CONQUERING MONTANA'S DIVIDE

MONTANA TELECOMMUNICATIONS ASSOCIATION

A REPORT ON THE STATE OF RURAL BROADBAND

OCTOBER 2016

GEOFF FEISS, GENERAL MANAGER

MONTANA TELECOMMUNICATIONS ASSOCIATION

The Montana Telecommunications Association represents nine member companies and cooperatives that together serve approximately 200,000 customers in rural areas across Montana.

FROM THE GENERAL MANAGER

MONTANANS NEVER SHRINK FROM BIG CHALLENGES.

We see that in massive projects such as the Going-to-the-Sun Road in Glacier National Park, the Yellowtail Dam on the Bighorn River, Butte's Berkeley Pit. We see it in the dedication of ranchers who flourish through brutal winters. We see it in the ingenuity of manufacturers, service providers and shopkeepers who manage to thrive in one of the nation's most sparsely populated states.

And we see it in Montana's locally owned rural telecommunications providers, who have long dedicated themselves to connecting people, services and businesses in the farthest reaches of our state.

From the beginning, our state's rugged geography, vast open areas and sparse population created unique challenges for building out Montana's telecommunications infrastructure. Yet even before Montana became a state, local exchanges had appeared in communities including Fort Benton, Choteau, Helena and elsewhere. By the middle of the 20th century, telephone service was available to most Montanans.

Today, customers expect more. In this era of streaming movies, distance learning, e-commerce and telemedicine, broadband internet access is now considered an essential part of life for most Montanans. Updating today's networks to meet tomorrow's demands with "future-proof" fiber optic infrastructure requires considerable investment of time and resources. Montana's rural telecommunications cooperatives and companies were founded to tackle exactly these kinds of challenges.

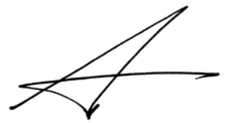
We've made great progress. And we're moving faster than ever.

WIDE-OPEN, ALL IN.

In this report you'll learn how the nine members of the Montana Telecommunications Association are working to bring state-of-the-art broadband internet, digital telephony, video, wireless and other telecommunications products and services to Montana's rural schools, businesses, residents, and emergency and health care services. Together, we are connecting Montana.

You can find additional information about broadband communications issues in Montana and keep up with recent news at our dedicated website, **www.BroadbandMT.com**. If you have questions or comments, please don't hesitate to call the Montana Telecommunications Association office at **406-442-4316**. You can also email me at gfeiss@telecomassn.org.

Thank you for your interest,



"Montana has a lot to celebrate when it comes to broadband and fiber connectivity in rural Montana. It's critical that our schools, hospitals, businesses and homes in every corner of the state have access to reliable, high-speed internet infrastructure and as this report shows, there has been significant progress in recent years toward that goal."

– Montana Governor Steve Bullock

OUR CONNECTIONS. OUR DIFFERENCES. OUR STRENGTH.

It is said that we live in the Information Age. Today, practically wherever you live, you can follow local news in your aunt's hometown halfway across the country, watch reruns of "Friends" or research home decorating ideas on Pinterest. People sometimes even complain: too much email, too many channels, too much to know, too many options.

Fact is, information has value. But connection has meaning. In the words of Brene Brown, the bestselling author and sociologist whose TED talks have been watched by millions of people around the world on the internet: **"Connection is why we're here."**

When we keep up with the news, we connect with our world. When we watch old reruns, we connect with our past. When we browse Pinterest, we connect with our passions. And when we read updates from old high school friends on Facebook or share our photos on Instagram, we connect with our communities. Our families.

We may complain about too much email. But practically no one complains about too much connectedness.

Not so many years ago, life in rural Montana was a mostly isolated experience. Our open spaces attracted and bred a certain type of person — hardy, self-sufficient, creative, curious. That spirit endures. Indeed, it is bound ever more tightly to this place by our new connectedness, by the clear knowledge that we are not out here alone.

Rural? Proudly. Remote? Hardly. That's the promise of connection. That's the vision of Montana's rural telecom providers.

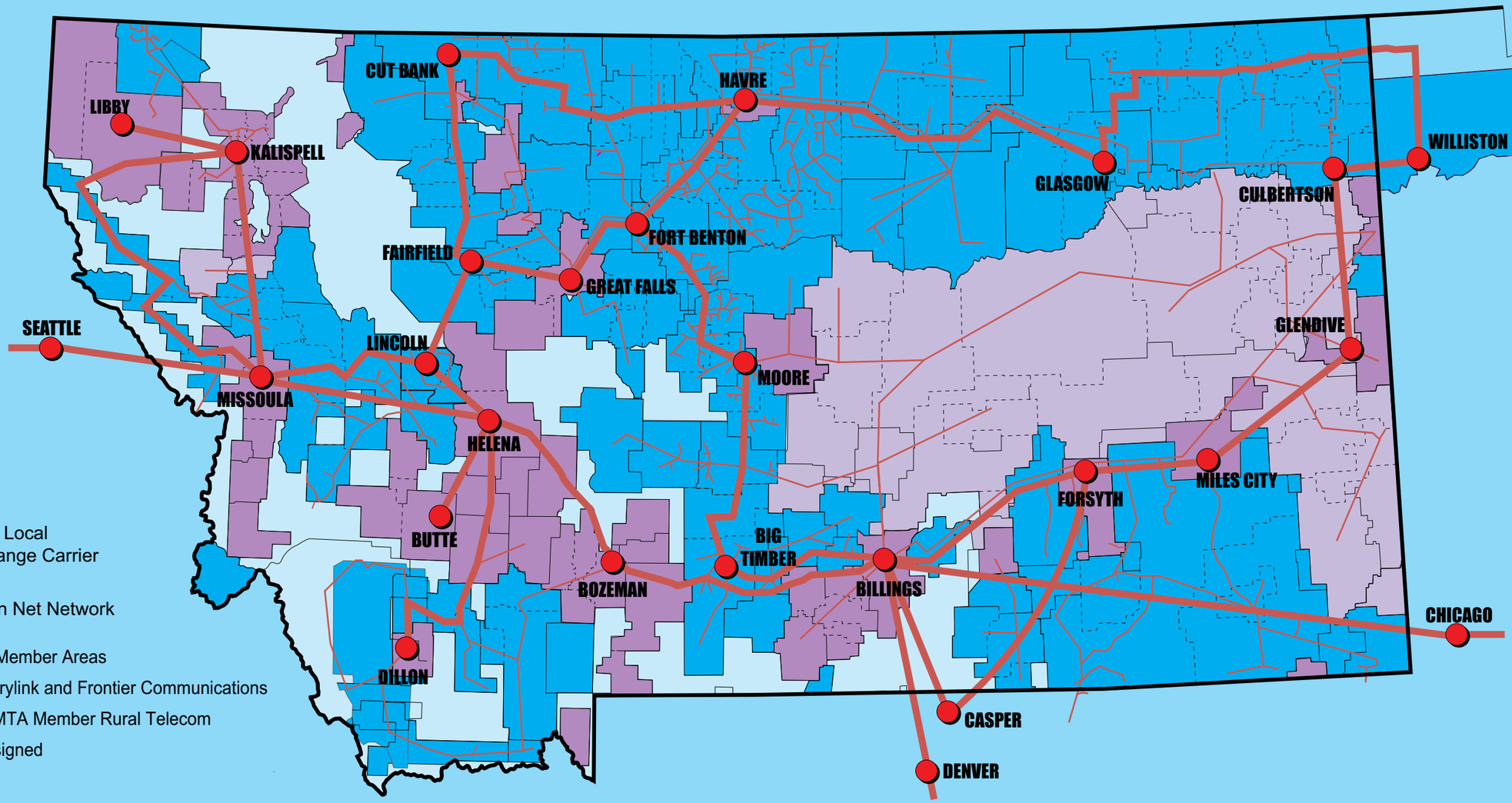
WE'VE GOT YOUR BACK(BONE).

As Montana's independent rural telecommunications providers, we cover over 70 percent of the state's geography and most of our smallest communities, from Westby to Grant. In 1995 we formed **Vision Net**, a joint venture that today serves as an internet backbone network connecting Montana to the rest of the world, while providing redundant, reliable service within Montana.

The map on this page shows our existing fiber network as of mid-2016. We now have installed more than 20,000 miles of fiber optic infrastructure across Big Sky Country. Our network continues to grow at an unprecedented pace, transforming opportunity and connectivity for everyone in Montana.

WHAT IS FIBER?

Fiber optics refers to the electronics and transmission medium used to send information literally at the speed of light along a fine strand of glass or plastic. A single fiber, approximately the diameter of a human hair, offers virtually unlimited bandwidth capabilities and is less susceptible than other transmission methods to electromagnetic interference.



CONNECTING THE DIVIDE ONE MILE AT A TIME.

We are leading the way in using broadband technology to conquer the challenge of distance and density to connect communities all across Big Sky Country.

100%

of rural Montana schools served by MTA members will be connected to fiber by the end of 2017.[1]

74,297

customer access lines provided by MTA members.

13,460

business customers served by MTA members.

Fiber investment by Montana's rural telecoms since 2011:

$248.6 MILLION.

27% of rural Montana homes & businesses are currently served by fiber-to-the-premise connections.

44.6% of Montanans today are served by hard-wired internet connections with download speed of at least 25 mbps.

National average: **44.5%**

Mb megabit

Average wholesale cost per megabit of bandwidth:

$40 2011

$4 2016

1. In limited cases, very small and remote schools may instead be connected via 100 mbps point-to-point wireless. This technology, which is being considered for eight schools that serve a total of 17 students, will more than accommodate the Federal Communications Commission's long-term goal of 1 mbps per student, as well as foreseeable growth in demand in future years.

REACHING RURAL: THE CHALLENGES WE FACE.

The very things we love about rural Montana — vast forests and sprawling plains, more wildlife than people — create complex financial and physical challenges when it comes to extending our fiber infrastructure.

100,715 SQUARE MILES
served by rural telecoms in Montana

83.8 SQUARE MILES
in Seattle

MTA member companies serve a vast region — 1,200 times the land area of Seattle.

Average per-mile cost of installing fiber backbone in rural Montana:
$30,000

Average per-mile cost of installing fiber backbone in Seattle:
$100,000

Installing fiber in a major urban area is complicated and expensive. Services must be routed around, under or through roads, skyscrapers, other utility infrastructure and more. But those complications reflect another truth: In a densely populated city, many more people can connect to a single mile of fiber infrastructure.

Customers per square mile (MTA member companies):
0.35–3.05

Residents per square mile in Seattle:
6,717

There's a reason we call it rural around here. MTA member companies serve fewer people across all of Montana than a Seattle provider could serve in just 12 square miles.

Average cost of fiber backbone construction per rural Montana resident:
$10,000

Average cost of fiber backbone construction per Seattle resident:
$18

BOTTOM LINE: Connecting every home and business in rural Montana to fiber is significantly more expensive on a per-customer basis than in Seattle.

DIVIDED BY DISTANCE, CONNECTED BY TECHNOLOGY.

PROVIDERS TACKLE UNIQUE CHALLENGES ACROSS RURAL MONTANA

Anyone who has spent time out on the vast, rolling plains of north central Montana knows that this is wild country. This is where the deer and the antelope play, where seldom is heard … well, any words … discouraging or otherwise. This is the sparsely populated region served by Northern Telephone Cooperative. The company serves approximately 1,200 customer locations dispersed across more than 3,300 square miles. The largest concentration of customers is in Sunburst, a town of just more than 350 residents.

Broadband has been available for years here, thanks to Northern's early decision to extend its fiber optic network to "hub" sites strategically placed throughout its service area. Customers initially accessed that network via Digital Subscriber Line or DSL technology.

But as bandwidth-hungry online services such as video have grown in popularity, Northern began to replace all of its copper phone lines with high-capacity fiber optic lines. Known as "fiber-to-the-home," or FTTH for short, this technology involves installing new cables and electronics across Northern's network, including new equipment at each customer location.

As is always the case when building out infrastructure in rural areas, the economics are daunting. (That's part of the reason Northern was founded as a co-op in the first place.) A new fiber installation in Northern's service area costs, on average, nearly $20,000 per mile. With Northern's average of less than one customer per two square miles … well, you can see the challenge.

Nevertheless, Northern has methodically worked to build out its network, investing approximately $1.5 million per year in new upgrades. The company is focusing first on its most bandwidth-constrained customers. Already, more than 40 percent of Northern's customers are served by FTTH. By the end of 2016 every school in Northern's service area will be connected via fiber. And within the next five to seven years the remainder of Northern's customers will have FTTH — providing them with as much as 1,000 times the bandwidth capacity of traditional copper-based DSL.

TECHNOLOGIES CHANGE. OUR COMMITMENT DOESN'T.

Northern's efforts serve as just one example of the aggressive efforts that Montana's rural telecoms are undertaking to "future-proof" the broadband infrastructure of our state:

- In early 2015, Nemont completed a FTTH project that made Scobey our state's first 100 percent "gigabit community." Nemont has been deploying fiber in its 14,000-square-mile service territory since 2007.
- Over the past 10 years Southern Montana Telephone invested more in its network than it had invested in the previous 101 years, combined. Today, 85 percent of the company's subscribers have fiber to the home.
- 70 percent of InterBel Telephone Cooperative's members will have fiber installed to the premise by the end of 2016. Co-op members with a serious need for speed will be able to subscribe to a gigabit service package.

Those and other rural providers are continuously adding capacity, doubling the overall bandwidth available to customers every 12–18 months on average.

Make no mistake. We face challenges to build networks that meet our customers' need for ever-increasing bandwidth today and tomorrow. But today's challenges are, in a sense, no different from what we have faced since our foundings. We've been bringing communications technology to rural Montanans for decades. In the following pages you'll learn some of the specific ways that we're working with you to focus our efforts where they have the most powerful effect.

ADVANCING EDUCATION.

RURAL TELECOMS CONNECT MONTANA STUDENTS TO A WORLD OF KNOWLEDGE

Internet-powered distance learning is transforming education today — especially in rural communities. Students can now study specialized subjects with teachers and other experts located almost anywhere, thanks to the interactive, real-time distance learning services provided by Vision Net. Using broadband connections, students can participate in experiments, monitor wildlife cameras and play music with students across the country. Thanks to technology, the information previously bound within the hard covers of a textbook has become a virtually limitless array of interactive content.

Nowhere are those opportunities and resources more valuable than in rural Montana. But rural schools face unique access challenges. Funding is tight. Meantime, the cost of connecting rural schools is generally higher than for schools in urban communities because of the sheer distance between them, other customers and the rest of the world.

DOING THE MATH.

Bringing technology to classrooms

The Electronic Education Equipment initiative of Blackfoot, Energy Partners and Missoula Electric Cooperative has donated more than half a million dollars worth of technology equipment to more than 70 schools in Western Montana over the past 25 years.

To address these challenges, we are investing for the long term while innovating local solutions to bring down the cost of bandwidth to schools.

Today, despite our low population density, **78 percent of Montana schools already meet the near-term federally recommended bandwidth standard of 100 kilobits per second per student.** For comparison, only 38 percent of schools in the more densely populated state of Maryland meet that standard.

Lifting all Montana schools to the next level will require continued investment and innovative local solutions from MTA's member companies and rural schools alike. But as providers and school districts across the state have already shown, Montanans don't shrink in the face of tricky math problems.

FUTURE FIRST.

A COMMITMENT TO BRING FIBER TO EVERY SCHOOL

Studies have shown that increased bandwidth and access to advanced digital technologies improve student outcomes. That's why we have committed to providing every school we serve with fiber internet connections by the end of 2017. (In the case of eight very remote schools that serve a total of 17 students, point-to-point wireless connections may be utilized instead.) As a result, **all rural Montana schools will be capable of meeting the FCC's long-term bandwidth goal of 1 mbps per student.**

The effort is already well on its way. Indeed, the majority of rural Montana schools already are connected to the internet via fiber. That includes schools in communities such as Plentywood, Lincoln, Chester, Wisdom and Broadus.

By putting Montana's future first, we aren't just building greater capacity. We're building Montana's capacity for greatness.

2016 MONTANA DISTANCE LEARNING HIGHLIGHTS.

Utilizing broadband technology from Vision Net, students across Montana now have access to awesome and inspiring programs that put them in direct contact with some of the top experts in the state and beyond. Here are just a few recent highlights:

BRAIN AWARENESS WEEK

More than 30 classrooms across the state participated in a study of the brain led by faculty members from an array of disciplines at the University of Montana.

FOLIO FEST

Students around Montana immersed themselves in the world that brought us Shakespeare's First Folio. The project was a collaboration of Vision Net, the University of Montana, the Montana Museum of Art and Culture and the Missoula Writing Collaborative.

WHALES!

The Washington State Parks Foundation led an online program for third through fifth graders in Washington, Idaho, Alaska and Montana. The program helped students understand how the things we put down our drains and into our rivers affect the health of whales in Puget Sound.

ACCELERATING BUSINESS:

WHAT WORKS FOR MONTANA, HELPS MONTANA WORK.

For many of us $21,000 is a heck of a lot of bull. That's the price paid by one buyer through the first online bull auction held by Malek Angus Ranch, located near the tiny town of Highwood in north central Montana. That long-distance sale — and plenty more like it — was made possible in part by a fiber-to-the-home project undertaken in Highwood by 3 Rivers Communications.

Technology has transformed the way that ranchers in Montana run their operations, from monitoring newborn calves to closing sales. And that's hardly the only industry affected by our state's advanced telecommunications network.

Columbia Grain in Chinook uses broadband to connect all its terminals and control operations to a central dispatch. Ninepipes Lodge south of Ronan entices visitors with an online, live camera focused on the area's abundant wildlife. One of the largest employers on the Fort Belknap Reservation is a call center that services e-commerce clients across the country.

And across the state, small manufacturers such as Tumblewood Teas, Red Ants Pants and Rocky Mountain Cookware are connecting directly with customers nationwide and beyond thanks to e-commerce.

Our robust rural telecommunications services are helping these and other businesses increase efficiency, reduce costs and serve new markets. It is now possible to run successful businesses in rural Montana that just a decade ago would never have survived.

Thanks to broadband communications technologies, what you can do is limited only by what you can dream.

THE NEW MAIN STREET.

REMOTE WORKERS REDEFINE THE POWER OF PLACE

Aaron and Jayne Morrow had often looked for opportunities to move back to Montana — Jayne's childhood home and the place where the couple first met and married. That opportunity finally came when Aaron had the chance to grow his business on Montana's Hi-Line. Aaron's offhand response? If he could get the kind of internet service that he then depended on in the Washington, D.C. metro area it would seal the deal.

The Morrows, who are both technically trained engineers, made the move to Chinook in July of 2015. Their 60 mbps, fiber-to-the-home internet connection enabled the relocation.

The Morrows count themselves among an increasing number of Montanans who have leveraged high-speed internet access and other digital technologies to work for companies and serve clients in distant parts of the United States and around the world.

In late 2015, the employment website Flexjobs.com crunched numbers from the U.S. Census Bureau and found that **Montana ranks No. 1 among all states in the percentage of workers who telecommute.** One out of every 14 full-time workers in Montana now telecommutes. And that proportion will likely only increase: According to the U.S. Census Bureau, telecommuting rose 79 percent between 2005 and 2012.

This change is positively influencing entire communities. Workers earning wages from outside the region or state create a ripple effect on local economies as they spend their income at local stores, restaurants and services. Telecommuters also bring welcome economic diversification to communities that have often relied on a small number of employers.

You may not see these changes evident on the Main Street storefronts of our small communities. But every day, Montana's workers and communities benefit from these new outposts on the information superhighway.

Telecommuting: Not just for techies

At the time of this writing, Flexjobs.com featured hundreds of telecommuting jobs for Montana workers in fields ranging from medical billing to railroad safety inspection to insurance claims adjustment.

RX FOR HEALTH: PLENTY OF FIBER.

BROADBAND POWERS HEALTH CARE FOR THE 21ST CENTURY

For decades, rural Montanans faced a significant challenge when it came to specialist health care. Many communities didn't even have a local clinic, let alone doctors trained in specific areas such as oncology, cardiology or gastroenterology. Treatment of significant health issues often meant traveling halfway across the state — or further.

In 1993 administrators and doctors at the Billings Clinic decided to do something about that age-old challenge. Working with five rural health care facilities in Eastern Montana, they established the Eastern Montana Telemedicine Network. Its aim: to deliver specialist health care and other services via two-way videoconferencing, remote monitoring and other broadband-powered technologies.

Today, the EMTN has 26 partners in 19 communities. The network has won numerous national honors including the President's Award for the Advancement of Telemedicine from the American Telemedicine Association. Meantime, other networks including the Partners in Health Telemedicine Network, Benefis Reach Montana Telehealth Network and Kalispell Regional Healthcare have expanded services to every corner of Montana.

These services now allow Montana's rural residents to access world-class specialist care, often without leaving town. Sites such as Mineral County Hospital, Phillips County Hospital and Daniels Memorial Healthcare Center offer services ranging from remote radiology and diagnosis to mental health services for at-home patients via two-way teleconferencing with doctors at major hospitals around the state and beyond.

All of these services depend on the availability of reliable, high-speed internet access. As of 2016, we have provided fiber to more than 30 clinics and hospitals across the state. Those connections allow not only remote videoconferencing for consultations, but also light-speed transfer of vital signs and other critical monitoring data that can sometimes determine the difference between life and death. Telemedicine networks throughout the state connect dozens more rural health care providers with remote medical services via broadband connections provided by MTA members.

It still takes a tough-minded, hardy person to live in rural Montana. But thanks to advances in telemedicine enabled by high-speed internet connectivity, quality health care has never been more readily available when it's needed.

Better medicine for an older population

The expansion of telemedicine services couldn't be timed better given shifts in Montana's demographics. Our state's population is forecast to become the fifth oldest in the nation by 2030. Meantime, more than 76 percent of Montanans now live outside of metropolitan counties — the highest percentage of any state in the nation. Given these trends, the need for quality rural health care will only continue to grow.

BIG SKY, SMALL WORLD.

ONLINE SERVICES BRIDGE DISTANCES TO BUILD COMMUNITIES

Reach out and see someone

In 2006, Skype launched its free, internet-based video calling service. In its first 10 years, users spent 2 trillion minutes connecting with friends, family and co-workers. That's 3.8 million years of face-to-face conversations over the internet.

You feel it when you watch a Facebook video of your grandson's first steps. You notice it when old friends email you after the loss of a loved one. You experience it when you stream a movie with your family on a Saturday night.

Today's internet is a binding fabric of our families and communities. In Montana, that fabric is increasingly stitched out of our extensive fiber network. Technologies that once were the stuff of science fiction — interactive digital games, videophones, movies on demand — are today commonplace thanks in large part to the dramatic proliferation of broadband over the past generation.

In rural Montana, thanks to services like Skype, it's often easier to talk face-to-face with your nephew serving in the military overseas than to visit your nearest neighbor down the highway. Thanks to Pinterest and Tumblr, you can find new friends who share your interests, your politics, your religious convictions, your hobbies. You can keep up with the weather and the price of commodities in real time via an array of apps and websites. Thanks to online dating sites, you can even meet your soul mate.

Telecommunications technologies have transformed our relationships with one another and with the world. Studies repeatedly have shown that the internet positively increases civic engagement, sociability and the intensity of family and friendship relationships, across all cultures.

Here in Big Sky Country, the internet and other communications technologies serve to make our world feel smaller and more accessible than ever.

"Connectivity removes geography as a constraint and allows Montanans in rural areas to start and grow world-class companies." – Senator Steve Daines

WIRING A WIRELESS WORLD

Cellphones have transformed our ability to communicate with anyone from nearly anywhere. It's easy to forget that "wireless" calling only applies to your cellphone's handset. Every cell tower in Montana is connected to a wired backbone communications grid. In this way, smartphone-equipped visitors and locals alike utilize infrastructure provided by rural telecom providers — even if they've never heard the names of those providers.

A TRADITION OF TRANSFORMATION.

RURAL TELECOMS EMBRACE NEW TECHNOLOGIES & CHALLENGES

As long-standing, locally owned telecommunications providers, we bring unique solutions every day to the challenges and opportunities in our communities and beyond. By investing millions of dollars each year to expand and enhance our state's fiber optic network, our nine member companies and cooperatives have already connected more than 100,000 square miles with a broad spectrum of digital voice, video, wireless, internet and other vital products and services.

3 RIVERS COMMUNICATIONS

Serving Beaverhead, Cascade, Choteau, Gallatin, Glacier, Judith Basin, Lewis & Clark, Liberty, Madison, Pondera, Silver Bow, Teton and Toole counties.
Fiber investment since 2011: $70 million
Service area: 12,111 square miles
Subscriber density: 1.62 per square mile
Miles of fiber: 4,357

Blackfoot Connect to more.

Serving Granite, Lake, Mineral, Missoula, Powell, Ravalli and Sanders counties.
Fiber investment since 2011: $5 million
Service area: 6,189 square miles
Subscriber density: 3.05 per square mile
Miles of fiber: 850

InterBel Telephone Cooperative, Inc.

Serving Lincoln County.
Fiber investment since 2011: $25 million
Service area: 984 square miles
Subscriber density: 2.78 per square mile
Miles of fiber: 474

LINCOLN TELEPHONE COMPANY, INC.

Serving Lewis & Clark County.
Fiber investment since 2011: $1.7 million
Service area: 509 square miles
Subscriber density: 2.66 per square mile
Miles of fiber: 80

Nemont

Serving Blaine, Daniels, McCone, Phillips, Roosevelt, Sheridan and Valley counties.
Fiber investment since 2011: $25.3 million
Service area: 13,465 square miles
Subscriber density: 1.36 per square mile
Miles of fiber: 4,552

NORTHERN TELEPHONE COOPERATIVE

Serving Glacier, Liberty and Toole counties.
Fiber investment since 2011: $7.5 million
Service area: 3,036 square miles
Subscriber density: 0.42 per square mile
Miles of fiber: 955

RANGE YOU'RE CONNECTED

Serving Big Horn, Carter, Custer, Powder River, Rosebud and Treasure counties.
Fiber investment since 2011: $12.4 million
Service area: 12,212 square miles
Subscriber density: 0.35 per square mile
Miles of fiber: 1,168

smt Southern Montana Telephone Local Connection, Global Reach

Serving Beaverhead, Deer Lodge and Silver Bow counties.
Fiber investment since 2011: $8.14 million
Service area: 2,029 square miles
Subscriber density: 0.56 per square mile
Miles of fiber: 413

TRIANGLE COMMUNICATIONS

Serving Blaine, Choteau, Fergus, Golden Valley, Hill, Judith Basin, Liberty, Meagher, Musselshell, Park, Phillips, Stillwater, Sweet Grass, Wheatland and Yellowstone counties.
Fiber investment since 2011: $93 million
Service area: 23,453 square miles
Subscriber density: 0.74 per square mile
Miles of fiber: 5,384

END NOTE: To the extent possible, the information in this report encompasses data from all telecommunications providers operating in rural Montana. In some cases we were unable to obtain data from nonmembers of the Montana Telecommunications Association. In those cases, we have used data from member companies and co-ops only.

MONTANA
TELECOMMUNICATIONS
ASSOCIATION

As Montana's rural telecommunications providers, we deliver state-of-the-art digital voice, video, wireless, internet and other telecommunications products and services to approximately 200,000 rural Montanans. We're overcoming significant challenges of distance and density to improve education, health care, economic opportunity and community bonds in Big Sky Country.

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