

## Research & Technology



Peter L. Stenberg

# Communications & the Internet in Rural America

Since the late 1990s, the telecommunications industry has witnessed a dramatic swing in its economic fortunes. From the “dot-com boom,”—during which investors became convinced that classic economic laws did not apply to the sector—to the “dot-com bust”—when investors discovered these laws do apply—expectations for growth in telecommunications services has moved from boundless to bleak. There is evidence that reality lies somewhere in the middle. Even in the current downturn in the telecommunications sector, businesses and households have continued the upward trend in volume of commercial activity on the Internet. Households alone spent \$5.7 billion on Internet retail purchases during December 2001.

Communications and information services delivery, through systems such as telephone and Internet, have, in fact, become an increasingly important factor in the growth of the economy, despite recent volatility in the sector. As with other technological service developments, however, the diffusion of communication and information services varies in time and place, which has implications for rural areas and households.

Based on an analysis of data from U.S. Department of Commerce surveys and from private industry, variations in diffusion and adoption of communication services conform to two well-accepted economic principles:

- Companies invest in providing new services where they earn the highest returns, and
- Households adopt new services if they can afford them and either need or desire them.

When these principles fail to provide the level of telecommunication services deemed necessary or equitable by policymakers, government policies have been developed to encourage or require wider delivery of services or provision of services at lower costs. The universal service program and emergency 911 service are two such policies.

### Communication & Information Service Adoption

It took nearly 100 years after the first commercial use in 1877 for telephone service in the U.S. to reach its current household penetration rate, and for most

of that time, people debated whether telephones were a necessity or a luxury.

Although penetration rates for having at least one telephone in a household vary across regions and income groups, the rate has remained stable for the last 20 years at roughly 95 percent of all households. The current regional pattern of adoption has been consistent for the last 10 years, with the distribution of household income a strong predictor of the penetration rate for any particular state. The adoption rate for rural areas is comparable to urban areas, largely as a consequence of Federal and state policies that have both subsidized and regulated the cost of telephone services in less densely populated areas.

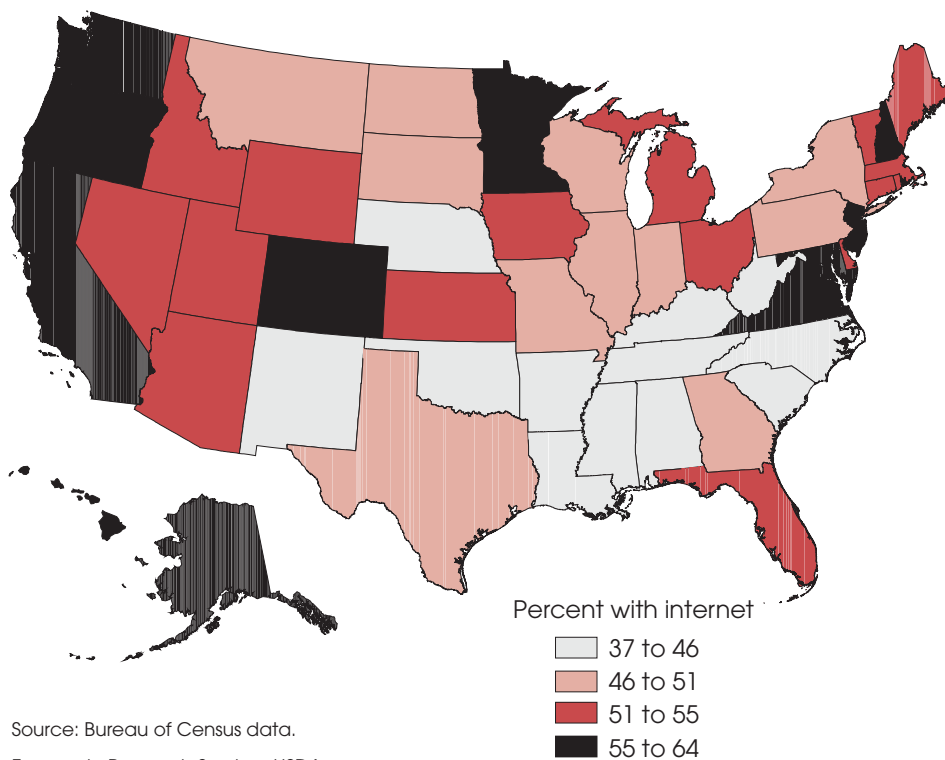
The household demand for telephones remains fairly consistent no matter what the cost for basic service, although the lower the household income, the less likely the household is to have telephone service. Analysis indicates that at about \$25,000 in annual household income, the cost of telephone service becomes an affordability consideration for lower income households. Current Federal and state programs, called universal service programs, effectively subsidize the telephone rates for all households; if not for these programs, affordability would likely become a consideration for those with annual household income above \$35,000. For rural households, the effect would be even greater, since there is a higher rate of subsidization in rural areas.

Wireless telephone service (cell phones) has been promoted as a more cost-effective means to deliver local phone service to rural households. Because there would no longer be the need to run wire to each household, both the fixed and marginal costs are potentially lower with wireless service.

Wireless services are starting to make inroads into the demand for traditional phone service—the latest data on communication and information services use indicate some middle-income households are dropping traditional phone service in favor of cell phones. High-income households are largely using both services.

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### Households with Internet Connections Are Below 46 Percent in Only 12 States



Source: Bureau of Census data.

Economic Research Service, USDA

Wireless, however, is not yet a perfect substitute for traditional telephone service—the average purchase price for wireless service is still greater than for traditional telephone service. In both urban and rural areas, low-income households, for whom the cost difference between traditional and wireless services is critical, continue to use traditional phone service.

Two potential events might change that balance: current government programs to keep local phone service affordable could be eliminated, or current programs could be adjusted to include wireless service. While there are advocates for eliminating current programs, the trend so far has been to add wireless services to already existing programs. At least four states now include wireless service in their universal service programs. Wireless carriers receive intra-industry financial transfers to reduce household subscription prices.

Internet use by rural and urban households has also increased significantly during the 1990s, so significantly that it has one of the fastest rates of adoption for any

household service. Whether the household adoption rate has been faster than for the telephone, television, color television, and the VCR, as Internet proponents claim, depends on how the initial adoption is dated. It seems undeniable, however, that diffusion and adoption of Internet services has been remarkably fast.

Internet use has increased for households in all regions and income groups regardless of rurality. Half of all American households now subscribe to some Internet service; over 40 percent of rural households subscribe. Since the penetration rate for urban households has likely come closer to its peak than the rate for rural households, the difference between rural and urban rates should close further. Nevertheless, Internet use in rural areas still lags both in aggregate and across income groups. Analysis of industry data suggests that critical elements in Internet service delivery, such as industry structure, may be impeding diffusion and adoption in these less densely populated rural areas. Thus, the penetration rate will remain lower for rural households than for urban households.

Recent data indicate the pace of Internet adoption may be beginning to slow. Higher income households may have already reached a saturation point; survey results from households in this income group indicate that those who do not yet use the Internet at home do not want it. Lower income households may continue to adopt Internet use more rapidly than higher income households, as the service comes to be seen as more essential. Income, however, is a much more limiting factor for Internet adoption than for telephone use—the lower the household income the less likely Internet service is affordable. Affordability is a greater factor for rural than for urban households.

### Higher Costs Slow Diffusion in Rural Areas

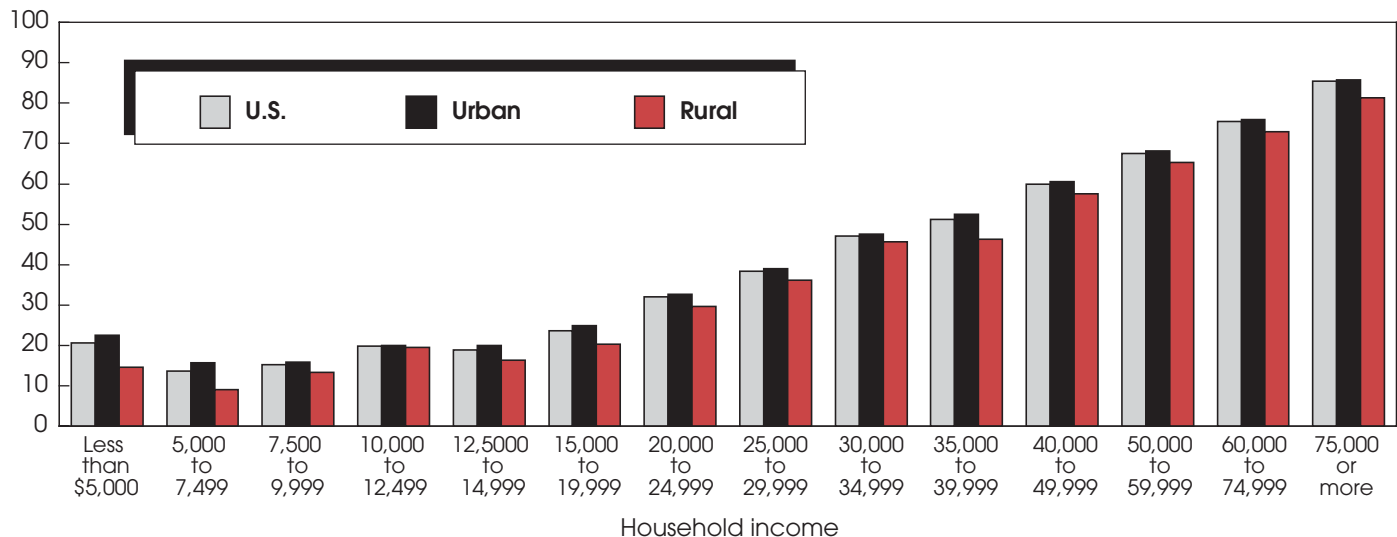
Local exchange carriers (local telephone companies) incur higher costs for providing rural households with telecommunication services than they do for urban households, for straightforward economic reasons. As population density decreases, the price for delivering traditional or wireless phone service increases exponentially. All rural areas, by definition, are characterized by low population density. The fewer people in any relevant geographic space, the fewer share in the costs for telecommunication services—central office switches, loop maintenance, and other common components of the local telecommunication system. In addition, rural telephone service providers must spend more per customer for maintenance and repair than do urban providers.

These economies of scale are true whether phone service is delivered through traditional copper wire or through new wireless services. Because equipment manufacturers focus on the needs of more profitable large-scale telecommunication companies (as large-scale companies focus on where they have the highest returns), small telecommunication companies often face difficulties in purchasing equipment scaled for their operations.

The structure of the telecommunication industry also continues to play an influential role in the delivery of telephone and Internet service in rural areas. When the telecommunication industry comes up in conversation, people often think only of

## Internet Access Increases With Household Income, With Rural Lagging Urban

Percent of Households



Source: Bureau of the Census.  
Economic Research Service, USDA

the four remaining “Baby Bells”—SBC, Verizon, BellSouth, and Qwest. Actually, there are more than 1,000 telecommunication service providers—most are small in scale and concentrated in rural areas, many are organized as cooperatives. The spectrum of providers ranges from “mom-and-pop” operations serving as few as 10 households to the Baby Bells with millions of customers. Quality of service varies considerably across these providers, and even within the service areas of the largest providers.

### Federal Policy Facilitates Diffusion

Federal policy has been developed to facilitate the diffusion of new communication and information services, and to address equity issues associated with cost barriers to providing equivalent telecommunication services to rural areas. The Telecommunications Act of 1996, the cornerstone of current policy, deregulated the communication and information sectors and updated universal service provisions that have led to a near universal availability of a minimum level of service at affordable rates. The Federal Communications Commission (FCC) has been mandated to determine what is “affordable.”

Deregulation of the communication and information service sector is intended to improve economic efficiency in the sector by allowing companies to enter new markets, reducing governmental oversight, and facilitating formation of new companies and the merger of older firms. The new universal service provisions build on previous policies that resulted in fairly uniform prices across the country for local telephone service. The uniformity in price, however, does not guarantee uniformity in quality of service, nor does universal service address the cost of toll calls, which can be a significant expense for some rural households.

Universal service provisions also provided \$2.25 billion dollars in new funds annually to help pay for modern communication infrastructure for schools and medical facilities in high-cost (i.e., rural) and low-income communities. The Act also mandated, at some point in the future, a broadening of the definition of telephony to include Internet service provision. The FCC has been mandated to determine when to include Internet service in the universal service program.

Federal, state, and local governments also address equity issues in telecommunication and information services through a

number of other programs. Key among these are programs that provide economic assistance for distance learning and telemedicine programs. Telemedicine programs provide medical services, such as X-ray readings by a radiologist, at a distance. For rural communities, these programs can improve telemedicine communication and infrastructure and increase the breadth and depth of local school curricula.

Not all Federal policy facilitates diffusion of telecommunication services. While the 1996 Act authorizes programs to make communication and information services more universally affordable, a plethora of Federal, state, and local taxes on local and long distance telephone service combine to make them more expensive. Among these is the telephone tax applied in 1898 to cover expenses incurred for the Spanish-American War. Although war debts were paid off by 1932, the tax continues to raise \$5 billion per year.

### Trends in Rural Communication & Information Services

Two major developments, wireless and satellite telephony, have often been cited by their promoters as overcoming the economic disadvantages rural areas have in

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the use of traditional telephone service. Both technologies, however, still face constraints that keep their costs high.

Wireless services have some cost advantages in covering the "last mile" from a phone company's switch to the household, but limitations in the technology and the terrain keep costs high—overcoming dead zones (i.e., areas either too far from a communications tower or where physical barriers impede the signal) in areas with low population density quickly reduces any cost advantages.

Although satellites may hold some promise in providing broadband Internet service to rural households, so far the quality has not lived up to some of the promise. Service speed may never match broadband services obtained through telephone or cable systems because of technical limitations within the system, in addition to the better known facts regarding the time required for a signal to reach a destination and the need for household receivers to have an unobstructed view of the southern sky (any obstructions, such as trees or a hill, between the satellite and the customer's dish interrupts service).

Since the invention of the telephone, communication and information service innovations have been introduced and disseminated throughout rural America in fits and starts. Some of the recent developments in the marketplace were not even dreamed of a decade ago.

The marked decline in investment in telecommunications since the dot-com bust will slow the diffusion of Internet and other new services, but the demand for these services seems to be continuing to grow. The availability of new services and their affordability will be determined by three main mechanisms: governmental policy, the economic feasibility and technical limits of new technologies, and market incentives.

The new farm bill provides funding to increase the availability of broadband Internet services in rural areas as well as support mechanisms for rural electronic commerce, telemedicine, and distance learning. **AO**

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### Want to know more?

Peter L. Stenberg, "Telecommunication Rural Policy in the U.S.: Issues and Economic Consequences," electronic proceedings for the conference European Rural Policy at the Crossroads, The Arkleton Centre for Rural Development Research, University of Aberdeen, Scotland, UK, 29 June – 1 July 2000, [www.abdn.ac.uk/arkleton/conf2000/papers/stenberg.doc](http://www.abdn.ac.uk/arkleton/conf2000/papers/stenberg.doc).

### July Releases—National Agricultural Statistics Service

The following reports are issued electronically at 3 p.m. (ET) unless otherwise indicated.

[www.ers.usda.gov/nass/pubs/pubs.htm](http://www.ers.usda.gov/nass/pubs/pubs.htm)

#### July

- 1** *Crop Progress (4 p.m.)*
- 2** *Weather - Crop Summary (noon)*
- 3** *Broiler Hatchery  
Dairy Products  
Egg Products*
- 5** *Dairy Products Prices  
Milkfat Prices  
Poultry Slaughter*
- 8** *Noncitrus Fruits & Nuts - Annual  
Crop Progress (4 p.m.)*
- 9** *Weather - Crop Summary (noon)*
- 10** *Broiler Hatchery  
Vegetables*
- 11** *Crop Production (8:30 a.m.)*
- 12** *Dairy Products Prices (8:30 a.m.)  
Agricultural Cash Rents  
Turkey Hatchery*
- 15** *Mink  
Crop Progress (4 p.m.)*
- 16** *Weather - Crop Summary (noon)*
- 17** *Ag Chemical Usage - Fruits  
Broiler Hatchery  
Milk Production*
- 18** *Farm Production Expenditures*
- 19** *Dairy Products Prices (8:30 a.m.)  
Milkfat Prices (8:30 a.m.)  
Cattle  
Cattle on Feed  
Cold Storage  
Livestock Slaughter  
Sheep*
- 22** *Catfish Processing  
Crop Progress (4 p.m.)*
- 23** *Weather - Crop Summary (noon)  
Chickens and Eggs*
- 24** *Agricultural Prices - Annual  
Broiler Hatchery*
- 26** *Dairy Products Prices (8:30 a.m.)  
Monthly Hogs and Pigs  
Monthly Agnews*
- 29** *Catfish Production  
Crop Progress (4 p.m.)*
- 30** *Weather - Crop Summary (noon)  
Peanut Stocks & Processing*
- 31** *Agricultural Prices  
Broiler Hatchery*