How Rural Minnesota Communities Access and Use Broadband: Minnesota Rural Intelligent Communities Baseline Report

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Introduction

Looking back several years from now, it may turn out that 2010 will be noted as a turning point for broadband deployment, adoption and utilization throughout rural Minnesota. Due to the passage of the federal American Recovery and Reinvestment Act (ARRA), more than $7 billion dollars were appropriated nationwide to support the deployment, access and adoption of broadband technology; much of it targeted toward rural America. It is a level of technology investment that can best be described as unprecedented; and to date here in Minnesota, municipalities, counties, nonprofit organizations and state agencies have been working together with local and regional broadband providers to secure more than $400 million of these funds.

While a majority of these investments are targeted for the deployment of last mile and middle mile fiber infrastructure, several of the funded projects are oriented toward increasing the access, use and adoption of broadband technology. One such project administered by Blandin Foundation is titled Minnesota Rural Intelligent Communities (MIRC). MIRC is $6.3 million project comprised of more than 19 statewide partners and 11 demonstration communities throughout rural Minnesota. Over the next 30 months the goal of the project is to help create technologically and economically-vital rural communities, competing and thriving in the broadband economy, with sustainable broadband adoption, job growth, and wealth creation.

The strategies to achieve this goal will draw on Intelligent Community Indicators and an array of broadband demand development approaches including education, training, technical assistance and barrier removal. Targeted populations are rural Minnesota residents who are unemployed and seeking employment, small main street businesses that have not yet adopted modern Internet-based technologies, county governments working together to implement technology plans, as well as 11 "demonstration communities" where local leadership has recognized broadband as a critical infrastructure in the global economy.

Specifically, the MIRC project will:

- Enhance public access at state workforce centers with increased access to training and new online learning opportunities
- Generate a sustainable community response for helping businesses use the Internet more effectively.
- Deliver e-entrepreneurship / training and technical support to small businesses in critical industries for rural Minnesota
- Support community broadband initiatives in community technology planning; reducing the 'digital divide'; and creating a 'culture of use'
- Support communities and critical institutions in the promotion and implementation of high-value broadband applications in health care, education, government and business

As part of the overall reporting and evaluation strategy, MIRC partners collaborated with the EDA Center at the University of Minnesota, Crookston to conduct the project's evaluation over its lifespan. Given that a central goal of MIRC is to increase the adoption of broadband technology throughout rural Minnesota, a key measure in its evaluation is the observed growth in broadband subscriptions throughout rural Minnesota. To accomplish that goal we conducted this baseline study of broadband adoption both statewide, as well as in the 11 demonstration communities identified in the project. This will be the baseline from which broadband growth is observed.

Methodology

Data for the statewide study was conducted through telephone interviews among 911 households across rural Minnesota. The sample was stratified based upon degree of rurality, categorizing rural counties as being (1) adjacent to a metro county; (2) non-adjacent; or (3) remote rural. The data were collected by the St. Peter-based Center for Rural Policy & Development from May through July 2010. The statistical margin of error is + 4 percent. And lastly, given the recent interest in understanding the impact of excluding "cell phone only" users from telephone polling, it is noteworthy to mention that all calls made as a part of this survey were made to landline telephone numbers (more about this later).

Data for the demonstration communities were also gathered through telephone interviewing, with each demonstration community being treated as a separate sample with an "N" of at least 300. As noted on the map below, some of these communities are actual municipalities (e.g., Windom, Winona, Worthington and Thief River Falls), while others are entire counties. Also counted as a "demonstration community" are other geographies such as the 5-county Upper Minnesota Valley Regional Development Commission Service area in the west central region, or the Leech Lake Band of Ojibwe Reservation in North Central Minnesota. Due to the lack of uniformity in population or geography among the demonstration areas, the sample sizes varied somewhat with an average margin of error of 5.6 percent. The data were collected by the Center for Small Towns at the University of Minnesota, Morris from May 2010 through July 2010; and similar to the statewide survey, cell phone only users were excluded from these efforts as well.

The data were analyzed using standard, off-the-shelf statistical software; and due to the strong correlation between age and technology adoption, the data was age-adjusted to reflect the population composition of rural Minnesota as defined by the United States Bureau of the Census.

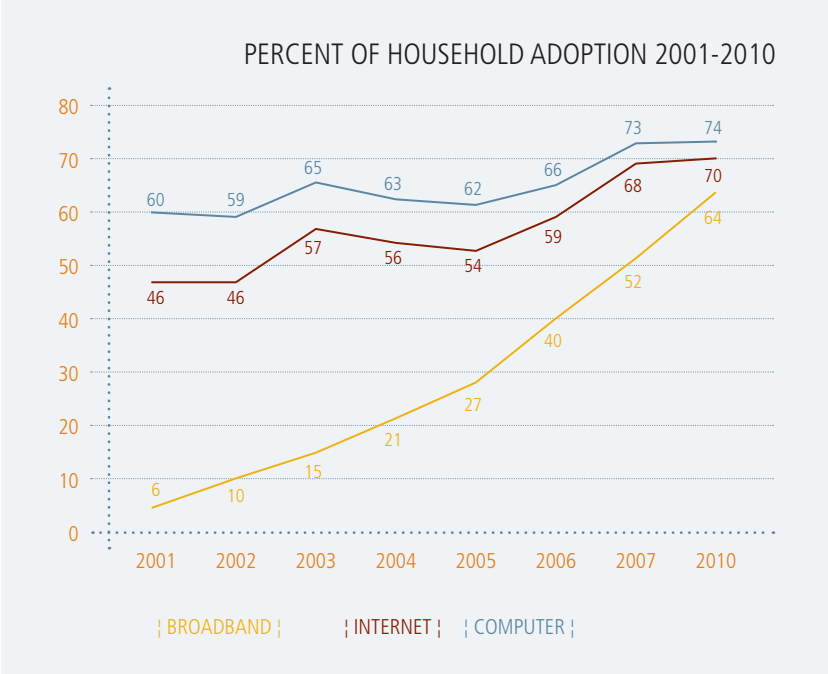
MAP OF THE MIRC DEMONSTRATION COMMUNITIES

Baseline Findings

The three key parameters measured to establish a broadband baseline across rural Minnesota are: (1) Home ownership of a working computer; (2) Internet connectivity in the household; and (3) Purchase of a broadband subscription. Fortunately, these three key measures have been regularly assessed since 2001 by the Center for Rural Policy and Development. Accordingly, the 2010 data collected helps not only establish a baseline for the MIRC project, but also helps us understand the important statewide trends for these key measures across all of rural Minnesota.

The chart below provides the estimated rates for computer ownership, Internet connectivity and broadband adoption from 2001-2010. As one can see, the blue line, which represents the adoption of computers in the home, shows virtually no substantive growth since 2007; suggesting a plateau in the adoption curve, leaving approximately one in four rural households without a working computer. This is a significant problem, as the home computer is still the primary appliance by which rural residents connect to the Internet.

The second red line represents the adoption curve for Internet connectivity in rural Minnesota households. Not surprisingly, it nicely parallels the adoption curve for computer ownership. However, if one looks close they can see that in 2001 76 percent of home computers were connected to the Internet, but now in 2010, 95 percent of all home computers are connected to the Internet. Clearly, while there are a wide variety of reasons why rural residents purchase a home computer, in 2010 connecting to the Internet is undoubtedly one of them.



The third green line represents the adoption curve for broadband adoption, and here you can see the dramatic growth trend since 2001. Today, 64 percent of all rural households have a broadband connection while 6 percent still maintain a dial-up Internet connection. Ironically in 2001 only 6 percent of rural households had a broadband connection and now a decade later that same percent are still maintaining a dial-up connection.

As in all parts of the U.S. there are a variety of reasons for this dramatic growth in broadband; however one of the primary reasons lies with the deployment patterns among rural cable and telephone providers. Unlike other parts of the country that are disproportionately dependent upon large national cable and telephone carriers, Minnesota has a multitude of smaller private, public and cooperative providers. Further, many of these smaller "home grown" companies actually deployed broadband technology to their rural customers before some of the larger national carriers

deployed similar technology to more populated suburban and exurban areas. Other reasons for the strong adoption rate includes the price competitiveness of the product as providers rushed to bundle their broadband services with video and voice products; the movement by commercial and governmental concerns to push more services online; and the strong advocacy and policy positions on broadband by local, regional and state groups and foundations.

However, it also must be cautioned that due to the stagnant growth of home computers throughout rural Minnesota, it is clear that we will soon see a dramatic slowing of broadband growth as we reach full adoption among all those residents that maintain a home computer. Unfortunately, this may still leave one in four rural households completely "offline."

The Demonstration Communities

The table below compares the baseline rates for the 11 MIRC communities to the statewide rates noted above.

ADOPTION PATTERNS IN MIRC DEMONSTRATION COMMUNITIES

COMMUNITY	COMPUTER OWNERSHIP	INTERNET CONNECTIVITY	BROADBAND ADOPTION	DIAL-UP ADOPTION
Benton County	74.2%	70.6%	66.3%	4.3%
Cook County	83.3%	74.8%	50.2%	24.6%
Itasca County	72.9%	68.2%	63.3%	4.9%
Kandiyohi County	74.0%	66.5%	64.0%	2.5%
Leech Lake Band	66.9%	57.4%	48.8%	8.6%
Stevens County	73.9%	68.1%	64.4%	3.7%
Thief River Falls	71.1%	67.0%	59.4%	7.6%
Windom	69.8%	66.4%	62.7%	3.7%
Winona	80.2%	76.0%	69.2%	6.8%
Worthington	61.3%	56.0%	53.9%	2.1%
Upper MN Valley	67.5%	60.2%	57.6%	2.6%
Rural MN Statewide	74.3%	70%	64%	6%

As one can see, the adoption patterns in the demonstration communities track closely to the statewide averages for rural Minnesota; however, there clearly are some deviations that are noteworthy. First, it appears that the areas in southwest Minnesota (Windom, Worthington & Upper MN Valley) have somewhat lower adoption rates than other areas of rural Minnesota. Second, the remarkably high percentage of dial-up connections in Cook County suggests that this is a region with unique broadband access problems. And finally, it should be noted that the community of Winona, being a somewhat larger community with multiple universities, likely has a profile more similar to a metro community than a rural community.

INTERNET CONNECTION TYPE

The graph on the left documents how rural Minnesota residents who are online actually connect to the Internet. Here we see that DSL technology maintains a greater market share over cable modem connections in rural areas. This may likely be due to the geographic reach of DSL into the rural countryside, whereas cable connections typically end at or near the municipal boundaries. Further, notice that 8.7% of those households online still maintain a dial-up connection, and 13.6 percent report connecting through a fixed wireless, satellite, or some other technology.

WHY DIAL-UP USERS HAVE NOT SWITCHED

Dial-up users were also specifically asked why they have yet to switch to a broadband connection. And as you can see from the graph on the right the overwhelming response was that broadband is still too expensive (61%). Slightly over 20 percent reported that broadband was simply not available where they lived, while 15 percent reported that they simply did not connect to the Internet often enough to justify the added expense of a broadband connection. Also interesting is that only 3.5 percent of current dial-up users reported the reason why they have not purchased a home broadband connection is due to their use of a broadband connection elsewhere, such as at work, at the public library, or at a friend's or relative's house. Such a low percentage suggests that these dial-up users are not accommodating broadband into other facets of their life and are not likely to switch without an external environmental change, e.g., a significant price reduction or a broadband deployment into regions that are currently unserved. Previous research by the Center for Rural Policy and Development and the Pew Center for the Internet and American Life has consistently documented strong correlations between the demographic and socio-economic variables of Age and Income with technology adoption. Specifically, these past studies have identified that elderly residents, along with those who are of lower-incomes are significantly less likely to adopt and utilize digital technologies than younger or more affluent cohorts.

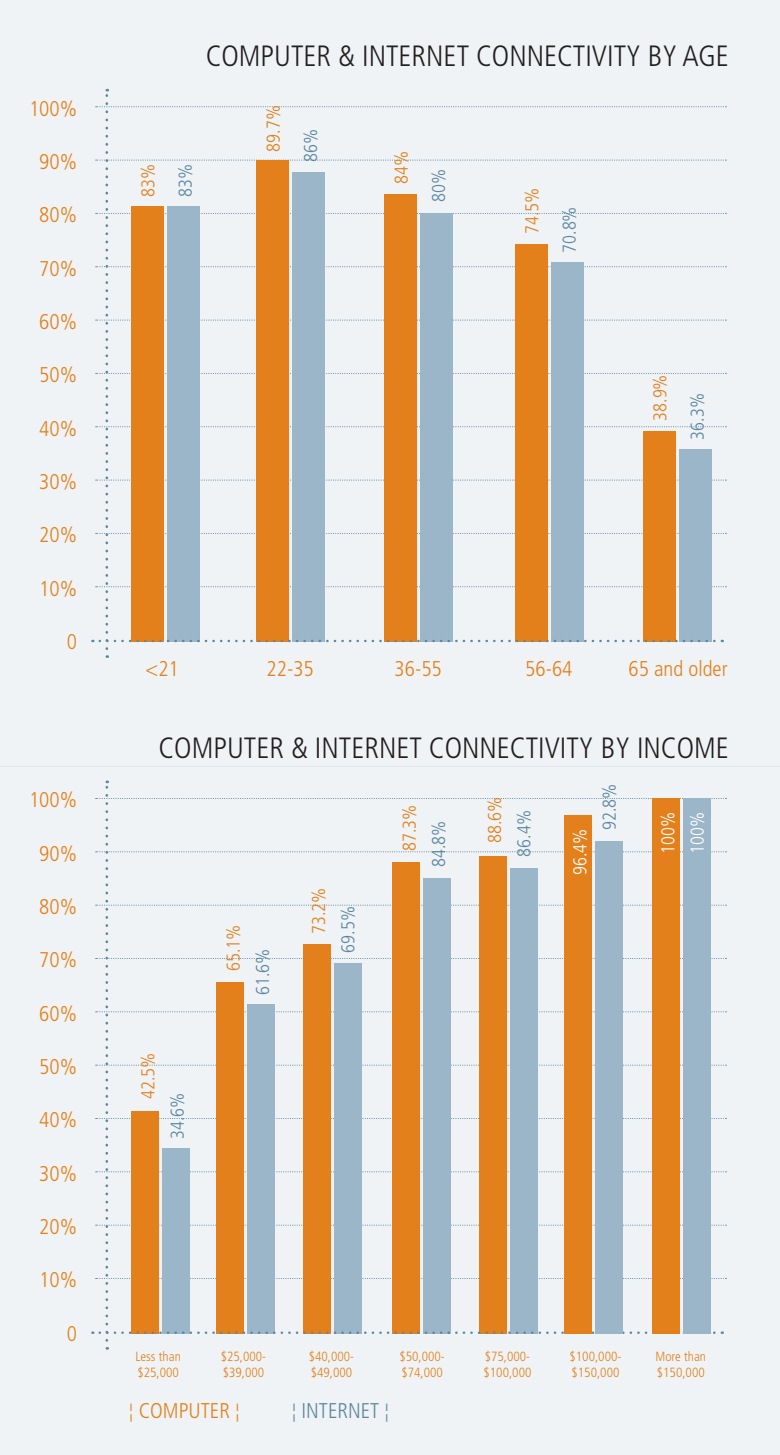
The following graphs examine the relationship between Age and Income in this regard.

As one can see on the chart on top of the next page, the relationship between Age and technology adoption is both obvious and inverse (i.e., higher levels of age lead to lower levels of adoption). Similar to what was observed in past studies, here we see that the adoption rate for those who report their age to be 65 or older tend to adopt these technologies at a rate that is barely one-half of the rate reported by all other age cohorts, with the exception of those 56-64 years of age. While past studies have also suggested that such correlations are also found in more metropolitan regions, the reality is that in many rural Minnesota communities, elderly residents comprise a disproportionately high percentage of the population. This of course, leads to creating a drag on rural Minnesota adoption rates and creates a

significant barrier to further gains in adoption.

On the other hand the chart at the bottom examines the strong positive correlation between Income and Adoption, where we see that higher levels of income lead to higher levels of technology adoption. Specifically, we see those respondents who reported a household income of at least $50,000 were twice as likely to report having a computer in their home, or having it connected to the Internet than those reporting incomes of $25,000 or less.

Such a strong relationship is further confirmed when we conducted a review of all respondents who reported that they did not maintain a working computer in their home. First we found that almost half of such respondents (46.4%) report having an income of less than $25,000; and 72 percent report having a household income of under $40,000. But second is the strong correlation between age and Income among rural Minnesotans, where 64.2 percent of respondents who report having a household income of less than $25,000 are also age 65 or older. This "double whammy" of older age and lower income creates a barrier to technology adoption that may not easily be overcome.



A Closer Look at the Digitally Distant

As noted earlier, the primary goal of MIRC is to increase the adoption and utilization of broadband technology throughout rural Minnesota. And while the current adoption rates are impressive compared to rural areas in other states, it is clear that the growth is slowing as broadband adoption inches closer to the rate of overall computer adoption. Accordingly, the ability to significantly increase broadband growth will lie in the ability to reach those rural residents who are currently the most digitally distant.

Everett Rogers, in his 1962 book titled Diffusion of Innovations called those who were the last and most difficult holdouts to adopt a new technology "Laggards." The term is certainly not meant to be derogatory, but rather reflective of those who often choose to never adopt the technology, or would only adopt it with significant assistance or structural change. Rogers suggests that "the point of reference for the laggard is the past." Accordingly, "the resistance to innovations on the part of the laggard may be entirely rational from the laggards' point of view as their resources are limited and so they must be relatively certain that a new idea will not fail before they can afford to adopt it." With that in mind, this brief section examines the characteristics of those respondents who are the most digitally distant.

As discussed earlier, the primary reason why these respondents reported that they did not have a computer in their home was simply that they did not need one (43.4%). Approximately 10 percent elaborated, saying that they did not know how to use a computer; 8 percent reported that computers were too expensive; 22 percent reported that they were too old for a computer; and 7 percent noted that they had access to a computer elsewhere. Of that group 4.8 percent noted that they had used a computer before at the library. But with the exception of this very small latter group, this appears to be a population of non-adopters.

An interesting discussion has more recently emerged among those who study technology adoption around the idea that access to the Internet is becoming less and less dependent upon the computer. Specifically, some have suggested that similar to trends in Asia and Europe, new cellular "smartphones" are becoming a common way to digitally connect without the use of a bulky computer. Accordingly, this digitally distant group was asked if they owned a cell phone; and surprisingly, 55.3 percent of these non-adopters reported that indeed they did.

This discovery led to a variety of other questions regarding the use of their cellular device. Specifically, it was found that only 6.4 percent of non-adopters ever sent a text message with their cell phone; only 1 percent ever sent or received an email; and only 1 percent ever connected to the Internet with their cell phone. As a result it is reasonable to conclude that the rural residents who have failed to maintain a computer in their home are not displacing the computer with their smartphones to connect to the Internet.

Demographically, as noted earlier, almost 70 percent of non-adopters report being 65 years of age or older; 91 percent of them live in a household of 2 or fewer people; 94 percent report having no school-age children living in their household; and 46 percent report a household income under $25,000.

Clearly, the strategy of simply waiting for this group to adopt digital technology assuming that they are simply late adopters has many flaws. Accordingly, MIRC is designed to work both statewide with media campaigns and public information, as well as on the ground, with extensive training and technical assistance to both rural residents and businesses. The baseline findings from this study seem to suggest that this strategy is sound.

Observations and Conclusions

The purpose of this MIRC study was to establish a baseline for technology and broadband adoption for rural Minnesota, and specifically for the 11 MIRC demonstration communities. As the statewide study allowed us to analyze the data within a multi-year framework dating back to 2001, it is instructive to see the overall growth in broadband technology. Starting from a low of 6 percent of all rural households to today's adoption rate of 64 percent, it is clear to say that broadband is now the predominant method by which rural Minnesotans connect to the Internet. Subsequently, within Rogers' framework of technology adoption, the time for innovators and early adopters has passed; and with a current rate of 64 percent we are moving into the stage for late adopters. Simply put, broadband today is a rather mainstream technology.

While it was not too long ago that availability of broadband was a primary concern, today access to a broadband service provider in rural Minnesota is more available than ever. Data from this baseline study suggests that while approximately 15 percent of respondents report having only one or no broadband providers locally, approximately half of all respondents report having at least two local broadband providers. Such findings are further verified by Connect MinnesotaSM , whose GIS mapping of broadband suggests that only 6 percent of Minnesota homes have no access to a single broadband provider. So while it is reasonable to conclude that competition among providers is limited in rural Minnesota, it is increasing.

Data from the 11 demonstration communities generally fall in line with the findings from the statewide study throughout rural Minnesota with a few exceptions. Most notable was the paradox of reporting a higher than average adoption of home computers and a significantly higher reliance on a dial-up connections in Cook County, MN. We interpret this finding to mean that this is an area of the state where due to the unique geography and topography of the county, availability of broadband is a particular challenge (further complicated by the fact that many residents are seasonal). However, it is pleasing to note that recently it has been announced that Cook County has been awarded funding through the ARRA to construct a fiber-to-the-premise network throughout the county.

Another demonstration community of particular note is the Leech Lake Band of Ojibwe. Due to the higher than average rates of poverty in the community, the rate of landline telephone adoption cannot be assumed to be equal to all of the other demonstration communities. And as a result, collecting data from only those with landline phones suggest that we are only reaching residents who are less likely to be in poverty. In fact, during the data collection, we exhausted all working telephone numbers assigned to Leech Lake members. Accordingly, the sample size is approximately half in size of the other communities (140), and due to the socio-economic influence on the adoption of landline phones, we do not have as much confidence in the findings in this community as we have in the others.

In spite of these unique challenges and circumstances, it is fair to conclude that overall, the data from the demonstration communities appears to verify the findings from the statewide study and the statewide study reciprocally verifies the community data. Further, the data provides us with a good baseline to track the future growth in the adoption of home computers, Internet connectivity and broadband subscriptions.

The baseline data also suggests that due to the demographic and socio-economic characteristics of many rural communities (and especially the more remote rural communities), the challenges to initiate further significant growth in broadband subscriptions will be substantial. First as noted above, with 64 percent of all rural households already adopting broadband, rural Minnesota is already moving into the secondary or tertiary stages of the adoption curve.

This by itself suggests further growth of this technology will be slowed as the remaining numbers to adopt get smaller and smaller. Second, there are unique challenges in targeting adoption strategies to a population that is disproportionately older and poorer. Yet many of those remaining non-adopters in rural Minnesota are increasingly found with these characteristics.

On the other hand, there are several factors, both internal and external to MIRC that will clearly help in this regard. First is the significant investment that is being made with the ARRA funds across rural Minnesota. Whether it is an infrastructure project that will soon begin to deploy fiber in the ground, or the activities of all the MIRC partners across the state; such activity creates visibility, attention in the local media and provides local residents an opportunity to once again put broadband awareness back on the "front burner" in their respective communities. Second, with a specific focus on older citizens, the unemployed, training, access and hands on technical assistance, the MIRC activities themselves appear to be targeting the needs of these remaining non-adopters. And lastly, as advances in tele-health applications, e-commerce, e-learning and e-government applications continue to emerge, the current population of "laggards" (Rogers, 1962) will increasingly find relevance and advantage in these innovations. And as Rogers suggests, once these residents interpret the advantages to an innovation to be significant, the probability of adoption increases.

Equally important, as noted at the beginning of this report one of the most significant barriers to broadband adoption in many rural areas is actually the adoption of home computers. For many reasons the adoption rate of computers will create a ceiling and barrier to broadband growth. The inclusion of strategies to increase the growth in home computer ownership will be a key factor in advancing broadband growth strategies. Subsequently, it is noteworthy to mention that the inclusion of PCs for People as one of the MIRC partners, whose specific strategy is to target lower-income residents and provide them with a refurbished computer and sufficient training to become both broadband adopters and full participants in the digital age.

Over the next 24 months the MIRC partners, as well as residents of the 11 demonstration communities will be engaged in a substantial effort to educate, train, promote and assist rural residents and small businesses in their adoption and enhanced utilization of broadband technology. As noted above, this initial research effort was designed to establish a baseline from which growth can be tracked. Over the project's timeframe, we will issue periodic reports of progress, as well as a final report in 2012 evaluating the project's results.

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