A Study of Internet Use Patterns and Broadband Availability Among Rural Illinois Households and Small Businesses

by Sharon Schumacher

The Telecommunications Act of 1996 directed the Federal Communications Commission (FCC) and the states to encourage deployment of advanced telecommunications capability to all Americans on a reasonable and timely basis. As recently as June 2002, the President reiterated the need for full deployment of high-speed Internet services, with a promise of additional support for FCC efforts.

The U.S. has fallen to tenth in the world in market penetration of high-speed Internet services—behind South Korea, Hong Kong, Taiwan, and Canada, to name a few (Point Topic Ltd. 2002). Within U.S. borders, the broadband digital information superhighway has become a powerful channel for commerce and communication in large metropolitan markets. Yet, many of our rural communities are still waiting for the technology to reach them.

In its third progress report on deployment of advanced telecommunications services, the FCC (2002) stated,

. . . the Commission identified several groups of consumers as being particularly vulnerable, including low-income consumers, those living in sparsely-populated areas, minority consumers, consumers living on tribal lands, persons with disabilities, and those living in the U.S. territories.

The delay in deployment to sparsely populated areas adds to factors aggravating weak rural economies. Rural businesses stand to lose local customers to online vendors, sending revenue out of the community. Without this connection capacity for broadband-dependent educational, entertainment, and business applications, rural communities will have difficulty attracting new businesses and retaining a young, well-educated workforce. Advanced information technologies applied in rural economies have the potential to reduce the disadvantages of distance and smaller market size and to level the competitive playing field between urban and rural businesses.

What approaches to encourage deployment are appropriate for rural Illinois at this point in time? The FCC (2002) maintains that, where effective, market forces should be allowed to drive the progression of advanced services into new markets:

Although regulators can play an important role in educating consumers about the availability and capability of advanced services, consumers and service providers, interacting in the marketplace, are ultimately best suited to determine how and when advanced services should be produced and purchased. Consumer responses to advanced services applications and technologies are continuing to evolve, and we believe that market participants should resolve challenges through technological innovations, marketing, creative financing and other skills.

This report seeks to inform the reader of various approaches to encouraging deployment in underserved areas of rural Illinois by providing a current picture of rural consumer use of Internet applications and technologies.

1 The author is Sharon Schumacher, Researcher at Southern Illinois University—Carbondale Office of Economic and Regional Development. The author would like to thank Dr. Jack M. Geller, president of the Center for Rural Policy and Development in Minnesota for generously sharing his survey instruments and his insights into the issues surrounding the deployment of new telecommunications technologies to rural areas. The author would also like to thank Nikki Nance and Kyle Harfst of SIUC Office of Economic and Regional Development for contributing their technical and statistical expertise toward the completion of this project.
Most households with phone service have Internet service available to them through their phone line (a dial-up connection); however, unless they purchase a second phone line, they cannot make or receive phone calls while using their dial-up Internet connection. In some areas, they must pay a fee for the number of minutes they stay online. These dial-up connections are sufficient for e-mail and slow Web surfing; however, a dial-up connection is too slow and narrow to accommodate some of the newer applications that require the transfer of large amounts of data. In comparison, a high-speed Internet connection is faster, allows for larger and speedier data transfers, is always on, and does not require an extra phone line (Table 1).

Several factors account for the disparity between deployment levels to rural and urban populations. In urban areas, deployment is driven by competition for dense, eager high-speed markets. In rural areas, weak demand and the comparatively high cost of deployment discourage investment. Lines must be laid and upgraded over longer distances, and there are fewer customers along the lines to pay for the services.

### Table 1: Capability of Dial-Up and High-Speed Connections

<table>
<thead>
<tr>
<th>Applications/Features</th>
<th>Dial-Up Connection at 56 kbps</th>
<th>High-Speed Connection at 1.5 to 10 mbps</th>
</tr>
</thead>
<tbody>
<tr>
<td>Always on</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>E-mail</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Time to download a 10 mb file</td>
<td>1 hour</td>
<td>10 sec. to 1 min.</td>
</tr>
<tr>
<td>Web surfing</td>
<td>Slow</td>
<td>Fast</td>
</tr>
<tr>
<td>Streaming Video</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Video conferencing</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Immediate Stock/News Updates</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Online gaming</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Online interactive classes</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>


In the evolution of advanced Internet technology, the technologies currently competing for the high-speed market are (1) digital subscriber line, (2) cable modem, and (3) wireless Internet service. The following is a compilation of the features and availability consumers must consider when choosing among these technologies (Table 2).

### Current Indications of Deployment in Rural Illinois

The number of high-speed lines in the U.S. increased by 249 percent between December 1999 and June 2001. The FCC (2002) reported that 98 percent of the nation’s most densely populated zip codes had at least one high-speed subscriber. At the same time, only 37 percent of our nation’s least populated zip codes (fewer than six people per square mile) reported high-speed service. Nonetheless, this was an 85 percent increase over the FCC’s (2002) December 1999 measurement (Figure 1).

**Availability of DSL in Rural Illinois.** As of December 2001, about 48 percent of the lines of all U.S. incumbent local exchange carriers 2 (ILECs) were DSL equipped. An informal review in June 2002 of the promotional websites of local exchange carriers (LEC) serving rural Illinois showed that many are advertising DSL offerings, but are advising their customers that DSL services are not available in all areas, especially not outside a three-mile

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2Incumbent local exchange carriers (ILECs) are owners of existing telecommunications facilities. Competitive local exchange carriers (CLECs) obtain access to ILEC facilities (central office co-location space and their lines running from there to each subscriber) to provide broadband using DSL.
Table 2: Comparative Features and Advantages of Various High-Speed Technologies

<table>
<thead>
<tr>
<th>Technology</th>
<th>Definition</th>
<th>Availability</th>
<th>Monthly Cost to Customer</th>
<th>Value for the Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential DSL (ADSL)</td>
<td>A DSL (digital subscriber line) is a method for moving data over regular phone lines. A DSL circuit is much faster than a regular phone connection, and the wires coming into the subscriber's premises are the same (copper) wires used for regular phone service. An asymmetrical digital subscriber line (ADSL) provides higher download speed than upload.</td>
<td>Available in medium and large cities. Rarely available in rural areas. Where available, customer must be within 18,000 feet (or around three miles) from telephone switching office.</td>
<td>Installation: free to $200. Equipment: free to $200. Monthly fee: about $50.</td>
<td>Moderate speed, low cost, reliable. Value drops as distance from central office increases.</td>
</tr>
<tr>
<td>Business DSL (SDSL)</td>
<td>A symmetrical digital subscriber line (SDSL) provides equal download and upload speeds.</td>
<td>Available in medium and large cities. Rarely available in rural areas. Where available, customer must be within 18,000 feet from telephone switching office.</td>
<td>Installation: about $300. Equipment: from several hundred to several thousand dollars. Monthly fee: about $100 to $400.</td>
<td>High speed, high cost, reliable. Value drops as distance from central office increases.</td>
</tr>
<tr>
<td>Cable</td>
<td>Cable modem uses the same cables that carry cable TV signals to carry data. Cable modem service can be purchased as a stand-alone service or as an add-on to one's current cable TV service. If many people in a neighborhood are using their cable modems at once, the connection speed may drop considerably.</td>
<td>Available in many markets where cable TV service is available. Not available in remote rural areas.</td>
<td>Installation: free to $200. Equipment: free to $200. Monthly fee: $30 to $60.</td>
<td>High speed, low cost. Speed depends on number of active users in the neighborhood. Cable modem service is a good choice if there aren't too many other cable modem users in your area and if you want a system that's easy to set up and maintain.</td>
</tr>
<tr>
<td>One-Way Satellite</td>
<td>Satellite broadband uses a dish on your house or building to send and receive data from satellites orbiting the Earth. The same dish may be used for satellite TV, depending on the service provider's offering. One-way satellite communication equipment requires the use of a phone modem connection to send data to the broadband provider; this results in additional costs and slower speed.</td>
<td>Available anywhere in the continental U.S. where you can get a phone line and set up a dish to face south.</td>
<td>Installation: up to $200. Equipment: up to $150. Monthly fee: $30 to $50.</td>
<td>Moderate speed; low cost; limited applications; sometimes unreliable due to bad weather, local interference, or a misaligned dish. Satellite isn't as fast or reliable as DSL or cable, but definitely better than dial-up.</td>
</tr>
<tr>
<td>Two-Way Satellite</td>
<td>Satellite Internet access allows for high-speed data transfers from the Internet to your computer via a satellite orbiting the Earth. Two-way satellite technology allows data to be sent through satellite both downstream and upstream.</td>
<td>Available anywhere in the continental U.S. where you can set up a dish to face south.</td>
<td>Installation: up to $200. Equipment: up to $500. Monthly fee: $50 to $70.</td>
<td>Moderate speed, moderate cost, faster and more reliable than one-way satellite.</td>
</tr>
<tr>
<td>Fixed Wireless</td>
<td>Wireless broadband uses an antenna placed on or in your building to send and receive data. The data is transmitted over a wireless network, which consists of antenna towers placed three to five miles apart. Wireless' speed is currently comparable to ADSL; however, the theoretical maximum is much higher, so you can expect the speed of wireless connections to increase in coming years.</td>
<td>Available in limited areas but expanding.</td>
<td>Equipment: up to $300. Monthly fee: $50 to $80.</td>
<td>High speed, moderate cost, relatively reliable. The connection speed is not limited by your distance from the wireless antenna or by the number of wireless users in your area.</td>
</tr>
</tbody>
</table>

radius of a telephone switching station (Office of Economic and Regional Development 2002).

The Illinois Public Utilities Act requires that every ILEC offer or provide advanced telecommunications services to not less than 80 percent of its customers by January 1, 2005, unless the Illinois Commerce Commission grants the carrier a waiver from this mandate. Implementation of the utilities act will leave 20 percent or more of Illinoisans without ILEC-provided advanced telecommunications services (Illinois Commerce Commission 2001).

Availability of Cable Modem Internet Service in Rural Illinois. Current promotional information about the availability of cable modem Internet access in rural Illinois is inconclusive. Providers advertise that high-speed Internet service is among their offerings, but customers must contact their providers' customer service office before knowing whether the service extends to their home or business. Recent mergers between cable TV and broadband companies promise to advance the deployment of cable modem Internet service in existing cable TV markets; however, cable TV is still not available in remote rural areas.

A June 2002 analysis of a commercial online inventory of internet service providers (ISP) reveals that eight percent of ISPs serving Illinois communities outside the Chicago area provide wireless Internet service (The List Web Host 2002) (Figure 2).

The National Regulatory Research Institute (2001) conducts an online survey of communities that have acquired broadband services for their areas. Of the eleven responding Illinois communities, eight procured fixed wireless Internet service rather than satellite, DSL, or cable; eight of the communities used private funding to purchase the equipment; nine described their region as rural and/or remote; five reported that their new services would be serving less than 10,000 customers; and four reported a customer base of less than 1,000.

<table>
<thead>
<tr>
<th>Types of Connections Offered by Illinois ISPs Outside Chicago Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wireless</td>
</tr>
<tr>
<td>8%</td>
</tr>
</tbody>
</table>


Rural Illinois Internet User Profile

Is the strength of the rural Illinois Internet market enough to influence the progression of advanced services? To obtain a measurement, a survey was conducted in April 2002. The study polled 800 randomly selected rural Illinois heads of household and 250 small business people.

The 800 rural Illinois household interviews were obtained by random digit dialing of a sample of 16,000 households situated outside metropolitan statistical areas (MSAs). The 250 rural Illinois small business interviews were obtained by random digit dialing of a sample of 3,000 small businesses, with 20 or fewer employees, situated outside MSAs.

Adoption Rates. Fifty-one percent of rural Illinois households reported having a personal computer. Of those with a computer, 83 percent reported being connected to the Internet, and of those, 11.4 percent reported being high-speed subscribers.

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Of rural Illinois small business respondents, 72 percent reported having at least one working computer at their business. Of those, 73 percent reported at least one computer connected to the Internet and 40 percent reported having more than one computer connected to the Internet. Of those connected, 27.2 percent reported a high-speed connection (Figure 3).

3An ISP provides Internet service to consumers. Most ISPs distribute Internet service using the facilities of telecommunications providers (e.g., copper wire, cable, bandwidth transmissions). Many ISPs offer companion services such as Web hosting and technical support.
Similar studies conducted in Iowa in 2001 and Minnesota in 2002 provide the opportunity to compare adoption rates among the rural households of the three states. As a percentage of the overall rural population in each state, the percentage of rural Illinois households connected to the Internet (42.5%) is lower than connected rural Minnesota households (47%) and about even with rural Iowa (42.2%) (Center for Rural Policy and Development 2002; Iowa Department of Economic Development 2001) (Figure 4).

Age and Adoption Rates. Age is a factor that appears to affect adoption rates. Of heads of households age 55 and older, only 29 percent reported having a personal computer in their home, whereas 71 percent of heads of households younger than 55 reported having a personal computer. These data are consistent with the findings of a parallel study conducted in Minnesota in July of 2002 (Center for Rural Policy and Development 2002) (Figure 5).

Household Internet Use Patterns. Rural Illinois households reported being online an average of 13.7 hours per week. Among all respondents, the three most-reported online activities were sending and receiving e-mail (93%), searching the Internet for fun (81%), and playing computer games online (79%).

Reported online activities differed among age groups. A larger percentage of respondents over age 55 reported buying and selling stock online, researching information about their personal finances, researching prices, and researching health information than the 55-and-younger respondents. The 55-and-younger respondents were more likely to perform work for their employer, play computer games, communicate through chat rooms, place bids at online auctions, surf for fun, make purchases, and make travel arrangements online than those over age 55 (Figure 6).

Of connected small businesses, 66 percent reported having more than one employee using a computer connected to the Internet. The businesses reported being online an average of 13.4 hours per week.
Of those online, 28 percent reported selling their products and/or services through a website, 64 percent reported corresponding with their customers and suppliers via e-mail, and 55 percent reported purchasing supplies and equipment online (Figure 7).

Internet Technology. Among online household respondents, 81.7 percent reported having a dial-up connection, 5.6 percent reported a cable modem connection, 4.7 percent reported a DSL connection, and 1.2 percent reported a wireless connection.

Among small business respondents, a lower percentage reported having a dial-up connection than the household respondents and a higher percentage reported DSL and wireless connections (Figure 8).

Demand. This study showed that cost is a factor in adopting high-speed technology. Of household dial-up respondents, 27 percent reported that they had the option to purchase a high-speed connection but chose not to. Among those, almost two thirds cited high costs as the reason they had not switched (Table 3).

Interest in using the Internet to conduct business appeared weak among the household respondents. More than half of online respondents said they were not interested in conducting routine grocery shopping, paying property taxes, and purchasing city licenses online (Figure 9).

### Table 3. If high-speed connections are available for purchase in your area, which statement best reflects the reason you haven’t yet purchased the service?

<table>
<thead>
<tr>
<th>Response</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Installation costs are too high.</td>
<td>33.3%</td>
</tr>
<tr>
<td>It’s too expensive where I live.</td>
<td>30.1%</td>
</tr>
<tr>
<td>I really haven’t thought about it.</td>
<td>18.3%</td>
</tr>
<tr>
<td>I don’t use the Internet enough for it to make sense to me.</td>
<td>9.7%</td>
</tr>
<tr>
<td>Some other reason</td>
<td>5.4%</td>
</tr>
<tr>
<td>Don’t know</td>
<td>3.2%</td>
</tr>
<tr>
<td>Total</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

Source: Office of Economic and Regional Development (2002).

### Figure 7. Percent of Businesses that Used Their Computer(s) in the Past 12 Months to Perform the Listed Activities

- **Sell products**: 28% 64%
- **E-mail customers/suppliers**: 64%
- **Purchase supplies/equipment**: 55%

Source: Office of Economic and Regional Development (2002).

### Figure 8. Percentage of Reported Internet Connections by Type

- **Dial-up**: 81.7%
- **Cable Modem**: 6.6%
- **DSL**: 4.7%
- **Wireless**: 1.2%
- **Don’t know**: 6.8%

Source: Office of Economic and Regional Development (2002).

### Figure 9. If the following services were available online, would you consider regularly using them?

- **Purchasing groceries**: 14%
- **Paying property taxes**: 22%
- **Purchasing city licenses**: 28%
- **None of the above**: 62%

Source: Office of Economic and Regional Development (2002).

### Figure 10. Income, Computers, and Connectedness

- **<$25K**: 27%
- **$25K-40K**: 48%
- **$40K-50K**: 64%
- **$50K-75K**: 72%
- **>$75K**: 84%

Source: Office of Economic and Regional Development (2002).

### Willingness to Pay.

Of household dial-up respondents, 82 percent indicated they are not interested in upgrading or would not be willing to pay more than $40 per month to upgrade to a high-speed connection. Of the small business respondents, 72 percent said they are not interested or would not pay more than $40 per month to upgrade. As a measure of demand, these response patterns would indicate small businesses have slightly stronger reasons to upgrade their Internet connections than households (Figure 11).
Satisfaction with Connections. An indicator that demand for high-speed Internet technology is slightly stronger among rural Illinois small businesses than households lies in reported satisfaction rates. Compared to dial-up household respondents, dial-up small businesses are less satisfied (56% satisfied) than household respondents (65% satisfied), and small businesses with a high-speed connection showed a higher rate of satisfaction (89%) than the household respondents (82%) (Figure 12). Among dial-up respondents, 35 percent of households and 42 percent of small businesses reported they were not satisfied with the speed of their dial-up service.

Another factor that may affect weak demand is a lack of exposure to the advantages of a high-speed connection. Of the household respondents who said they were satisfied with their slower, dial-up connection, 40 percent said they had no experience with a high-speed Internet connection. In addition, 38 percent of dial-up small business respondents said they could purchase high-speed service but chose not to. Of those, 62 percent said they had never experienced a high-speed Internet connection.

Approaches to Access and Demand Issues

Considering the moderate enthusiasm level of the rural Illinois market, what can policymakers, telecommunications providers, and rural communities do to ensure that all rural citizens have access to the opportunities created by high-speed Internet technology? Although the FCC has recommended letting market forces dictate deployment, there are many nonmarket initiatives aimed at providing computer and Internet technology to remote and low-income populations.

The Community Connect Broadband Grant Program. In 2002, the Community Connect Broadband Grant Program made $20 million in grants available to rural, economically challenged communities to provide broadband transmission service where such service does not currently exist. Grant funds may be utilized to deploy service to critical community facilities, rural residents, and rural businesses and to construct, acquire, or expand; equip; and operate a community center that provides free access to broadband services to community residents for at least two years. Grants will be awarded to entities serving communities of up to 20,000 inhabitants to ensure that rural consumers enjoy the same quality and range of telecommunications service as are available in urban and suburban communities (USDA Rural Utility Service 2002).

Illinois Century Network. The Illinois Century Network (2002) is a telecommunications backbone providing high-speed access to data, video, and audio communication in Illinois schools and libraries, at colleges and universities, to public libraries and museums, and for local government and state agencies. More than 5,500 sites are now connected across Illinois, regardless of location. In communities where standard LEC service does not exist, or would be too expensive, the Illinois Century Network utilizes lower cost alternatives, such as cable modem, wireless, and dark fiber (For more information, see the Illinois Century Network’s website: <http://illinois.net>.)

Community Readiness Inventories. Assessment tools are available for communities to use in determining their telecommunications needs, their readiness for telecommunications investment, and for developing a telecommunications plan. These tools provide guidelines for communities to gather and document the information they need to attract investors and/or apply for funding.
to upgrade their information technology infrastructure. Examples of two free tools available online include the Computer Systems Policy Project (CSPP) (1998) and the Telecommunications Readiness Inventory (University of Illinois Community and Economic Development 2002).

The Illinois Community Technology Fund. The Illinois Community Technology Fund (2000) was designed to ensure that citizens in rural communities and low-income areas of Illinois have access to advanced telecommunication technology. In 2002, the Illinois Community Technology Fund issued a three-year grant to create a network of community technology centers (CTC) in Illinois, including rural Illinois. CTCs are places where people can use computer and Internet technology to get information, services, and training. They are situated in small and large nonprofit, public agency, after-school, library, and faith-based settings. To learn more about CTCs, see the CTCNet website at <www.ctcnet.org>. For more information about the grant program, see Midwest Technology Access Group, Inc. (2002).

Neighborhood Networks. Neighborhood Networks is a community-based initiative created by the U.S. Department of Housing and Urban Development (HUD) (2002). Through innovative private/public partnerships, Neighborhood Networks establishes multi-service CTCs that bring digital opportunities and lifelong learning to residents of public and assisted housing. There are more than 640 Neighborhood Networks centers operating in HUD’s multifamily housing properties. Hundreds of additional CTCs operate under other HUD programs. For more information, see HUD’s website: <www.hud.gov/offices/hsg/mfh/nnw/nnwindex.cfm>.

The Illinois Department of Commerce and Community Affairs (DCCA) Eliminate the Digital Divide Grant Program. The goal of the Eliminate the Digital Divide program (Illinois DCCA 2003) is to increase access to computers and telecommunications technology (e.g., the Internet) for residents in low-income areas, thereby helping ensure that they have an equal opportunity to benefit from technologies and compete for technology-related employment. The program subsidizes CTCs in communities where 40 percent or more of the students are eligible for the federal school lunch program. Libraries, park districts, local and state educational agencies, institutions of higher education, and other public and private agencies and organizations are eligible to apply. For more information, visit DCCA’s technology programs Web page at <www.illinoisbiz.biz/tech/tech_eliminate.html>.

Technology Opportunities Program. The Department of Commerce’s Technology Opportunities Program (TOP) (2002) promotes the widespread availability and use of digital network technologies in the public and nonprofit sectors. As part of DCCA’s National Telecommunications and Information Administration (NTIA), TOP gives grants for model projects, which demonstrate innovative uses of network technologies. TOP evaluates and actively shares the lessons learned from these projects to ensure that the benefits are broadly distributed across the country, especially in rural and underserved communities. TOP makes matching grants to tribal, local, and state governments; health care providers; schools; libraries; police departments; and community-based nonprofit organizations. For more information, see the NTIA website: <www.ntia.doc.gov/otiahome/top/grants/search.htm>.

The Beaumont Foundation of America. The Beaumont Foundation of America (2003) grants Toshiba brand equipment to support digital inclusion for underserved individuals. The foundation has three distinct grant programs:

1. Community grants of computer equipment to community-based organizations
2. Education grants of computer equipment for schools
3. Individual grants of computer equipment directly to individuals

In 2003, the foundation will award grants in 21 states and the District of Columbia, and grants will be awarded in the remaining 29 states in 2004. Additional grants will be available in subsequent years. For more information, see the Beaumont Foundation website: <www.bmtfoundation.com>.

References


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