky's broadband availability has increased from 60% to 95% of all residents (ConnectKentucky, 2007). However, their own 2007 residential survey indicates that 73 Kentucky counties have below or significantly below average access to broadband at home (ConnectKentucky, 2007). Population density and other geographic drivers appear to be the primary deterrents to broadband infrastructure investments in rural communities across America. If education and income levels do not make up for the penalty of distance, existing telecommunications providers often do not find it profitable to provide advanced services to lower density populations without additional subsidy.

Benefits of Rural Broadband

Why should communities across the nation care about this ongoing digital divide? Substantial research documents the positive economic and social benefits derived from access to high quality broadband service. For example, Stenberg et al. (2009) provide examples for enhanced community interactions, telemedicine, distance education, and telework when discussing the relationship between rural area development and broadband. For rural businesses, broadband enables both cost savings and increased revenue potential. Cost savings come through such things as increased worker productivity, reduced marketing costs, and access to a more robust supplier network. Increased revenues are generated through access to larger and potentially global markets, better exposure to marketing channels, more efficient customer relations, and the ability to make secure transactions virtually anytime the purchaser desires (Barkley, Markley, and Lamie, 2007).

In the health care arena, broadband technologies represent critical cost-saving and health care enhancing services for rural communities. Telemedicine applications rely on high speed, high quality telecommunications networks to provide rural communities with "virtual" access to urban health centers and their related medical specialists and services. One recent review of 10 different studies on the potential benefits of telemedicine services with heart failure patients found significant cost savings for the consumer as well as hospitals and physicians (Seto, 2008). Similarly, Whitacre et al. (2009) documented annual community-level savings of nearly $500,000 to rural communities who participated in telemedicine. The FCC has recognized the potential benefits of telemedicine services and recently provided $417 million to the Rural Health Care Pilot Program, which

encourages the development and use of broadband networking services by rural health care providers.

Government and educational services are other potential areas for rural communities to effectively leverage broadband infrastructure investments. E-government services have the potential to streamline local government management and service provision, enhance customer service, improve community information, increase civic participation, and reduce government costs. Broadband networks allow for improvements in public safety, transportation networks, and public utility service and delivery. There are also potential benefits for citizens as they spend less time dealing with government bureaucracy and feel more informed about their community. Broadband service of some kind is almost universally available to American public school students. As a result, there is tremendous potential to leverage broadband technology for the enhanced delivery of adult education and college-level courses in public school systems across rural communities. Superior educational and job training resources also have the potential to improve rural labor resources and thereby enhance rural economic development prospects.

Rural consumers can also derive important benefits from improved access to information and goods and services not readily available in their local community. Atkinson (2007) argued that nationwide broadband access will generate “network effects,” whereby the benefits of broadband multiply with additional customer and business use. A nationwide study by researchers at the Massachusetts Institute of Technology and Carnegie Mellon Institute (Gillett et al., 2006) provided estimates of the economic impact of broadband deployment at the zip code level. Even while controlling for other factors affecting economic growth, they concluded that broadband deployment has a significant impact on local economies. Similarly, Kolko (2010) concludes that there is a positive relationship between broadband expansion and economic growth.

The corollary of this research implies there are potential negative consequences for communities lacking adequate access to broadband infrastructure. In today’s economy many firms consider broadband a critical input into the production process. Some firms, like call centers and customer support firms, are completely dependent on this infrastructure for the effective operation of their business. As a result, firms may not locate in rural areas without proper broadband access or may relocate out of these rural communities as they grow and demand access to better service. Without access to high-speed, high-bandwidth Internet service, rural communities already suffering from the economic effects of industrial restructuring and the current economic crisis may continue to find their communities increasingly less competitive. This situation creates a vicious cycle that serves to widen the rural-urban digital divide.

Overall, it appears that access and diffusion of high quality, high speed broadband networks is a critical economic and community development tool for all communities in the twenty-first century. The question is how to ensure that the rural-urban digital divide does not widen and that all communities, if they choose, can have up-to-date access to this technology, a choice of service providers, and the ability to effectively use broadband service.

What to Do?

A recent report by the Berkman Center for Internet and Society at Harvard University (2009) upholds that nations, states, and localities must have access to ubiquitous, seamless, high-capacity telecommunications networks to meet the needs of a global, technologically advanced society. Ubiquitous and seamless connectivity refers to having high speed networks that are always on and able to connect with anyone, anywhere, anytime. The definition of high speed varies, but generally refers to the ability to effectively handle “next generation” technology applications. Most developed nations have set specific technology goals to meet current and future delivery and service options of universal service. In any description of U.S. universal service, better deployment of technology, greater access to different technology choices, and higher rates of consumer and business adoption would all be critical goals for rural communities. However, one of the ongoing public policy questions is whether universal service means 100% access or if there is some cut-off point where subsidies no longer make economic sense. What is clear is that if advanced telecommunications is a prerequisite to national, state, and local economic and community development, then broad policy measures will be necessary to achieve the appropriate level of telecommunications access and service.

A key question is how do rural decision makers ensure these services are organized and delivered to their constituents? Unfortunately, the status quo system of broadband providers is unlikely to offer service to the most rural communities or enhance existing service in already underserved rural areas. Current suppliers operate under a complex array of government regulations, subsidies, and market protection, which provide little incentive for these firms to alter the status quo structure. Furthermore, incumbent firms are profit motivated and

are therefore reluctant to deploy infrastructure and provide service in areas that do not meet specific, identified expectations for revenue generation. If there are additional constraints, such as having a higher proportion of lower demanding elderly and low income populations, geographic barriers, or others, rural communities are even more unlikely to have or gain access to the most up-to-date broadband service. While some research has suggested the normal pattern of diffusion is leading to higher adoption rates in lower-income households, lower education households have not seen the same pattern (Whitacre, 2008a). The status quo system of broadband service and delivery has not resulted in comparable rural/urban access and/or adoption. Better understanding the reasons behind these differences and whether policy measures are necessary to improve rural broadband service is an important focus for future research.

In the current political climate, federal and state policymakers have a window of opportunity in which they can improve the technology status of rural businesses and consumers. The American Recovery and Reinvestment Act (ARRA) of 2009 provided $7.2 billion to raise levels of broadband infrastructure across the nation, with a particular focus on rural areas. From a policy perspective there are three primary targets in improving rural technology delivery and service:

1. Rural technology infrastructure deployment;
2. The provision of high quality telecommunications service; and
3. Improving rural consumer and business broadband subscription and use of service.

Focusing on these three target areas emphasizes both the supply of service through infrastructure deployment and service provision and the demand for service through improving broadband adoption rates.

Several areas of recent research focusing on supply side policies of infrastructure deployment and/or service deserve further consideration. The FCC's national broadband plan proposes reforming the Universal Service Fund—currently not designed to support broadband directly—into a funding mechanism to maximize broadband availability (FCC, 2010). Other options include strategies that work in conjunction with rural utilities, which can be important partners and/or leaders in the deployment of broadband infrastructure (Feld et al., 2005). Another critical component in determining funding should be the model of service delivery considered by the communities. Those with poor or no service have an opportunity to move away from traditional duopoly models of service towards models that emphasize a more competitive, open access approach (Berkman Center for Internet and Society, 2009). An open access model is one that builds out the infrastructure for a community but allows multiple competitors to simultaneously lease access to the network for service delivery. This model alleviates the necessity of waiting until providers see enough profit potential to build out the network and has the potential to bring more competition to rural communities, lowering prices and improving service provision.

The demand side of the broadband policy equation is equally important. If rural consumers and businesses do not subscribe or do not know how to effectively use the technology in place, the infrastructure investment is of little use. Land-grant university Extension programs can play a critical role in educating rural constituents about the potential benefits of broadband (Whitacre, 2008b). Funding for programs like the National e-Commerce Extension program could also be encouraged (Southern Rural Development Center, http://www.srdc.msstate.edu). In rural communities, schools, libraries, and community colleges may also be important assets for the diffusion of resource knowledge. Rural communities may also consider developing community spaces where broadband is easily accessible at little or no cost to the user, such as in a popular coffee shop or diner. In general, efforts that help rural communities build civic infrastructure around these technology issues will be important tools for overall community success.

Concluding Comments

As most research on the subject indicates, positive economic and social spillovers from broadband use in rural areas are likely. Additional work in quantifying the economic and social impacts of broadband adoption would be useful to shaping expectations of rural communities. However, it seems as though the broadband genie is clearly out of the bottle, meaning that rural areas must find the means, on their own or with outside support, to ensure that their communities have the access and service the future demands.

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