

Telecommunications

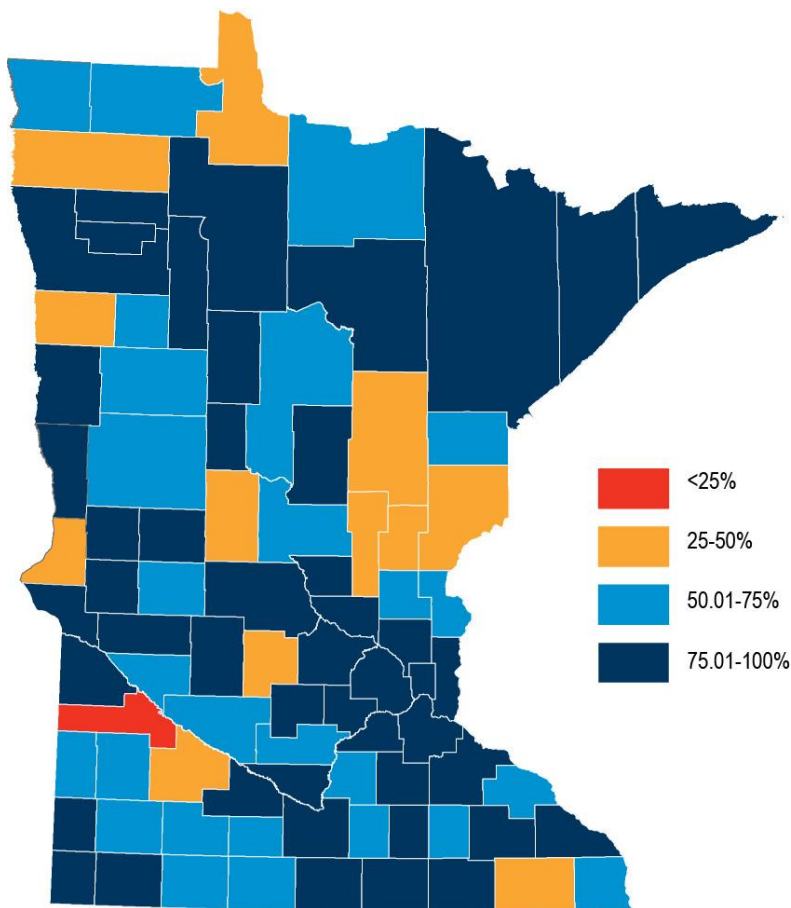
This paper is based on work completed as part of The University of Minnesota's Transportation Futures Project. More information about The Transportation Futures Project can be found on the [project homepage](#).

Innovations in telecommunications capabilities had significant impacts on many aspects of modern life. Over the last 15 years, major changes in how people shop, communicate, recreate and work occurred as a result of improved abilities to send and receive data remotely. This in turn impacted how frequently and far people travel for a variety of purposes. Of primary interest are the impacts of telecommuting and telemedicine on Minnesotans' transportation behaviors.

BROADBAND ACCESS

It should be noted that the benefits of improved telecommunications capabilities are limited to people with access to consistent broadband internet. The Minnesota Department of Employment and Economic Development tracks broadband access for both wired and wireless connections in Minnesota. Figure 1 shows a map of wired broadband connectivity in Minnesota. Yellow Medicine County in the southwestern part of the state is the least connected county with 21 percent of people having access to download speeds of 25 Mbps or faster. Red Lake is the most connected county, with nearly 100 percent of people having access to this level of service.¹

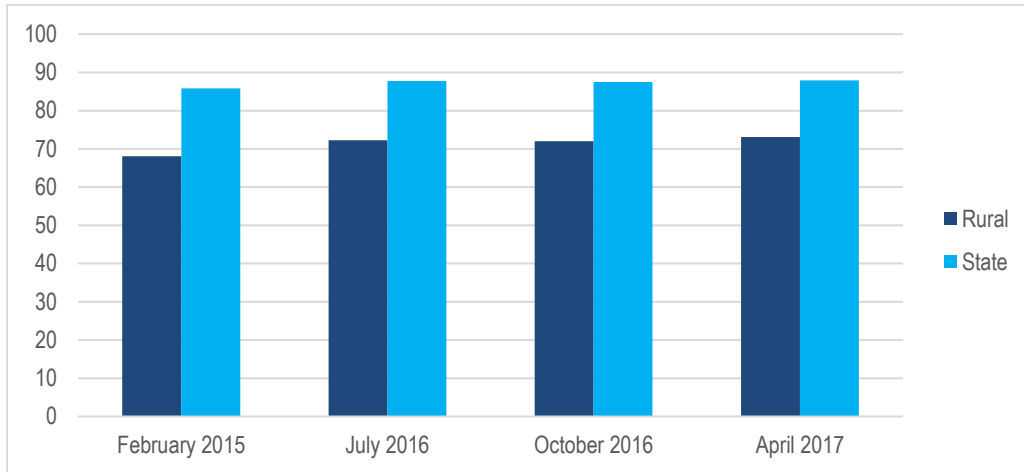
Figure 1: Percent of households with fixed and mobile broadband service at speeds of 25 Mbps download and 3 Mbps upload or greater



¹ [MN Department of Employment and Economic Development, 2017.](#)

Since 2014, Minnesota invested \$66 million in its broadband grant program to improve coverage in rural areas. Including wireless or mobile broadband, 98 percent of households have access to the initial target of 10 Mbps download and 1.5 Mbps download by 2015.² The Minnesota Legislature recently established new goals in statute to guide the state’s broadband development efforts. The state aims to provide all businesses and homes with access to high-speed broadband with minimum download speeds of 25 Mbps and upload speeds of 3 Mbps by 2022. Figure 2 shows the estimated wireline broadband service availability at the target level of service.³

Figure 2: Percentage of households with wireline broadband service in rural areas compared to the statewide goal for Minnesota⁴



TELEWORKING & TELECOMMUTING

Rates of teleworking or telecommuting have long been interesting to transportation planners because working remotely offers one way to reduce the number of people traveling during peak rush hours, including subsequent impacts on air quality and energy consumption.⁵ There is some debate as to what exactly qualifies a person as a teleworker. How the definition is framed can significantly change the estimated number of people who telework. On the low end, the American Community Survey estimates that 5 percent of people in the United States work from home at least a majority of the time.⁶ Meanwhile, approximately 43 percent of U.S. workers say they have telecommuted, up from 37 percent in 2015. Gallup finds that telecommuting is more common among those with formal education and higher household income.⁷

Telework in Minnesota

Rates of teleworking in Minnesota remained relatively stable over the last five years, as is shown in Figure 3. Some increases occurred particularly in management, business, science, and arts professions. However, those gains were largely offset by declines in other sectors. Recently, a small number of employers, like Minnesota-based Best Buy, recalled some of their remote workforce back into the office. In total, the American Community Survey reports that just nearly 6 percent of Minnesota’s workforce primarily works from home.

² [Connected Nation, 2017](#)

³ [MN Department of Employment and Economic Development, 2017](#)

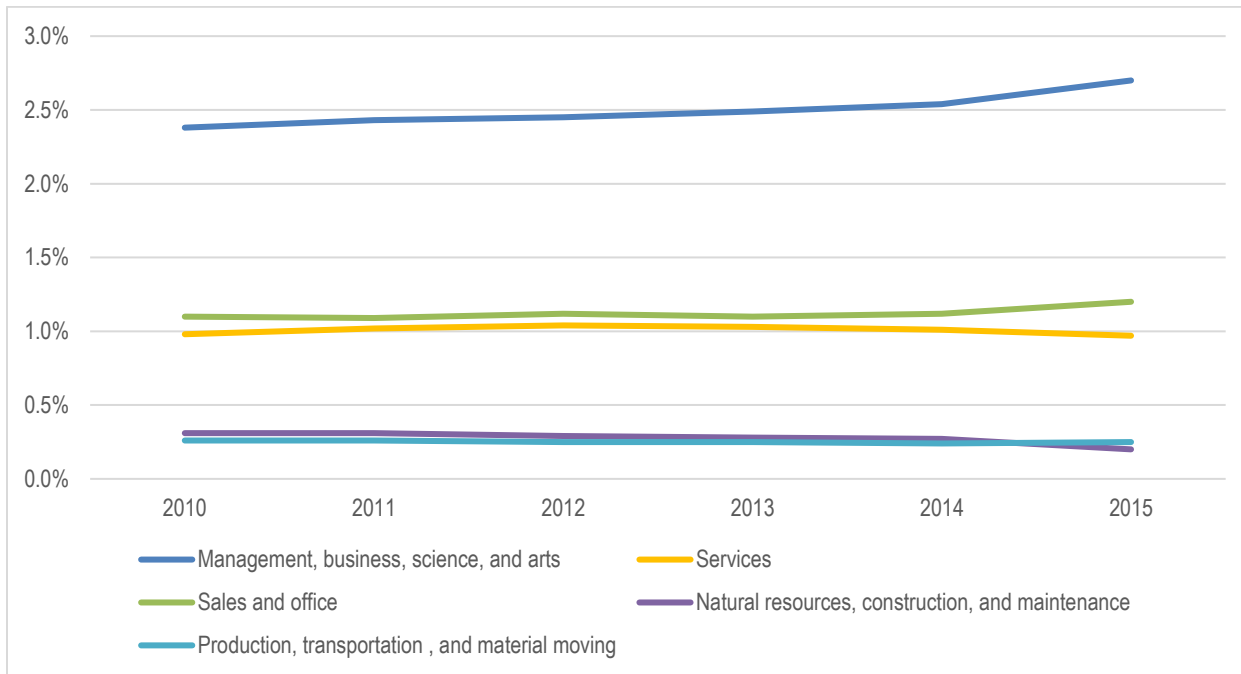
⁴ [MN Department of Employment and Economic Development, 2017](#)

⁵ Levinson et. al., 2015

⁶ [American Community Survey, 2015](#) The American Community Survey asks respondents to indicate what their primary means of traveling to work is – worked at home is often equated to someone being a regular teleworker or telecommuter.

⁷ [Gallup, 2017](#)

Figure 3: Teleworking by profession in Minnesota as a percent of the total workforce⁸



Telework in the Twin Cities

Rates of teleworking in the Twin Cities grew modestly since 2010, particularly in the fields of management, business, science, and the arts, as shown in Figure 4.⁹ Similar to the state as a whole, just fewer than 5 percent of residents in the Twin Cities primarily work from home according to the American Community Survey. The percentage of workers who telecommute grows significantly if the definition is expanded to people who work from home at least once per month, from 5 percent to 33 percent.¹⁰ In a recent study, the University of Minnesota found that regular, non-daily telecommuting is on the rise. While those who telecommuted every day dropped, the number of people who telecommuted once a week or more increased.¹¹

Consistent with Gallup's findings, workers in Twin Cities with higher education levels are more likely to telecommute. Those with bachelor degrees are 70 percent more likely and those with post-bachelor degrees are 90 percent more likely to telecommute than the average worker.¹²

Telecommuters are frequently white-collar professionals working in executive/managerial, specialty professional, technical, sales or administrative positions. Figure 4 shows teleworking by profession in the Twin Cities metropolitan area.

⁸ [American Community Survey, 2015](#)

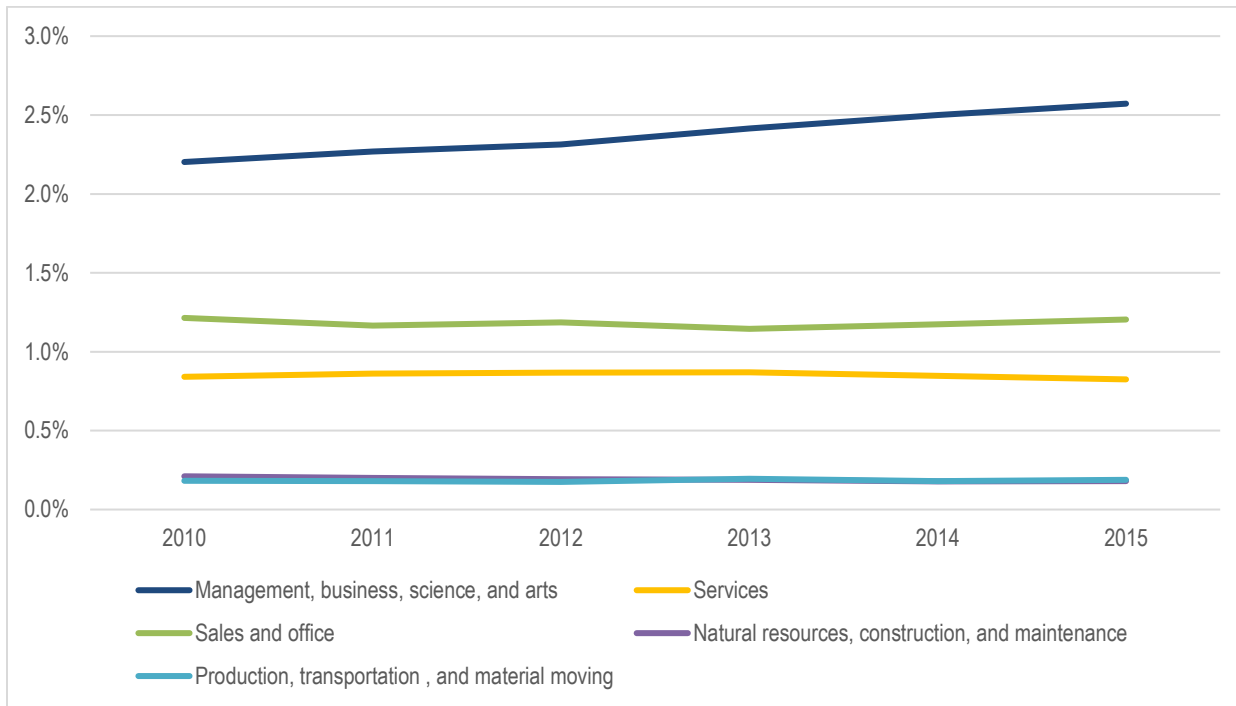
⁹ [American Community Survey, 2015](#)

¹⁰ [Metropolitan Council, 2013](#)

¹¹ [University of Minnesota Center for Transportation Studies, 2015](#)

¹² [Metropolitan Council, 2013](#)

Figure 4: Teleworking by profession in the Minneapolis-Saint Paul-Bloomington Metropolitan Statistical Area¹³



Impact on Transportation

The impact of telecommuting on transportation is the subject of extensive research over the past decades. Telecommuting typically has one of four effects on travel behavior: substitution, complementarity, modification or no effect.¹⁴ Substitution occurs when a person replaces their home-to-work trip by working from home. Complementarity means that despite telecommuting and eliminating their home-to-work trip, a person generates new demands for other non-work trips. Modification occurs when telecommuting doesn't affect the total amount of travel, but changes a person's mode choice, timing or linking of trips together. In some instances, telecommuting has no impact on travel behavior. The overall impact of telecommuting on transportation is uncertain, though it seems that telecommuters are at least slightly more likely to take longer and more frequent non-work trips.¹⁵ A review of 30 studies into telecommuting's effects on overall travel found that reductions in travel occur over the short-term, but long-term impacts are uncertain depending on whether or not a person moves farther away from other amenities due to the mobile nature of their work commute.¹⁶

The Future of Teleworking

Looking forward, growth in the number of people in the U.S. who telecommute is likely to continue at a small rate through the mid-2030s. Under theoretical 10, 20, and 40 percent saturation levels for teleworking, researchers from the University of Minnesota anticipate that between 7 and 8 percent of the total workforce will work from home by the year 2035.¹⁷ This matches projections from the American Community Survey, which estimates that an additional 3 percent of the workforce may work from home by 2040.¹⁸ Part-time or occasional telecommuting will likely continue to grow as remote access to email and online meetings becomes more widespread.

¹³ [American Community Survey](#)

¹⁴ Levinson, et. al., 2015

¹⁵ [Zhu, 2012](#)

¹⁶ [Andreev et. al., 2010](#)

¹⁷ [Levinson et. al., 2015](#)

¹⁸ Ibid.

TELEMEDICINE

The emergence of widely available broadband opened new doors to remotely accessible medical care in many parts of the country. Telemedicine, e-medicine or telehealth services allow for real-time communication between patients and providers through technologies such as the internet, over the telephone or through a videoconference.¹⁹

In Minnesota, telemedicine takes a variety of different forms. Direct patient to practitioner services like HealthPartner's *virtuwell* or CentraCare's eClinic allow patients to connect with a healthcare professional to treat a list of common ailments that are often treated at urgent care facilities.²⁰ As of December 2015, *virtuwell* treated more than 170,000 cases nationwide.²¹ In other cases, telemedicine is used to connect specialists at one healthcare facility to doctors and patients at an off-site facility. Hospitals and clinics that are part of the Veterans Affairs system in Minnesota use remote appointments to connect specialists from the Minneapolis system to other VA clinics in places like Saint Cloud, Alexandria and Montevideo. This practice significantly reduces the amount of advance notice needed to schedule an appointment and travel to a different clinic.²² Effective January 2016, Minnesota Health Care Program covers medically necessary services and consultation through telemedicine in the same way it would if the service or consultation was delivered in person.

Telemedicine can be especially vital in emergency situations when every second counts and time spent traveling to a specialist may be the difference between successfully treating a patient or not.²³ Beyond emergency situations, advances in telemedicine can help to connect small rural clinics to medical professionals in larger urban areas without placing significant travel demands on patients. It can also allow for real-time communication of vital statistics or condition monitoring between patients and practitioners. This can be especially important for Minnesota's seniors who may not want or be able to drive themselves to an appointment in a distant community.

RELATED TRENDS

- Transportation Behavior
- New Logistics

¹⁹ [American Telemedicine Association, 2016](#)

²⁰ [Virtuwell; CentraCare](#)

²¹ [Business Wire, 2015](#)

²² [Laxen, 2014](#)

²³ [Cronin, 2014](#)