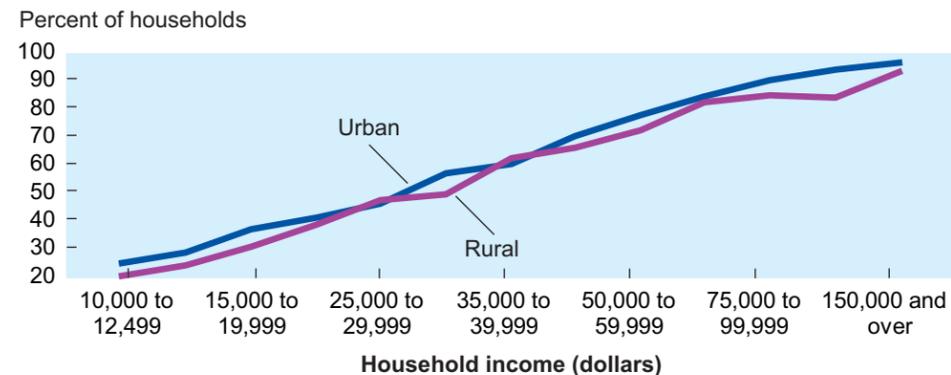


## Internet Use: Broadband and Dial-Up Access

Internet use is lower for individuals in rural areas (71 percent) than in urban areas (77 percent). Overall, household Internet activity is lower than individual activity. If one person in a household uses the Internet, however, other members are also likely to use it. In 2007, 63 percent of all rural households had at least one member access the Internet, at home or elsewhere, compared with 73 percent of urban households. Fifty-two percent of all rural households had in-home Internet access compared with 64 percent of urban households.

High-income households may have already reached a saturation point. High-income households that do not already have Internet access have indicated that they do not want it. Low-income households access the Internet less at home than high-income households do. If Internet use is related to household income, then broadband Internet adoption may also be related to household income. The underlying causes behind this relationship, however, cannot be explored further without better data on household Internet use, education, age, and the pricing/cost of broadband Internet access.

### At-home Internet use of any kind for rural and urban households, by income, 2007



Source: Economic Research Service calculations based on Census Bureau data.

### Overall and in-home Internet use of any kind, 2007

Region	Internet use, anywhere <sup>1</sup>			Internet use, at home <sup>2</sup>		
	Urban	Rural	Total	Urban	Rural	Total
Northeast	71.0	69.5	70.9	64.1	61.0	63.7
Midwest	74.0	65.7	72.1	63.1	53.7	60.9
South	70.7	58.3	68.3	61.7	46.4	58.7
West	75.5	68.6	74.9	67.0	56.9	66.1
<b>National Total</b>	<b>72.6</b>	<b>63.3</b>	<b>71.1</b>	<b>63.7</b>	<b>51.9</b>	<b>61.8</b>

<sup>1</sup>Percentage of households with at least one person going online at home or elsewhere.

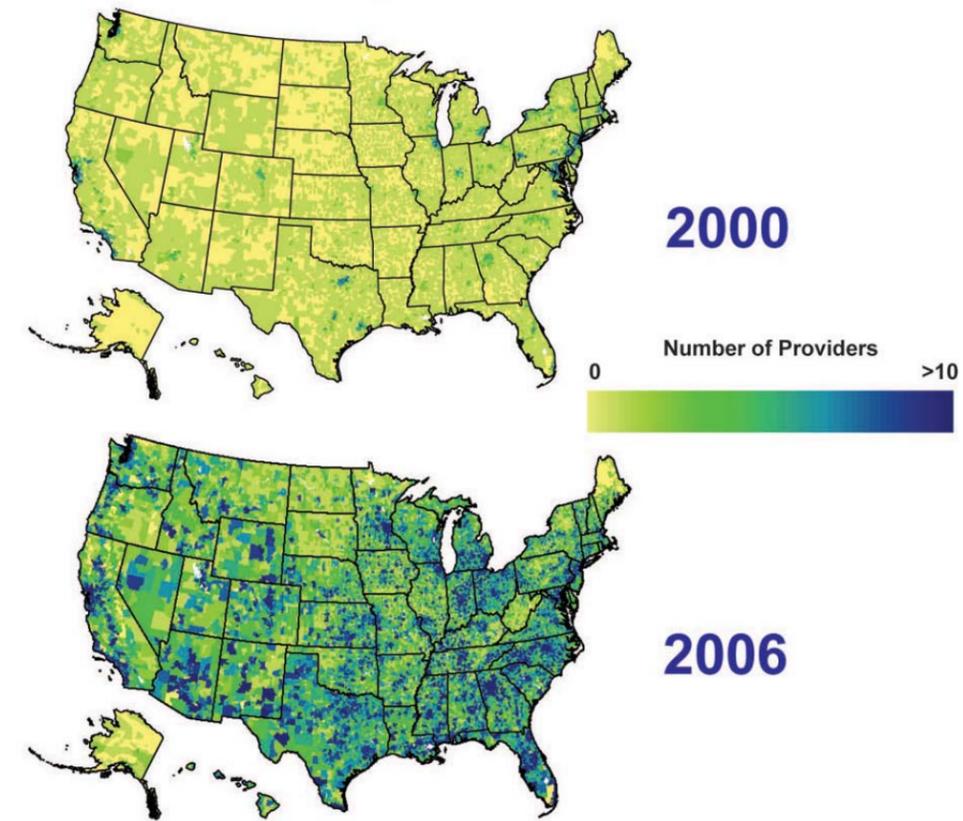
<sup>2</sup>Percentage of households with at least one person going online at home.

Source: Economic Research Service calculations based on Census Bureau data.

### Measuring Broadband Availability . . .

Measuring broadband availability is problematic, and no consumer price data are available nationwide. Geographically detailed broadband data with national coverage are available for U.S. ZIP Code areas from the Federal Communications Commission (FCC). FCC data report the number of companies providing broadband service in a ZIP Code area. These data overestimate broadband availability, however, because broadband “availability” requires that only one customer be located in that ZIP Code area. Results reported here should be interpreted with these limitations in mind.

## Broadband Internet availability increased between 2000 and 2006



Source: Economic Research Service calculations based on Federal Communications Commission data.

## Broadband Availability

The growth in broadband availability since 2000 has been rapid. In 2000, land-based broadband service provision was clustered in highly urbanized areas with service available only in a limited number of rural areas. By 2006, broadband availability was far more common in rural areas. Throughout this decade, broadband access has increased, but is less likely to be found in rural areas. Today, clusters of lower service exist in sparsely populated areas, such as the Dakotas, eastern Montana, northern Minnesota, and eastern Oregon. Other low-service areas have an aging population and are experiencing persistent population loss (e.g., the Missouri-Iowa border and Appalachia).

Government policies that encourage deployment of broadband services increased availability and, in some cases, encouraged more competitive pricing. The Universal Service Program established by the 1996 Telecommunications Act funded broadband Internet access for medical facilities and elementary and secondary schools. The 2008 Farm Bill (Food, Conservation, and Energy Act of 2008) reauthorized USDA's telemedicine and distance learning and rural broadband access grant and loan programs. The Distance Learning, Telemedicine, and Broadband provision of the American Recovery and Reinvestment Act of 2009 provided \$2.5 billion to USDA for loans and grants to increase broadband provision in primarily rural areas.

Depending on the ultimate goal of universal Internet access, the distinction between individual access and household access can be important. The gap in Internet use between rural and urban households (9.3 percentage points) is wider than the gap between all rural and urban individuals (6.5 percentage points—underlying data available from authors). Policies encouraging broadband access generally adopt either an implicit individual or household approach, where the policy addresses one population directly with only secondary efforts directed at the other. If, for example, the policy goal is to improve educational opportunities for school-age children, a program that improves in-school broadband access may be more cost effective than one designed to improve broadband access to households, although such a program may also spur household adoption.

## Broadband's Relationship to Rural Business

Broadband Internet enables businesses to increase efficiencies in existing commercial relationships, increase market presence by reducing the cost of reaching larger markets, and introduce new services. Broadband Internet, however, can also increase competition between businesses (e.g., local banks must compete with Internet-only banks). Business adoption of the Internet has been rapid. In 1997, 13 percent of farmers were using the Internet for farm business; 10 years later, use had increased to 55 percent. As Internet adoption increases, the need for high-speed Internet also rises as online purchasing and marketing become the norm. Rural businesses, however, use broadband less than urban businesses, perhaps due to higher prices for rural broadband service. Online business activity provides rural businesses with potential benefits due to the efficiencies found in high-speed Internet access:

- Direct sales from manufacturer to consumer are available on a broader scale. Value-added and niche agricultural products, horticulture, and other specialty products, for example, are often sold directly to consumers.
- Business-to-business transactions over the Internet have increased substantially. By 2003, online wholesale trade of farm products had already reached \$3.7 billion or approximately 3 percent of all wholesale farm product sales, while all online wholesale trade had reached \$386 billion or 13 percent of all wholesale trade.
- Online retail sales have increased substantially. Rural retail business Internet users found that broadband access allowed them to increase operational effectiveness and exploit market niches.

## Broadband's Relationship With Rural People and Households

Broadband Internet gives rural residents access to goods and services that may not otherwise be available locally or via dial-up Internet. Online purchases now replace the once common Sears and Roebuck catalog. Broadband Internet access can also affect purchase decisions, however, facilitating price discovery and consumer information gathering. Real estate and automobile purchases are examples of markets that have been significantly impacted by Internet-based consumer price discovery activities. Broadband Internet also facilitates services, such as online banking, teleworking, and distance education, which would not be possible with dial-up Internet. Examples of how broadband Internet affects rural residents include the following:

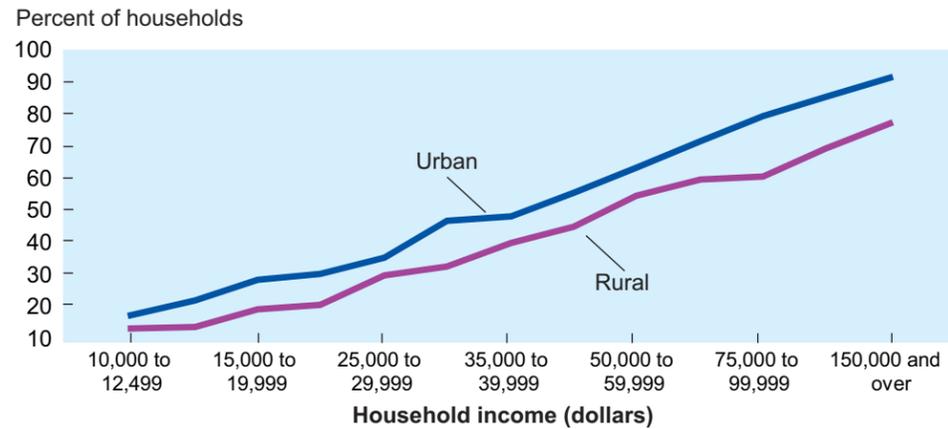
- Teleworking and increased marketing opportunities generate jobs and economic development.
- Government services can be more accessible and convenient.
- Telemedicine reduces patients' time off work and out-of-pocket expenses.

Internet access is recognized as an important tool for many different aspects of social life. Experts fear that areas without broadband Internet access are being systematically segregated from activities in their region. Research shows that broadband Internet facilitates greater contributions to community vitality through civic engagement and community participation.

The gap between rural and urban household broadband use suggests broadband availability and cost presents more of a challenge for rural households. As such, the percentage of households with broadband increases as household income rises. Broadband providers now offer tiers of service speeds so that users can match their needs and affordability, but these options may not be available in rural areas.



## Household broadband use in rural and urban areas, by household income, 2007



Source: Economic Research Service calculations based on Census Bureau data.

Unfortunately, broadband price data are not available nationally; such data would help researchers and policymakers better understand and address the gap in rural and urban broadband use. For example, pricing data are needed to assess the extent to which broadband access cost limits use in areas where it is physically available and to better understand the impact of public policy on broadband use.

## The Value of Broadband: Telemedicine

Rural residents often face challenges accessing a full range of health care services. Today, due to the availability of broadband Internet, rural health care providers can more easily link with urban providers through the use of health information technology. There is a national push to create electronic health records for all Americans so that patient information can follow individuals from one health care provider to the next. The ability to meet that goal is dependent on all health care providers' having the kind of rich connectivity available only through broadband Internet services. Rural health care providers and their patients also benefit from the use of telemedicine technology, where specialty services can be offered real-time to clinics and hospitals that may not have full-time specialists. Patients no longer have to travel long distances or wait to consult with specialists, and emergency cases may not always have to be evacuated to a larger hospital. Telemedicine is helping address an acute problem in the United States, where vast distances and low population densities have led to doctor shortages for many rural communities. Other benefits from telemedicine include the following:

### Medical benefits

- Improving the perception of locally provided health care quality.
- Offering a larger menu of locally provided medical services.
- Treating emergencies more efficiently.
- Telehome monitoring can help providers better manage elderly rural residents with chronic conditions, thereby reducing hospitalizations and avoiding early placement in nursing homes or assisted-living care facilities.

### Economic benefits

- Reducing time off work due to decreased travel time to access specialist care.
- Lowering the cost of travel to receive care.
- Increasing revenue from pharmacy and lab work that can be conducted locally.
- Reducing costs to health facilities by outsourcing specialized medical procedures.

In summary, rural communities have not been left out of the ever-changing information economy, although issues of equal access exist. Evidence suggests that the difference in access may lie in the higher cost or limited availability of broadband Internet in rural areas. Data on broadband use in households and businesses and its cost are needed to better address this issue.

## What Is Broadband . . .

The Federal Communications Commission has historically defined broadband Internet service as providing a minimum of 200 kilobits per second (kbs). This speed is much faster than dial-up, which has a maximum speed of 56 kbs and can be as slow as 14 kbs in rural areas. Unfortunately, the definition, although recently updated to a tiered definition, includes a wide array of technologies with varying reliability and quality, making economic impact analysis and discussion of broadband Internet service challenging.

## Data Resources

This report draws on the research of ERS's Resource and Rural Economics Division. Data in this analysis are drawn from the Federal Communication Commission's (FCC) Form 477 survey and the U.S. Census Bureau's Current Population Survey (CPS).

FCC Form 477 survey data provide a biannual account of broadband Internet service providers in each ZIP Code area. The number of providers in areas with one, two, or three providers, however, is not disclosed to protect firm confidentiality. Form 477 represents the only nationwide data on the number of broadband providers serving rural communities. The CPS surveys a nationally representative sample of households in both rural and urban areas and included a supplement on "Internet and Computer Use" in its August 2000, September 2001, October 2003, and October 2007 surveys.

Additional data resources include surveys and the Local Exchange Routing Guide data on the number of local exchange carriers and switches. USDA's June Agricultural Survey (since 1997), Agricultural Resource Management Survey (since 2005), and Census of Agriculture (2007) provided information on Internet and broadband adoption by farm households. The Pew Internet & American Life Project has also conducted multiple, publicly available, nationwide surveys of household use of the Internet. In addition, some States (e.g., North Carolina and Kentucky) collect data on broadband availability within their borders, affording more geographic detail than that provided in the FCC data.

## Background and Contacts . . .

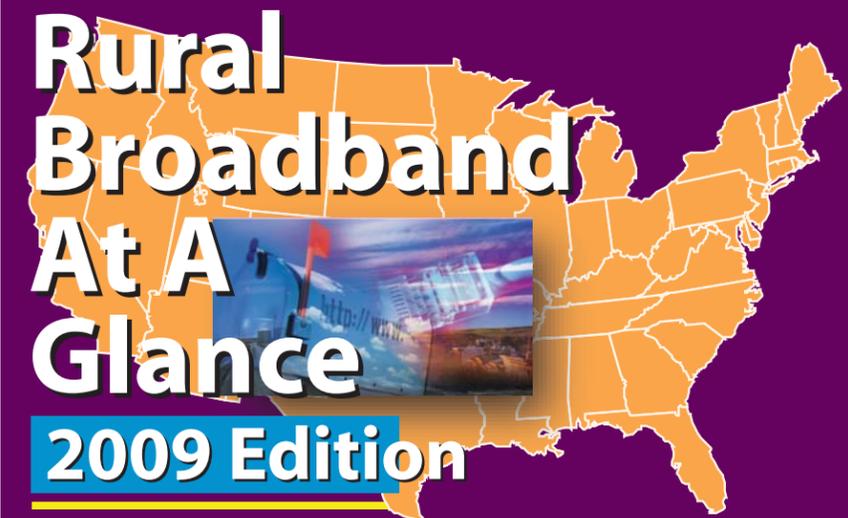
Findings in *Rural Broadband at a Glance* are drawn from a larger body of research currently underway. ERS is conducting a multi-disciplinary nationwide study of the economic issues surrounding broadband access and use in rural America. Ongoing research focuses on broadband use, broadband availability, and the effects of broadband Internet service on rural growth and prosperity, the provision of community public services, access to healthcare, and rural well-being.

For additional information on this topic, please contact *Peter Stenberg* at [stenberg@ers.usda.gov](mailto:stenberg@ers.usda.gov) or *Sarah Low* at [slow@ers.usda.gov](mailto:slow@ers.usda.gov).



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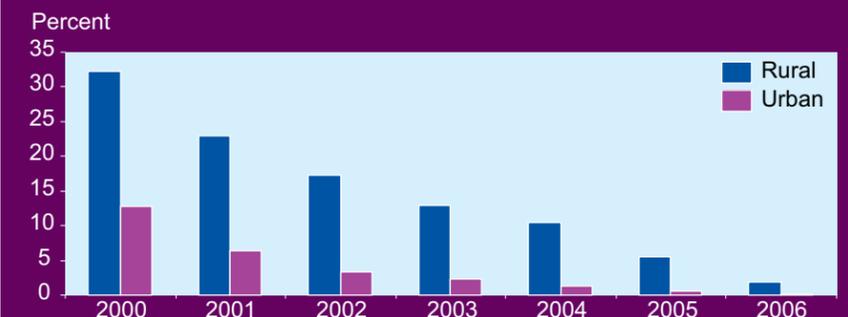
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The size and growth of U.S. Internet use is impressive as it becomes more embedded in national and rural economies. Three-quarters of U.S. residents used the Internet to access information, education, and services in 2007. Widespread Internet adoption suggests it has great value to individuals, businesses, and communities. Broadband Internet access is becoming essential for both businesses and households; many compare its evolution to other technologies now considered common necessities—such as cars, electricity, televisions, microwave ovens, and cell phones.

Although rural residents enjoy widespread access to the Internet, they are less likely to have high-speed, or broadband, Internet access than their urban counterparts. Nonetheless, broadband access for both rural and urban populations increased rapidly between 2000 and 2006. The main limitation of slower, dial-up Internet access is that many content-dense applications and documents, and such critical services as anti-virus protections, are not readily usable via dial-up due to low transmission capability and speed. Broadband Internet access in rural areas is less prevalent than in more densely populated areas of the country. Circumstantial evidence suggests that the difference in access may lie in the higher cost and limited availability of broadband Internet in rural areas. As a result, rural residents depend more on Internet use outside of the home, relying on places like the library, school, and work, where broadband Internet access is available.

## Share of population with low broadband Internet service provision for U.S. rural and urban areas<sup>1</sup>



<sup>1</sup> Low broadband Internet service provision is defined as zero, one, two, or three service providers within a ZIP Code area. The specific number of providers is not disclosed for low service provision areas to protect firm confidentiality.

Source: Economic Research Service calculations based on Federal Communications Commission and Census Bureau data.