



2002 Rural Minnesota Internet Study

Examining the telecommunications needs of Greater Minnesota companies

When rural economic development professionals seek to diversify their local economies they often look toward the manufacturing sector. And why not? According to the U.S. Bureau of Economic Analysis, in the year 2000 manufacturing jobs outside the seven-county metro area numbered 191,113, an increase of 25 percent since 1990. What makes this growth in rural manufacturing so significant is that over the same period of time, manufacturing jobs increased in the metro area only a paltry 1.7 percent. Clearly, manufacturing firms have been looking toward rural Minnesota as a place to grow their business.

But the story doesn't end there. Today, sales from manufacturing outside the metro area total more than \$7 billion annually. And this growth in rural manufacturing is reflected in the higher-than-average income it provides. In the year 2000, non-farm earnings in Minnesota averaged \$35,436 statewide; outside the seven-county metro area that figure was only \$26,894, approximately 24 percent lower. However, earnings for manufacturing jobs outside the metro averaged \$36,587, approximately 3 percent higher than the state average and 36 percent higher than non-manufacturing jobs outside the metro. Is it any wonder that the manufacturing sector is becoming a key component of the rural economy?

Today, manufacturing firms find themselves part of a large and dynamic global market, and a market that is going increasingly digital. A growing number of firms are both purchasing their inputs and selling to their customers through telecommunications technology. It is for that reason that rural policymakers and other officials are particularly concerned about the availability and access to advanced telecommunications in rural Minnesota. Clearly, the adoption and diffusion of broadband and other advanced telecommunications services is viewed as an economic development or business recruitment and retention issue, as many are concerned that manufacturing and other rural businesses could be significantly disadvantaged if the rural telecommunications infrastructure is lacking.

A PDF of this report can be downloaded from the Center web site www.ruralmn.org

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Conducting the survey

To better understand these issues from the perspective of these rural businesses, Minnesota Technology Inc. conducted a survey of randomly selected rural manufacturing and technology-based firms in February 2002. MTI compiled a list of over 900 firms located in rural Minnesota communities with populations under 10,000; from this list over 300 of these firms were randomly selected to be surveyed by telephone by Information Specialists Group of Eden Prairie, Minn.

The survey response rate among these businesses was outstanding, at 98 percent. Interviewers were asked to seek out that individual in the business who was most responsible for technology purchasing and coordination. Not surprisingly, given the size of most rural businesses, 29 percent of the interviews were conducted with the president or CEO of the company. Others interviewed included the general manager (19%), vice president (8%), controller (6%), IT manager (6%), or employees with other titles. Finally, 58 percent of the respondents were male and 42 percent were female.

Characteristics of the Companies in the Sample

Figures 1-5 document the overall characteristics and locations of the firms in the study. Figure 1 shows that almost half (45%) of the firms are located in the central region of Minnesota, with slightly more than a third (35%) located in the southern region. Slightly less than one in five (19%) firms interviewed was located in northern Minnesota. Further, the overwhelming majority of the firms in the study were located in communities with populations under 5,000 (Figure 2). Slightly more than three out of four firms in the study were located in such communities.

Figure 1: Regional locations of companies

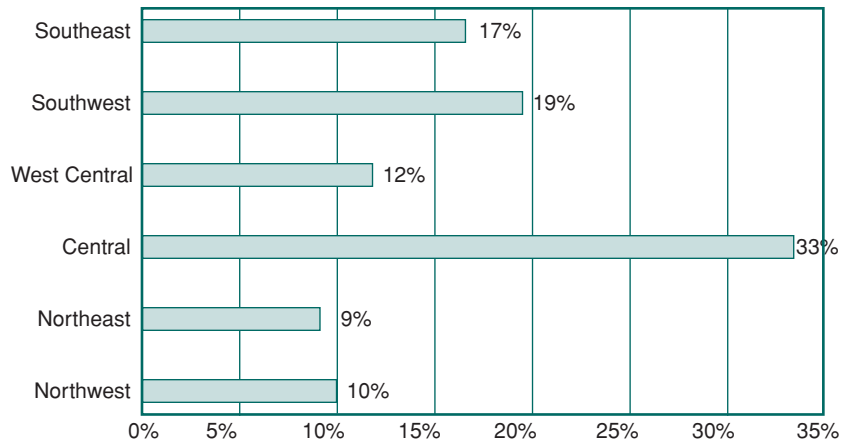
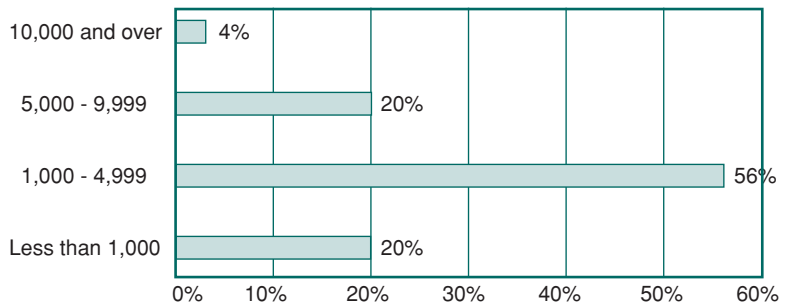


Figure 2: Distribution of companies by city size



Firms were also queried about their size, which was measured by both the number of employees, as well as by gross annual sales. The bulk of the firms, 77 percent, have annual sales under \$5 million, while 23 percent have annual sales over \$5 million (Figure 3). Figure 4 shows over half the firms (56%) reported having between 10 and 49 employees, while 20 percent employ fewer than 10 workers.

Figure 3: Size of company by annual sales

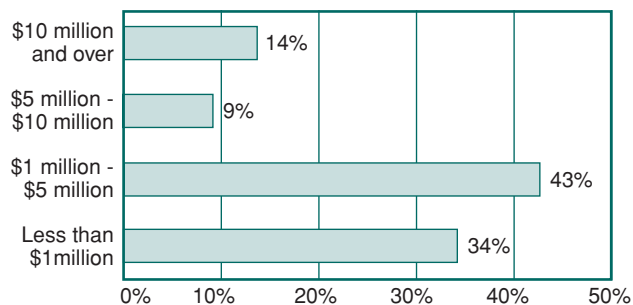
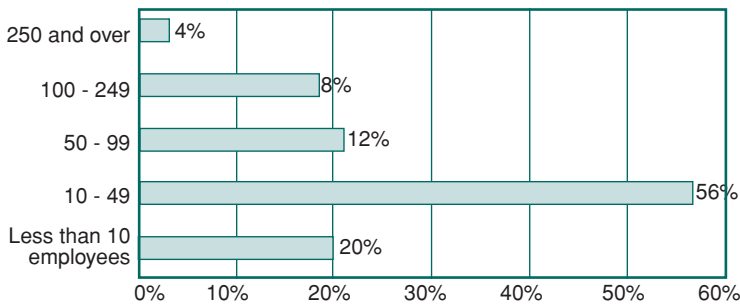
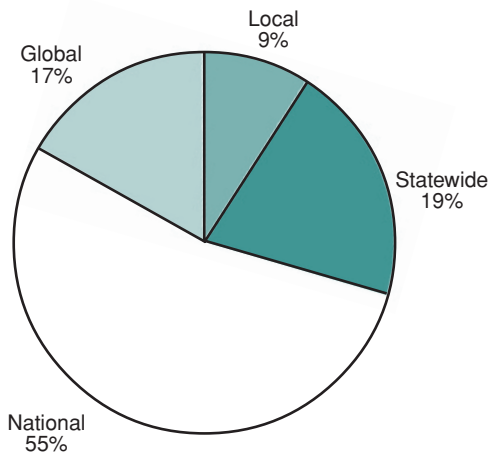


Figure 4: Size of company by number of employees



Lastly, firms were asked to describe their primary market area, i.e., whether they sell and distribute their goods and services mostly to a local market, statewide, nationally or globally (Figure 5). More than half of the companies responded that their primary market area is nationwide, while slightly less than 30 percent reported that their market area lies within Minnesota’s borders, with the remainder (17%) reporting that they participate in a global market.

Figure 5: Primary market area



Utilization of Telecommunication Applications

Companies in this study were asked to report what types of telecommunication applications they use in their business (Tables 1 and 2). Not surprisingly, an overwhelming majority of the companies surveyed (93%) reported that they currently have an Internet connection and use e-mail communications in their business. Further, 73 percent of the companies also reported that they have and maintain a company web site. And a surprising 28 percent of these companies reported that they are actively engaged in purchasing or selling products through e-commerce applications.

When asked about other telecommunication applica-

tions, 13 percent reported that they currently use distance learning and customized training via telecommunications. Finally, 4 percent of companies reported that they currently engage in regular video teleconferencing in their business.

Table 1: Percent of companies currently using these applications

Internet	93%
E-mail	93%
Company web site	73%
E-commerce	28%
Customized training/ Distance learning	13%
Video teleconferencing	4%

Decisions regarding telecommunications needs for manufacturing firms are often directly tied to their design and data transfer needs. Accordingly, these firms were queried regarding the types of data that they regularly transfer via telecommunications (Table 2).

Table 2: Types of files regularly transferred electronically

Text files	80%
Data files	74%
Graphics files	71%
CAD/CAM/Multimedia files	53%
Full-motion video files	9%
Don't know/refused	10%

Not surprisingly, a very large majority of the companies (80%) reported that they regularly transfer text files, which can consist of letters and memos, invoices, drafts of reports, etc. However, a large number of companies also reported regularly transferring data files and graphics files. Further, more than half of the companies (53%) reported transferring computer-aided design (CAD)/computer-aided manufacturing (CAM) and/or multimedia files. These files are usually quite large and can take some time to transfer using dial-up Internet connections. Lastly, 9 percent of the companies reported regularly transferring full motion video files.

Tables 1 and 2 suggest that rural manufacturing and technology-based companies use a wide variety of applications in their daily business. Some of these applications, such as e-mail and text file transfers, would not generally require high-speed telecommunication connections. On the other hand, a larger-than-expected number of companies reported using e-commerce applica-

tions, distance learning and video conferencing applications, as well as regularly transferring CAD/CAM files and even full-motion video files. Clearly, the telecommunications infrastructure needs for these applications should be much greater.

Utilization of the Telecommunications Infrastructure

As mentioned earlier, 93 percent of all the companies surveyed reported having Internet services for use in their business. It was important, however, to learn what type of telecommunications connections they actually use and how they receive these services.

When asked what type of infrastructure they use to access their Internet service, 47 percent of the respondents reported using a dial-up connection, while 42 percent reported using some type of broadband connection. The remainder either did not know or did not have an Internet connection. When asked what type of broadband connection they use, a majority reported either using a digital subscriber line (DSL) or a T-1 line. The remainder of broadband users reported using a cable modem or some type of wireless broadband connection (including satellite).

Table 3: Current Internet service used

Dial-up	47%
DSL	21%
T-1 line	12%
Cable modem	4%
Wireless/satellite	5%
ISDN	2%
Other	1%
Don't know/refused	8%

Table 4 documents the responses from the companies when asked what connection speed their Internet service provided. Of greatest note is the fact that almost one-third of the respondents did not know the speed of their Internet connection and another 41 percent reported speeds that did not approach being classified as broadband (i.e., faster than 200kps). The remainder reported connection speeds that ranged from 256kps to 1MBps.

These firms were also asked whether there were competitive telecommunications providers to choose from to meet their needs. Overall, 75 percent of the respondents reported that they do have a choice of

providers. To explore this issue further, the responses were grouped based upon whether they reported to be dial-up users or broadband users, as well as in what region of the state they were located. Table 5 shows that both broadband users and dial-up users reported similar percentages regarding competitors in the marketplace (76%). There was somewhat greater variation in responses across regions, where 70 percent of respondents from northern Minnesota reported having competitors to choose from, compared to 71 percent of respondents in central Minnesota and 81 percent in southern Minnesota.

Table 4. Current Internet connection speed

28.8kpbs	12%
56kpbs	29%
256kpbs	10%
512kpbs	8%
128kpbs	2%
384kpbs	1%
1 Mbps	5%
Other	1%
Don't know	32%

Finding that 47 percent of these businesses still used a dial-up connection begged the question of whether dial-up was used because it was preferred or because broadband was not available at a reasonable price. As DSL and T-1 lines were the most common broadband technologies used by the companies in the study, we partitioned the sample into two groups: those that use broadband and those that use dial-up. Businesses in both groups were then asked whether DSL and/or T-1 technologies were available to them at a reasonable price (Table 6).

Table 5: Companies reporting having a choice of providers for Internet service

	Broadband users	Dial-up users	Northern Minnesota	Central Minnesota	Southern Minnesota	Total
Yes	76%	76%	70%	71%	81%	75%
No	17%	20%	19%	21%	12%	17%
Don't know	7%	4%	11%	8%	7%	8%

As one can see, those companies that reported using broadband were more than twice as likely as dial-up users to report that both DSL and T-1 line technology were available to them at a reasonable price. This finding strongly suggests that cost and availability of broadband technology is not uniform across all of these businesses. It also raises the possibility that “reasonable cost” is at least one factor in why some firms are still using dial-up connections.

Table 6: Companies reporting availability of DSL and T-1 lines at a “reasonable cost,” by type of connection

	Broadband users	Dial-up users
DSL		
Yes	65%	28%
No	26%	51%
Don't know	11%	21%
T-1 Lines		
Yes	58%	24%
No	29%	55%
Don't know	13%	21%

We also examined which types of firms are more likely to report using broadband services as opposed to dial-up services for their Internet connections (Figures 5 and 6).

Figure 5: Type of Internet connection by size of sales

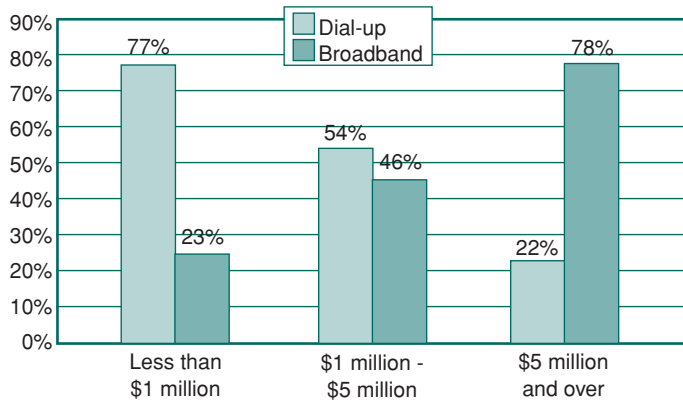
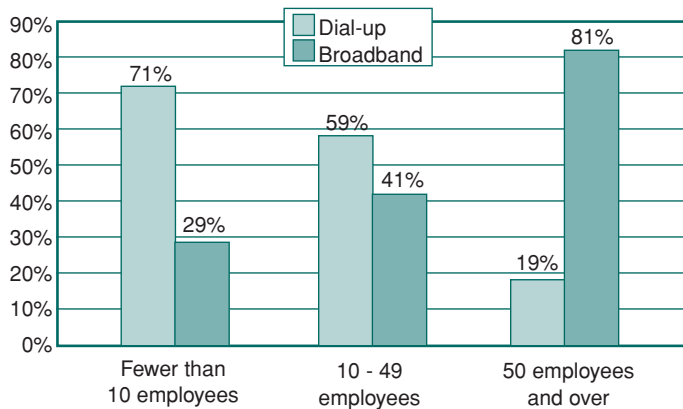


Figure 6: Type of Internet connection by number of employees

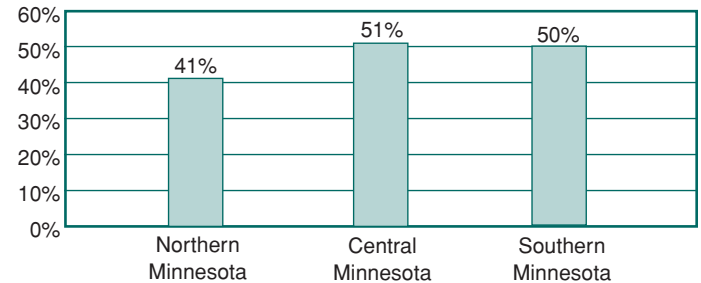


Both Figures 5 and 6 clearly document a relationship between the size of the firm and their likelihood to use a broadband connection. Among those firms that reported the type of connection they use, Figure 5 shows that 78 percent of companies with \$5 million or

more reported using a broadband connection, compared to 46 percent of firms with sales between \$1 million and \$5 million, and 23 percent of firms with sales under \$1 million. A similar correlation was found between broadband use and the number of employees. Figure 6 shows that 81 percent of firms with 50 or more employees reported having broadband service. By comparison, 41 percent of firms with 10 to 49 employees reported having broadband service, and only 29 percent of firms with fewer than 10 employees reported having a broadband connection.

Lastly, Figure 7 shows some modest variations in broadband use across different regions of the state. While 51 and 50 percent of firms in central and southern Minnesota report using broadband services, only 41 percent of firms in northern Minnesota reported the same.

Figure 7: Percent of companies reporting broadband use, by region



The findings presented in this section document several discernable trends. First, almost half of the firms, 47 percent, reported still using a dial-up connection instead of a broadband connection. This finding led us to explore whether those firms using a dial-up connection did so because broadband was unavailable to them at a reasonable price or they simply preferred a dial-up connection at this time. As the figures above show, those firms that reported using broadband were more than twice as likely to also report that broadband was available to their business at a reasonable price. This strongly suggests that those companies that are still using a dial-up connection may be doing so because of cost and lack of availability.

The findings also documented a strong correlation between company size and the use of broadband services. Clearly, those companies with a greater number of employees and larger gross sales were much more likely to report using broadband services. Finally, the data also suggests some modest variation

in broadband use across various regions of the state. Specifically, businesses in northern Minnesota consistently report a somewhat lower adoption of broadband services and a somewhat less competitive market for broadband than did businesses in central and southern Minnesota.

The Impact of Telecommunication Services on Business

Companies in the survey were also asked what kind of impact telecommunications technology, or the lack thereof, has on their businesses (Table 7). Slightly over half of the respondents reported that having telecommunications technology had an impact on some elements of their business. Specifically, slightly more than half of the respondents reported that their telecommunications infrastructure or lack of it has an impact on their cost of doing business, on productivity, or most importantly, on the ability to capitalize on potential business opportunities.

Table 7: Percent reporting that access to needed bandwidth has an impact on business

	Great impact	Some impact	No impact
Cost of doing business	9%	45%	43%
Productivity	8%	37%	54%
Inhibits or prevents capitalizing on potential business opportunities	8%	33%	57%
Expansion plans	6%	21%	71%

Respondents were also specifically asked about added expenses that their company might bear due to the inability to secure adequate bandwidth. These companies were asked if their costs for training and education, travel, and purchasing were significant higher due to their lack of bandwidth. Table 8 shows that more than 75 percent of the respondents did not believe their costs in these areas were greatly affected due to a lack of telecommunications services. However, approximately 20 percent of respondents reported that their expenses were impacted in this way.

Lastly, these companies were queried as to the barriers they face regarding the acquisition of telecommunications services (Table 9). Not surprisingly, the cost of service was cited as a barrier by 44 percent of the respondents, while service availability was cited by 42 percent of the respondents. In addition to these two factors, 38 percent of the

respondents reported that they experienced difficulty in obtaining service from their vendor even when the service was available.

Table 8: Percent reporting that lack of bandwidth has resulted in added travel and other costs

	High	Medium	Low
Travel for training and education	5%	19%	75%
Travel for collaborative work on projects	6%	15%	77%
Travel to meet vendors	4%	15%	80%
Couriers to pick up and deliver documents	5%	16%	77%
Ordering just-in-time inventory over the Internet	5%	13%	77%

Table 9: Barriers to acquiring desired bandwidth

	Great impact	Some impact	No impact
Service too costly	1%	32%	52%
Service unavailable	16%	26%	56%
Service difficult to obtain from vendor	11%	27%	60%

Overall, the findings in this section suggest that many of the respondents do believe that access to high quality, affordable telecommunications services does impact their business. Specifically, approximately half of the respondents reported that telecommunications technology impacts their costs, productivity and ability to capitalize on some business opportunities. A smaller percentage of respondents also believe that telecommunications technology can offset some of their travel expenses in training and education and in other areas.

And finally, when asked about the barriers they encountered in acquiring higher level telecommunications services, respondents most often reported costs and availability, with a smaller percentage reporting difficulties working with providers.

A Look to the Future

Finally, these companies were asked about their planning concerning the types of telecommunication investments their company had planned for the next year (Table 10). At least 5 percent of the companies reported plans for such short-term investments as: investing in DSL technology (10%), a company web site (9%), e-commerce solutions (7%), fiber optics (6%), cable modem (5%), a voice mail system (5%), and video teleconferencing (5%).

Table 10: Telecom investments companies report they have planned

INFRASTRUCTURE	
DSL	10%
Fiber	6%
T-1	2%
Cable modem	5%
ISDN	3%
DS1 or DS3	1%
APPLICATIONS	
Company web site	9%
E-commerce	7%
Voice mail	5%
Video teleconferencing	5%
Distance education	4%

If all of the broadband technologies were aggregated, the data would suggest that close to 25 percent of manufacturing firms in rural Minnesota plan to invest in broadband technology. This should be very encouraging news to broadband providers. Further, many of these companies appear equally ready to invest in several telecommunications applications, including the development of company web sites, developing e-commerce platforms, and investing in video conferencing capabilities.

Summary and Conclusions

The purpose of this study is to establish a baseline from which rural Minnesota's manufacturing and technology-based companies can be monitored in their technology adoption and deployment. Of equal importance is its ability to help organizations like Minnesota Technology Inc. to better focus their technology and business assistance activities in Greater Minnesota.

Overall, the study documented that over 90 percent of the firms subscribe to an Internet service, with almost half (47%) reporting that they still used a dial-up Internet connection in their business. However, it is important to recognize that these 47 percent of businesses are not randomly distributed across all types and sizes of companies surveyed. Specifically, companies with higher gross sales and a greater number of employees were more than twice as likely to report that they use broadband services over dial-up. One can sum up this trend by concluding that the size of the firm matters and that fulfilling broadband needs is a much greater issue for smaller companies than for larger ones.

It was also found that there were some regional differences in the use of broadband. Specifically,

companies located in northern Minnesota were somewhat more likely to report still using a dial-up connection than companies located in central or southern Minnesota. Interestingly, this regional variation was independent of company size as the mix of firms by size was relatively equal in all three regions. Consequently, one may conclude that the availability of these advanced telecommunication services might be somewhat less available and/or cost incrementally more in northern Minnesota.

Regarding the utilization of telecommunications applications, these companies reported using a variety of applications and regularly transferring a variety of file types. Almost three out of four of these companies surveyed maintain a company web site, 13 percent are engaged in distance learning and 4 percent regularly use video teleconferencing services. Further, over half of the companies (53%) regularly transfer CAD/CAM or multimedia files and 9 percent transfer full-motion video files. Transferring these types of files is extraordinarily slow if one is using a dial-up connection, and yet 38 percent of those firms transferring CAD/CAM files and 19 percent transferring full-motion video files report doing just that. While the data can't identify a specific reason, it is likely that these companies are located in areas where broadband services are still unavailable or are cost-prohibitive.

In fact, when asked about whether broadband services (specifically DSL and T-1 lines) were available to them at a reasonable price, 65 percent of the broadband users reported that they were, while only 28 percent of the dial-up users reported so. This finding provides further evidence that many of the 47 percent of firms that reported still using a dial-up connection likely do so because it is either unavailable or cost-prohibitive. As noted above, this was particularly true for the smallest firms in the study, which had fewer than 10 employees.

Companies were also asked how telecommunications technology impacted their business and their costs. To these questions the responses were somewhat mixed. Most respondents did not believe that lack of bandwidth significantly increased their costs of travel for training or other purposes. However, more than half did report that in general, the inability to secure needed bandwidth does impact their costs of doing business and, to a somewhat lesser extent, their productivity. As mentioned above, of the firms that reported regularly transferring CAD/CAM files, 38 percent do so with a dial-up connection. This can be an agonizingly slow



process and clearly reduces productivity. One can simply interpret such findings, as “time is money.”

More disconcerting is the finding that 41 percent of these firms reported that their inability to secure higher bandwidth has somewhat inhibited or even prevented them from capitalizing on potential business opportunities. This finding should be of great concern, as it directly suggests that the availability of affordable bandwidth could become a factor in business retention and expansion efforts. If companies continue to believe that they are in any way losing business opportunities due to the local telecommunications infrastructure, they could relocate to areas that better meet their needs.

Lastly, businesses were asked about their future investment plans in telecommunications technology and applications. Here, almost one in four businesses reported that their plans included investing in broadband services over the next year, with the greatest percentage reporting planned investments in DSL, fiber and cable. Other planned investments of

note include investments in their company web site (9%) and e-commerce applications (7%).

This study is intended to serve as a baseline against which progress can be tracked on the utilization and deployment of telecommunications technology among rural Minnesota businesses. As manufacturing and technology-based businesses have become a vital and growing component of the rural economy, such monitoring is imperative.

However, in addition to these long-term objectives, this survey’s findings provide those engaged in both the provision of telecommunication services and the provision of business assistance and development, valuable insight into the needs of rural Minnesota’s manufacturing and technology-based companies. It is hoped that future reports will add valuable information for policy makers, local officials and economic development professionals as these industries continue to help grow our rural economy.