Broadband Strategic Report

Building Broadband Access and Adoption in Missouri

Fall 2013

mobroadbandnow

This report was prepared by the *MoBroadbandNow* program office. Questions and comments can be directed to mobroadbandnow@oa.mo.gov.

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Executive Summary

Broadband – or high speed Internet – has become a critical infrastructure for 21st century communities. Our businesses, schools, hospitals, and public safety institutions are increasingly interconnected. The ability of Missourians to participate in our interconnected communities and economy depends on reliable, and affordable broadband access.

In 2009, Governor Jay Nixon established *MoBroadbandNow* as a public-private partnership to expand broadband accessibility and adoption in Missouri. The Governor's goal is to increase broadband accessibility from its 2009 level of 79 percent to 95 percent by the end of 2014 – a goal which was met two years ahead of schedule.

Missouri's broadband initiative and infrastructure efforts have been within a larger national context of broadband investment. In 2009, the American Recovery and Reinvestment Act (ARRA) designated $7.2 billion in funding to expand broadband. This money was divided between the National Telecommunications and Information Administration (NTIA) Broadband Technology Opportunities Program (BTOP) and State Broadband Initiative (SBI) and the US Department of Agriculture's (USDA) Rural Utility Service (RUS) Broadband Improvements Program (BIP). Through BTOP and BIP, grants and loans were made to critical infrastructure projects across the country, including those in Missouri.

As part of the national broadband efforts, the Federal Communications Commission (FCC) released the National Broadband Plan in 2010. The plan established six long-term goals for broadband nationally: 1) increasing access to high-speed, affordable broadband; 2) leading the world in mobile innovation; 3) ensuring that Americans who want to access the Internet have the skills to do so; 4) connecting community anchor institutions; 5) creating interoperable public safety networks; and 6) using broadband to support the clean energy economy.[1] The plan also highlighted priority sectors, including economic opportunity, education, healthcare, energy and the environment, civic engagement, and public safety.[2] In order for these goals to be achieved, the plan recognized the need for a healthy "broadband ecosystem."

This report provides an update on the progress that has been made in Missouri since 2009 with respect to broadband planning and investment and highlights key sectors for continued broadband investment in Missouri. These are areas – informed through an 18 month long regionally-based planning process – where broadband can help connect Missourians and have a positive impact on daily life:

- Healthcare
- Agriculture
- Economic Development
- Public Safety
- Education

[1] For the complete goals, visit www.broadband.gov.
[2] For the complete list of sectors, related goals and objectives, visit www.broadband.gov.

Broadband in Missouri

MoBroadbandNow

MoBroadbandNow, established by Governor Jay Nixon in 2009, is a public-private partnership that is seeking to understand, expand and enhance broadband assets in Missouri, focusing on availability, adoption, affordability, choice, speed, usage, literacy, and sustainability. *MoBroadbandNow* has seven core functions:

1) Collecting and verifying broadband provider data and information
2) Preparing and analyzing state and regional broadband maps
3) Establishing and supporting ongoing regional technology planning teams
4) Building and leveraging relationships with broadband stakeholders
5) Providing technical assistance for adoption and use
6) Tracking the progress of infrastructure projects
7) Convening public forums and community-based surveys and outreach

In addition to the seven core objectives, *MoBroadbandNow* has launched two sector specific initiatives – *AgBroadbandNow* and the *Rural Health Broadband Initiative. AgBroadbandNow* is focused on better understanding the specific broadband needs of the agriculture and agri-business communities and facilitating conversations between the agricultural community and Internet Service Providers. *The Rural Health Broadband Initiative* focuses on how broadband connectivity in rural hospitals can improve health care and lower associated costs, contributing to a better quality of life in rural Missouri. *MoBroadbandNow* awarded $375,000 to 15 small rural hospitals through the initiative. See www.mobroadbandnow.com for more information.

> To deal with difficult conditions, like high unemployment, Missouri must transform its economy by adapting to the global marketplace and embracing high-growth industries. To be truly competitive in the 21st century we must upgrade our technology infrastructure with the goal of giving every Missourian access to the information superhighway. Because this is an opportunity of great importance for education, for agriculture, and for industry, I believe Missouri must put its best foot forward in what will be a fierce competition for federal broadband grants. So the state will work together with private industry and use the strengths of each to pursue an achievable vision for universal access.
>
> -Governor Jay Nixon

Broadband Overview – Accessibility and Adoption in Missouri

Access and Adoption

According to current NTIA data, 97.8 percent of Missourians have access to broadband, or high-speed Internet, at speeds of 3 mbps downstream and 786 kbps upstream. Nationwide, 98.8 percent of Americans have access to broadband at these speeds, as seen in the comparisons

in Table 1. Overall, Missouri ranks 38th out of the 56 states and territories when it comes to access at this speed tier.[3]

Table 1. Broadband Access by Speed Tier, Nationwide and Missouri

	Nationwide	Missouri	Missouri-Urban	Missouri-Rural
≥3Mbps Down, ≥768Kpbs Up	98.8%	97.8%	100.0%	92.5%
≥768Kpbs Down, ≥200Kpbs Up	99.7%	99.6%		

Along with access goes adoption – the percentage of Missourians who choose to subscribe to a broadband connection. Based on a 2011 survey of Missouri households conducted by *MoBroadbandNow*, 71 percent of Missourians have already adopted broadband for in home use. Missourians who have not yet adopted broadband have chosen not to do so due to reasons including cost (computers and Internet connection), availability, concerns over safety or privacy, or digital literacy-related issues.

The Rural-Urban Divide

Just under 30 percent of Missouri's population – 1,770,566 people – live in rural areas.[4] Both broadband access and adoption remain lower in Missouri's rural areas than in the urban areas. In urban areas, broadband access is universal at 100 percent, in rural areas it is 92.5 percent. In some respects, Missouri is representative of national broadband trends. Nationally, 99.9 percent of people living in urban areas and 93.8 percent of those living in rural areas have access to broadband. Based on data from the *MoBroadbandNow* survey, 82 percent of Missouri residents in non-rural areas are broadband adopters, while only 63 percent of those in rural areas have adopted broadband – an adoption gap of nearly 20 percent.

The Missouri-Iowa border is frequently referenced as one of the most difficult low service areas in the country – this region, along with eastern Montana, northern Minnesota, eastern Oregon, and other remote, low population-density areas of the country have experienced and continue to experience population loss.

> I realize a tower for such a small population is hard to justify. Yet I feel like we are discriminated against for living in a rural area so that we can help feed the world!
>
> The rural communities as well as the small towns in this area are very challenged as far as Internet services are concerned. Many of the rural residents gave up on internet because of the dial up either could never connect or the servers were terribly slow.
>
> - Survey Responses, Rural Residents

[3] For more information, and a full comparison of states and territories, see the National Broadband Map at www.broadbandmap.gov

[4] Based on the 2010 Decennial Census, Missouri's population is 5,988,927. The urban population is 4,218,371 and the rural population is 1,770,556.

Broadband can offer a range of benefits to rural communities. Increased broadband access and speeds can provide the infrastructure necessary for distance learning, telemedicine, and advanced agricultural applications, such as remote monitoring and alert systems. It can also have economic development benefits, providing rural communities with the ability to compete for service sector jobs, such as call centers, as well as providing rural residents with the ability to telework.

However, due to their low population densities and often challenging geographies, rural areas do not fit into standard Return on Investment (ROI) models for service provision. The costs of service provision and infrastructure maintenance are high, due to the distances between customers and the relatively small customer bases; and there is relatively little potential for market growth.

Speed, Technology, and Providers

While access is critical, it is the speed that defines how Missourians are able to use their broadband connections. A basic connection, as defined by NTIA at ≥768Kbps download is nearly universally available in both rural (98.6 percent) and urban (100 percent)[5] areas and is sufficient for emailing and basic web browsing. A ≥10Mbps connection is the speed necessary for most distance learning applications (and is the base-level connection speed necessary for telemedicine), is available to 99.7 percent of Missourians in urban areas, but fewer than 80 percent in rural areas. Table 2 further delineates these speed tiers and application relationships.

[5] NTIA. "Broadband Statistics Report: Broadband Availability in Urban vs. Rural Areas." http://www.broadbandmap.gov/download/Broadband%20Availability%20in%20Rural%20vs%20Urban%20Areas.pdf

Table 2. Broadband Speeds, Technologies, and Applications.

Download Speeds	Upload Speeds	Technology	Typical Applications*
≥786 Kbps but <1.5 Mbps	≥200 Kbps but <768Kbps	DSL Cable Modem Fiber Satellite Cellular Fixed Wireless	• Basic Email • Low Resolution Videos
≥1.5 Mbps but <3 Mbps	≥786 Kbps but <1.5Kbps	DSL Cable Modem Fiber Satellite Cellular Fixed Wireless	• Streaming Music • Standard Definition (SD) Video • Telecommuting/Telework
≥3Mbps but <6Mbps	≥786 Kbps but <1.5Kbps	DSL Cable Modem Fiber Cellular Fixed Wireless	• Multi-Channel Internet Television • SD Video • File Sharing • Video Streaming
≥6Mbps but <10Mbps	≥1.5Mbps but <3Mbps	DSL Cable Modem Fiber	• Online Gaming • Video-on-Demand • File Sharing • Remote Diagnostics (Download Only)
≥10Mbps but <25Mbps	≥3Mbps but <6Mbps	DSL Cable Modem Fiber	• Telemedicine • Distance Learning • IPTV-High Definition (HD)
≥25Mbps but <50Mbps	≥6Mbps but <10Mbps	Cable Modem Fiber	• HD Video Surveillance • Advanced Remote Access Applications
≥50Mbps but <100Mbps	≥10Mbps but <50Mbps	Cable Modem Fiber	• Video Conferencing with Multiple Users • Remote Supercomputing
≥100Mbps	≤100Mbps	Fiber	• Real-time Data Collection and Research Applications • Real-time Medical Image Consultation • Remote Supercomputing

*Application examples adapted from the California Broadband Task Force's Definition of Broadband chart and the Washington State Broadband Office "2011 Annual Report on Broadband in Washington" (Appendix B) for illustration purposes.

Along with speed is choice of service provider – Missouri currently has 161 identified service providers, 121 of whom participate in data collection and mapping through *MoBroadbandNow.* Figure 1 shows the percentage of population served by technology type. Figures 2 and 3 show broadband service availability by number of service providers.

Figure 1: Percentage of Population Served by Technology Type, Missouri and US[6]

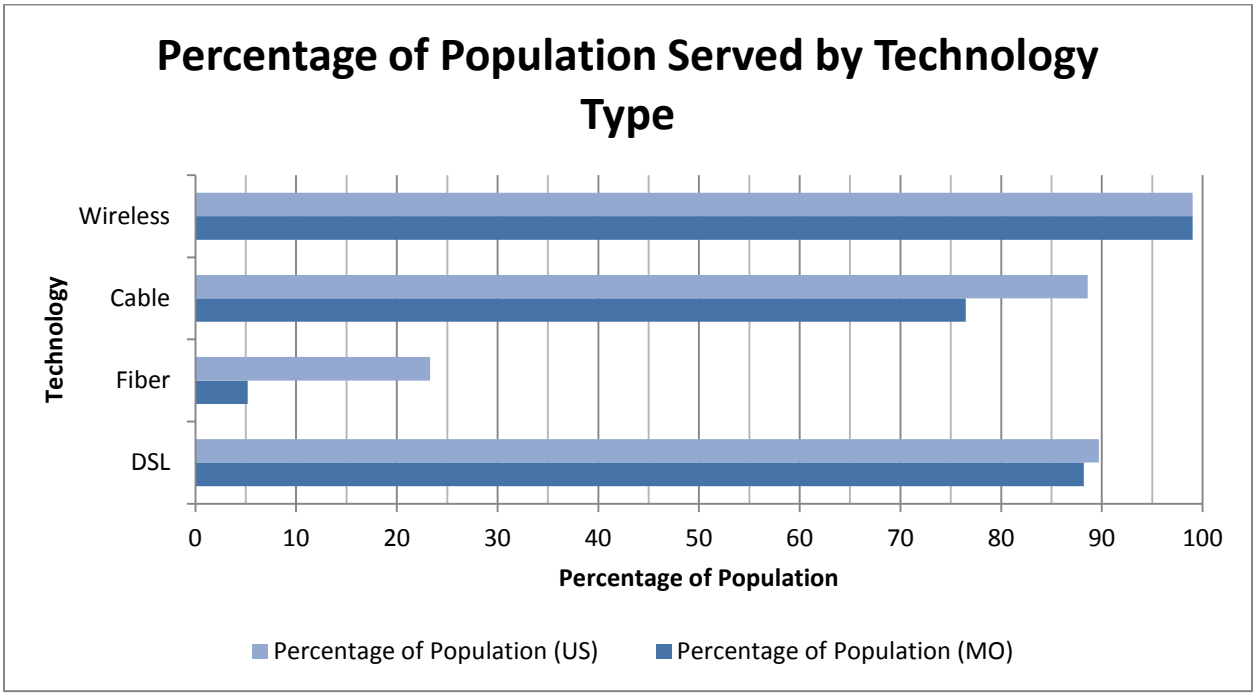
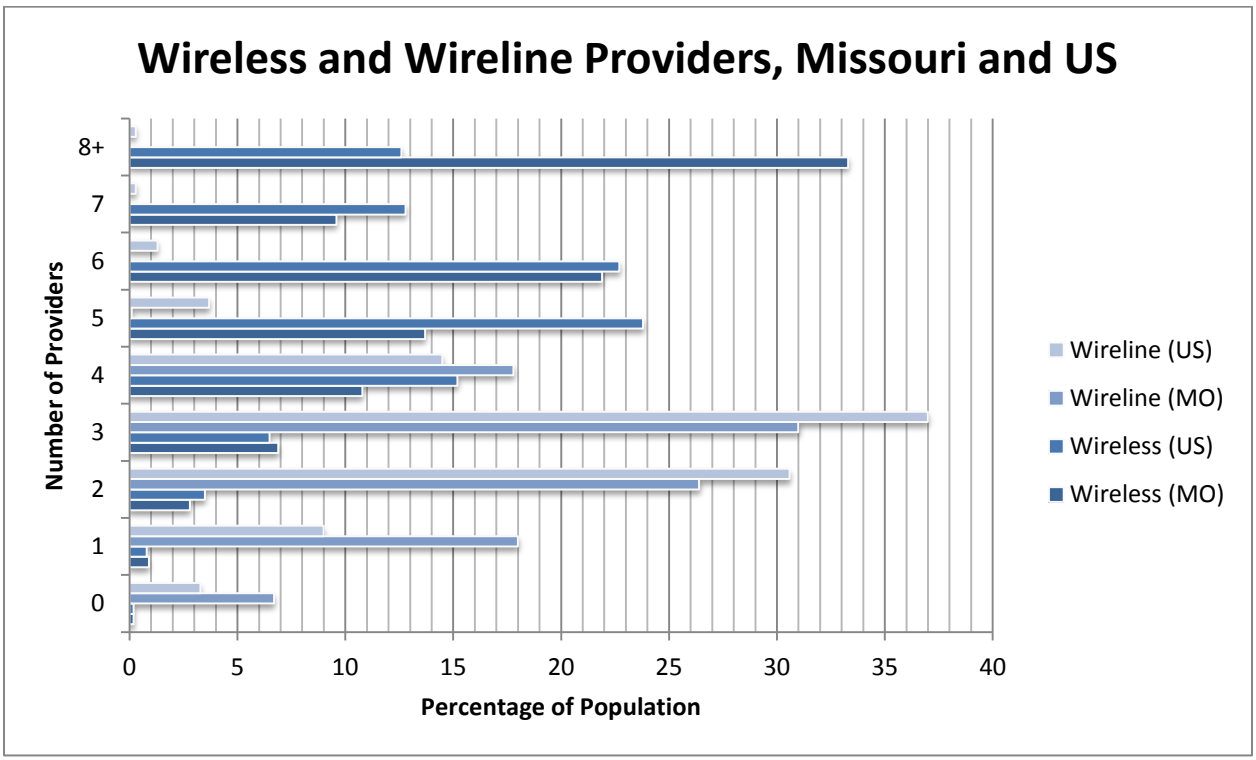
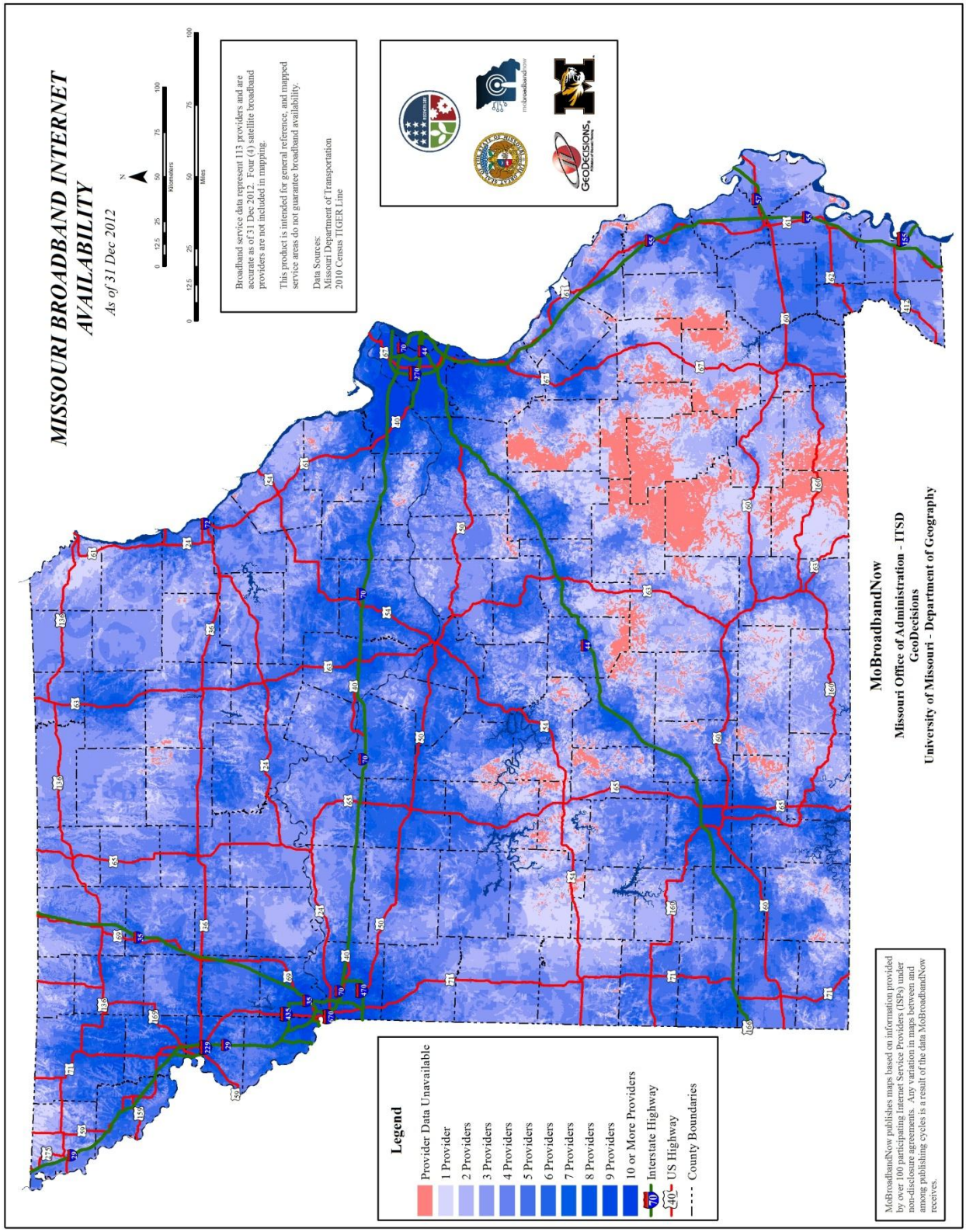


Figure 2. Wireless and Wired Providers, Missouri and US



[6] Data for figures 1 and 2 is from the National Broadband Map, www.broadbandmap.gov.

Figure 3. Missouri Broadband Internet Availability, as of December 31, 2012



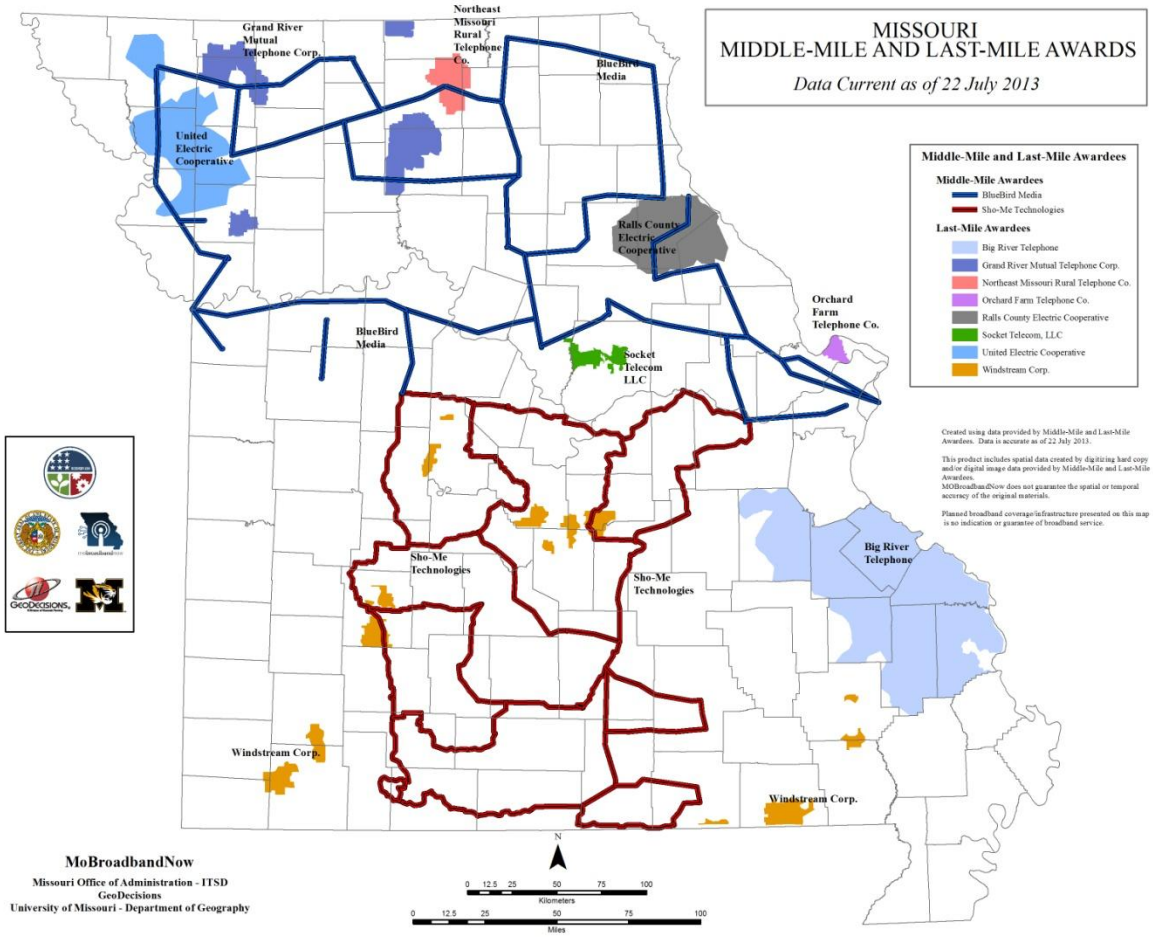
Broadband Expansion in Missouri: Infrastructure

As the data show, Missouri has made great strides in expanding broadband accessibility since 2009. Middle-mile and last-mile infrastructure grants around the state (Figure 1), which have a federal deadline to be substantially completed in 2013, are making great progress in connecting under- and unserved areas. The two middle-mile networks – Bluebird Media in the northern part of the state, and Sho-Me Technologies in the southern part of the state – are building more than 1,500 miles of fiber and connecting more than 200 Community Anchor Institutions between them.[7] Last mile projects are extending high-speed service to end-users across the state, from new fiber connections in Ralls County to new wireless infrastructure in southeast Missouri. Last mile projects include:

- Big River Telephone – Big River Broadband is bringing fixed and mobile high-speed wireless Internet access to a seven county area in Southeast Missouri. The project will bring broadband access at download speeds of up to 14.4 Mbps and upload speeds of up to 5.8 Mbps to over 7,500 businesses and nearly 45,000 residents.
- Grand River Mutual Telephone Corporation – Grand River Mutual is deploying Fiber-to-the Home in four Missouri service areas – Lathrop and the surrounding rural areas; Linn, Livingston, and Sullivan Counties (towns and surrounding rural areas); Gentry, Harrison, and Worth counties (towns and surrounding rural areas); and Powersville, Missouri and its surrounding rural areas. In all, the Grand River Mutual project will provide service to 3,051 homes and 1,191 businesses in Missouri and 1,997 homes and 339 businesses along the Missouri-Iowa border.
- Northeast Missouri Rural Telephone Company – The Northeast Missouri Rural Telephone Company (NEMRTC) is building Fiber-to-the-Premises around its Green City and Unionville telephone exchanges. This project will allow NEMRTC to offer triple play service and broadband speeds of 20 Mbps and greater to residents and businesses within the exchange areas.
- Orchard Farm Telephone Company – Orchard Farm Telephone (dba TDS Telecom), is bringing high speed DSL service to its rural service territory. The service will be comparable to what is available in more populated areas of the service territory and the network is engineered so that it can be easily upgraded to meet future needs.
- Ralls County Electric Cooperative – Ralls County Electric Cooperative is constructing a Fiber-to-the-Home network for cooperative customers. The project is designed both to allow multiple vendors to provide service and to enable “Smart Grid” technologies.
- Socket Telecom, LLC – Socket is building a Fiber-to-the-Home network in rural Boone and Callaway Counties. The network will provide triple play service and speeds of up to 20 Mbps and will bring broadband access to over 2,200 homes and over 260 businesses.
- United Electric Cooperative – United Electric Cooperative is building a Fiber-to-the-Home network in its service territory in Northwest Missouri, which will provide access to over 4,200 houses and over 50 businesses in underserved areas of Andrew, Buchanan, Clinton, Dekalb, Gentry and Nodaway Counties. The network will be provide speeds of up to 100 Mbps and will have a dedicated 1 Gigabit education network.
- Windstream Corporation – Windstream is installing asynchronous DSL to bring broadband service to 4,350 homes and 201 businesses in southern Missouri.

[7] For a complete list of projects, as well as a map of project areas, visit www.mobroadbandnow.com.

Figure 2. Middle-Mile and Last-Mile Projects in Missouri[8]



[8] This map was created with data on fiber locations provided by Bluebird Media and Sho-Me Technologie and is current as of July 22, 2013.

Broadband Expansion in Missouri: Non-Infrastructure

The Missouri Department of Higher Education (MDHE) has also been working to expand access to broadband for vulnerable populations through the Pathways to Broadband Access Technology Education Project. Through the project, which received $6.6 million in federal and matching grant funds through NTIA, MDHE has partnered with six community colleges across the state to establish 23 public computing centers, which provide broadband access and digital literacy training. The partner institutions are:

- Jefferson College
- Metropolitan Community College
- Mineral Area Community College
- Moberly Area Community College
- St. Louis Community College
- Three Rivers Community College

As of the late 2012, the project was approved to open two additional centers in New Madrid and Piedmont. More information about Pathways to Broadband Access can be found at: http://dhe.mo.gov/ppc/grants/broadband.php.

Connecting Community Anchor Institutions

Community Anchor Institutions (CAIs) – or schools, libraries, health care organizations, local governments, public safety entities, and other critical community institutions and organizations – are often important points of broadband access within communities. Libraries often provide free public access to broadband, as well as trainings and support services. Schools, community colleges and universities connect students and provide expanded opportunities for learning.

Through *MoBroadbandNow*, Missouri has been collecting data on CAIs and whether they subscribe to broadband. Currently, there are over 5,300 records of CAIs in the state, 75 percent of which have broadband subscriptions.[9]

The ARRA funded broadband projects are helping to connect CAIs across the state as part of their infrastructure expansion. Also critical to the connection of many CAIs across the state is the Missouri Research and Education Network (MOREnet). Founded in 1991 and housed within the University of Missouri, MOREnet provides Internet connectivity, training, and technical support for K-12 schools, colleges and universities, public libraries, local and state government entities, the health care sector, and other affiliated organizations throughout the state on a 1-to-1 aggregation model.[10]

[9] For more information on CAIs in Missouri and broadband, visit http://www.broadbandmap.gov/summarize/state/missouri

[10] For more information on MOREnet, their network model, and the services provided to CAIs, visit http://www.more.net/content/welcome-morenet

Regional Planning Overview

The Planning Process[11]

Beginning in 2010, *MoBroadbandNow* collaborated with the state's 19 Regional Planning Commissions (RPCs) on a regional broadband planning process. Each region formed a Regional Technology Planning Team (RTPT) and engaged stakeholders representing up to 17 sectors in the creation of Broadband Availability and Adoption Strategic Plans.

The regional planning process consisted of two stages: 1) a needs assessment to gather information on broadband in the region from residents, businesses, and sector representatives and 2) the development of a strategic plan to enhance and expand broadband availability and adoption in the region.

Needs Assessments

The regional needs assessments consisted of four central components:

1) Mapping of regional information, including data on broadband service provision;
2) A residential survey;
3) A business survey; and
4) Sector-based online surveys.

The needs assessment process provided baseline data on broadband coverage (speeds and providers), as well as needs, attitudes, and opinions related to broadband availability and adoption. The discussions below will provide further context and explain further the findings from each of the four components.

Mapping

Mapping was foundational to the regional needs assessment process. For each region, reference maps were created showing topography, housing density, and the socio-economic demographics based on free and reduced lunch status of school districts within the region. Based on data from participating providers, service and speed maps were also produced and updated for each region. These maps depict both broadband availability and the number of providers. As a continuing part of the *MoBroadbandNow* initiative, these maps have continued to be updated, showing increases in speed and coverage across the regions (Figures 6 and 7).

[11] *MoBroadbandNow* would like to thank the Regional Planning Commissions, Internet Service Providers, and Missouri residents who have participated and continue to participate in planning, mapping, and data collection efforts.

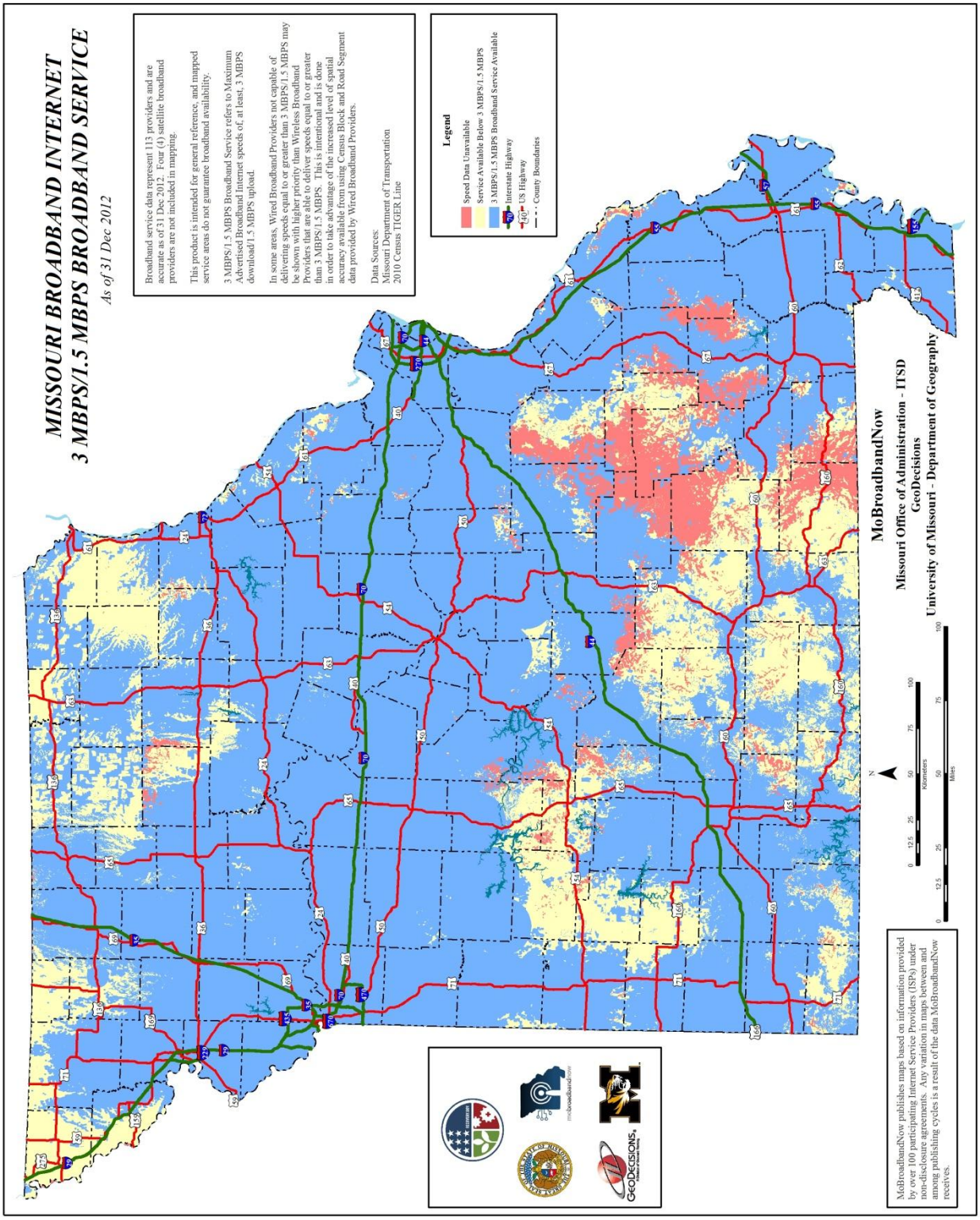
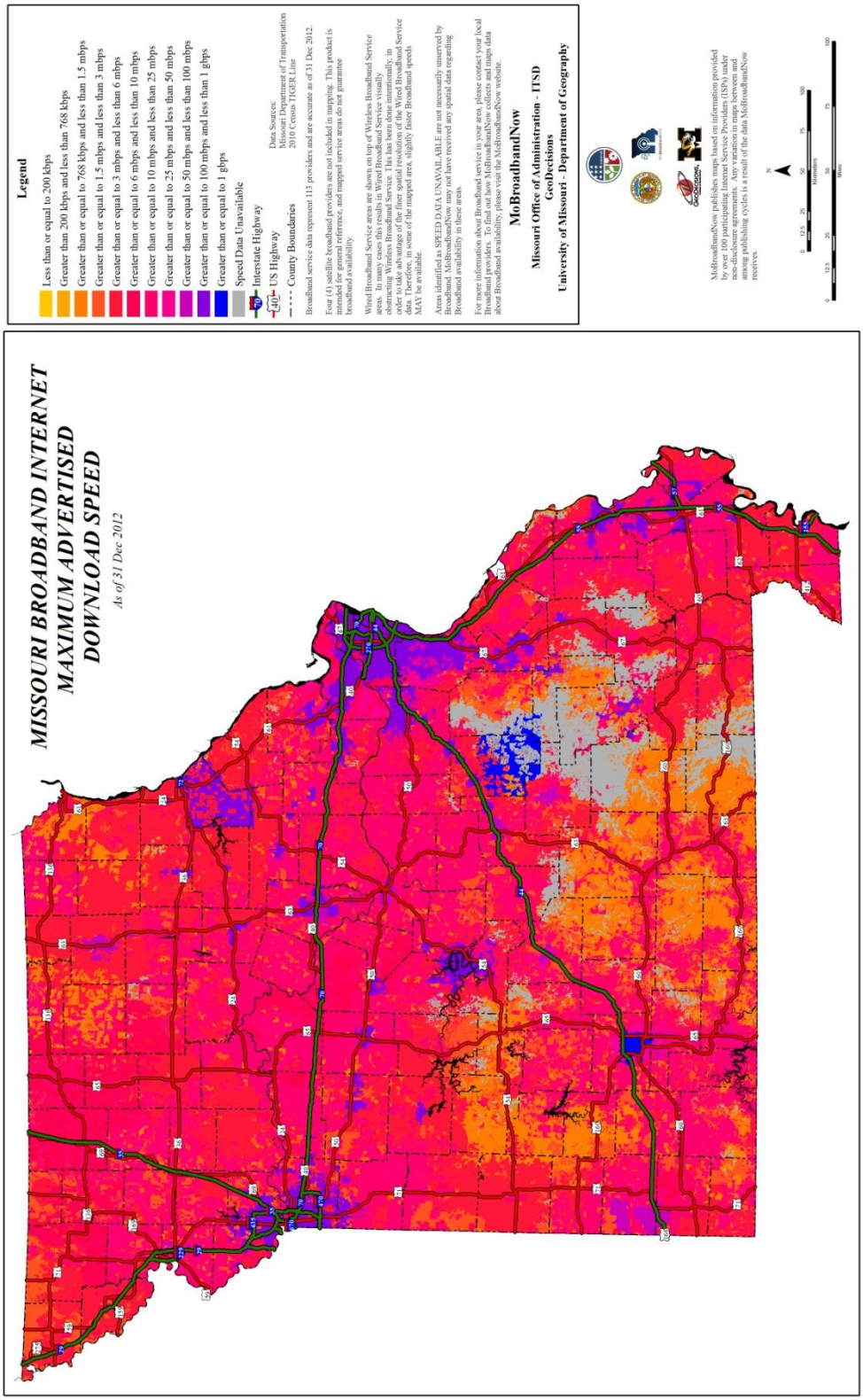
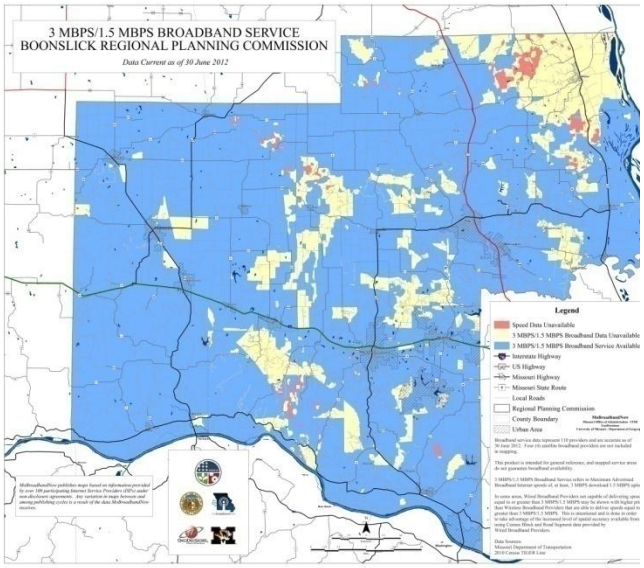


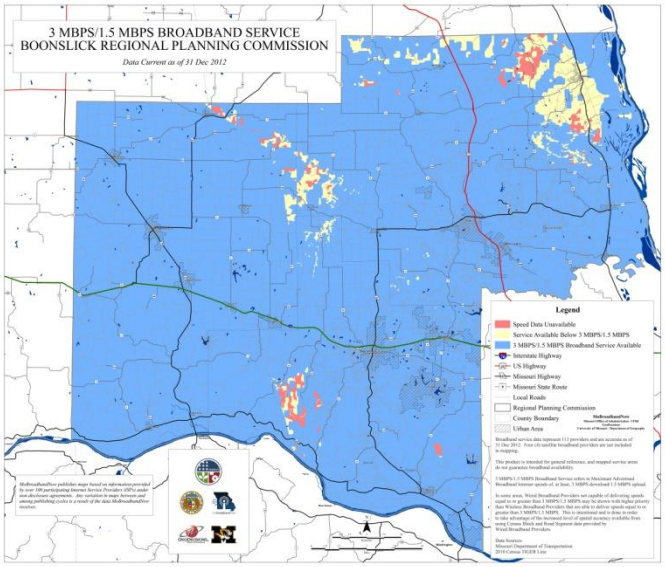
Figure 4. Missouri Broadband Internet Service 3 Mbps/1.5 Mbps as of December 31, 2012

Figure 5. Maximum Advertised Download Speeds, as of December 31, 2012



Figures 6 and 7. Broadband Internet Service at 3 Mbps/1.5Mbps in the Boonslick Region (Lincoln, Montgomery, and Warren Counties), as of June 30, 2012 and December 31, 2012





Residential Survey

A residential survey was conducted in May 2011 to set a baseline understanding of the broadband needs, interests, attitudes, and opinions of Missourians. A total of 76,400 surveys were mailed to households across the 19 regions – 9,825 were returned for a response rate of 13 percent.

The survey data created a statewide picture of broadband adoption and use, as well as regional baselines. It showed that there were areas of great variation in adoption and cost across regions. In the Bootheel, which has the lowest rates of computer and Internet adoption, only 83 percent of residents have adopted computers and 80 percent are Internet adopters (71 percent report adopting broadband). The Mid-Missouri Region has the highest rate of computer adoption at 95 percent, and one of the highest rates of Internet adoption at 92 percent, but broadband adoption within this region falls at only 76 percent. The Lake of the Ozarks Region, similarly, has high rates of computer adoption (92 percent) and Internet adoption (84 percent), but has the lowest rate of broadband adoption in the state (at 48 percent). On the other end of the spectrum, the Mid-America region has a broadband adoption rate of 88 percent – 17 percentage points above the state average (Table 3).

The survey also found that average cost of broadband access varies across the state, from a high of $50/month in the Mo-Kan Region to a low of $37/month in the Harry S Truman Region. These numbers show that different levels of connectedness exist across the state and, as a result, present different challenges when planning for broadband both regionally and at the state level.

Table 3. Adoption and Cost by Regional Planning Commission

Regional Planning Commission (RPC)	Computer Adoption	Internet Adoption	Broadband Adoption	Average cost for Internet ($/month)
Mid-America	93%	93%	88%	48
East-West Gateway	95%	93%	83%	48
Mo-Kan	91%	89%	81%	50
Southwest	93%	93%	80%	43
Northwest	89%	88%	78%	43
Boonslick	92%	88%	77%	44
Mid-Missouri	95%	92%	76%	43
Northeast	89%	87%	76%	43
Green Hills	87%	87%	75%	39
Southeast	93%	89%	74%	43
Harry S Truman	90%	86%	73%	37
Bootheel	83%	80%	71%	40
Pioneer Trails	92%	91%	69%	46
Mark Twain	89%	85%	66%	41
Meramec	92%	88%	66%	43
South Central Ozark	89%	84%	64%	44
Ozark Foothills	87%	81%	55%	41
Kaysinger Basin	87%	84%	54%	41
Lake of the Ozarks	92%	84%	48%	42
Missouri	**91%**	**88%**	**71%**	**43**

Business Survey

An online survey of businesses was also conducted to assess the broadband related needs, interests, attitudes, and opinions of the business community. A total of 1,182 businesses completed the survey between April and October of 2011. The survey was primarily completed by small businesses – 77 percent reported having 25 or fewer employees and 90 percent reported having 100 or fewer. Of those businesses completing the survey, 95 percent have Internet access and 5 percent do not. Survey results indicate that the vast majority of Missouri businesses view broadband as important or very important (98 percent). Most businesses report that they have a broadband connection, and that enhanced broadband in their respective regions would benefit their operations (95 percent).

Table 4. How are Missouri Businesses Using Broadband? (Top 5 Responses)

Application	Percent of Businesses
Email	82%
Website Applications	56%
Banking	54%
File Sharing	44%
Research	43%

Sector Surveys

Sector surveys were also conducted in each of the regions, focusing on broadband needs specific to industry and citizens. Sector representation included agriculture, economic development, education, energy, healthcare, libraries, public safety, tourism, and workforce

development, among others. Across regions, strengths were identified in some sectors, while weaknesses were identified in others. Across sectors, respondents expressed frustration with available broadband speeds. They also stated that improved broadband speeds and accessibility would benefit not only the sector they represented, but other sectors as well.

Analyzing Opportunities and Challenges

A central component of the strategic plan development was a Strengths, Weaknesses, Opportunities, and Challenges (SWOC) analysis.[12]

Each RTPT identified the top five strengths, weaknesses, opportunities, and challenges as they pertained to broadband availability and adoption in their region. The identified strengths provided a basis on which goals and objectives for accessibility and adoption could be built, while the identified weaknesses provided an overview of issues that would need to be addressed. Tables 5 and 6 show the similarities among the regions in identified strengths and weaknesses. The identification of opportunities provided insight into how broadband capabilities could be enhanced (Table 7). The final step was analyzing what challenges might exist to taking advantage of strengths and opportunities to expand and enhance broadband in the region (Table 8).

> I think it is very important to improve the broadband experience in individual homes. Many rural areas can only access broadband through their library. If libraries do not have excellent broadband then many, many people would be without a connection to the world. We get many patrons coming in to use our computers because they can only access certain job applications online or other information is only online. Industry and for that matter the world expects everyone to be able to access everything online.
>
> - Library Sector Survey Response, Green Hills Region

[12] For each region's SWOC analysis or to view regional plans, visit the *MoBroadbandNow* Regional Planning page: http://mobroadbandnow.com/regional-planning/

Table 5. SWOC Analysis – Strengths

Strengths	% of Regions Identifying
Substantial broadband user base to build upon	94.1%
Vote getting sectors exhibiting strengths	70.6%
Broadband/internet applications being well utilized	70.6%
Business support for broadband deployment/business driver	52.9%
Large number of providers	41.2%

Table 6. SWOC Analysis – Weaknesses

Weaknesses	% of Regions Identifying
Residents without broadband service	100.0%
Residents and businesses dissatisfied with connection speed, reliability, number of providers	94.1%
Limited connectivity in rural/remote areas	58.8%
Many necessary applications cannot be effectively, efficiently, or uniformly implemented when there is a lack of robust broadband and a lack of internet and digital literacy	76.5%
Economic development, education, etc. hindered by lack of broadband	47.1%

Table 7. SWOC Analysis – Opportunities

Opportunities	% of Regions Identifying
Those with broadband want more choice/capacity	100.0%
A high value is placed on internet access and broadband within the region	94.1%
Broadband development is associated with growth in all sectors	94.1%
Those without broadband want it and are willing to pay for it	82.4%
Specific sectors (e.g. healthcare, economic development) were seen as providing growth opportunities for broadband	70.6%

Table 8. SWOC Analysis – Challenges

Challenges	% of Regions Identifying
Technology/Computer/Broadband Valuation	88.2%
Challenges within specific sectors	88.2%
Digital divide/digital literacy	82.4%
Balancing speed and affordability	64.7%
Competition desired in areas that have trouble supporting single providers	52.9%

Across Missouri, there is a base of broadband users to build on (a strength), and people who have broadband expressed that they want more choice and capacity while those without broadband expressed a willingness to pay for it (opportunity). However, many Missourians remain without broadband or with limited connectivity, particularly in rural or remote areas (weakness). There are also challenges related to broadband and technology valuation and digital literacy. Regions also identified more regionally-specific strengths, weaknesses, opportunities, and challenges. These include well developed co-op systems (strength); the need for more digital-based skills in the workforce and weakened economic development in underserved areas (weakness); the active use of available public computers at libraries and the availability of grant funds to support broadband (opportunities); and brain drain from the region and getting providers to provide service in areas that do not meet traditional ROI models of service provision (challenges).

The results of the SWOC analysis show the regions have both a number of strengths to build upon and opportunities to address when planning for broadband, as well as a number of challenges to overcome. The consistency in identified strengths, weaknesses, opportunities, and challenges creates a basis for understanding what assets can be leveraged and what challenges may exist statewide.

Goals and Outcomes

The regional planning process focused on the two central goals of expanding broadband availability and increasing adoption. Each region identified specific short, medium, and long term goals as well as accompanying action items or objectives. Five overarching goals in the areas of availability and adoption were identified as follows:

- ***Availability***
    - **Expand broadband availability so that it meets or exceeds the Governor's goal of 95% availability within the region** – Objectives for meeting this statewide goal at the regional level include:
        - Working with providers to design initiatives to expand broadband to target areas (leveraging data collection and mapping efforts);
        - Exploring community assets (i.e. water towers) that could be used to expand availability;
        - Gaining an understanding of state and local regulations as they apply to broadband deployment and development; and
        - Leveraging existing activities occurring at community anchor institutions.
    - **Expand broadband capacity throughout the region –** Objectives in this area include:
        - Partnering with providers to target underserved areas for capacity expansion;
        - Creating and expanding competition;
        - Improving speed; and
        - Expanding technology choice.
- ***Adoption***

- **Increase access to affordable broadband options –** Objectives to increase affordable options include:
    - Working with providers to develop or expand low-cost broadband options;
    - Exploring the potential of using regional educational facilities with computer labs and good broadband connections for after-hours use and programs; and
    - Creating new and expanding existing public computing facilities.
- **Increase digital literacy –** Literacy objectives include:
    - Enhancing existing and developing new digital literacy programs; and
    - Strengthening or sustaining outreach to achieve the highest possible perceived value of computers, the Internet, and broadband.
- **Increase computer access and device ownership –** To meet this goal, objectives include:
    - Working to ensure access to residents of the region who want computers but who do not have them;
    - Evaluating existing example programs that provide low-cost tablet computers or allow computer reclamation and repurposing efforts.

2013 Residential Survey Summary

A second residential survey was conducted from April to June 2013. The survey had a response rate of 12 percent, with responses from all Missouri counties. Just over three-quarters of survey respondents self-reported as living in a rural area and nearly 28 percent reported income from farming related activities. Slightly more than 90 percent of respondents reported having a home computer, and slightly more than 80 percent said they had home Internet service.

Survey data show that nearly 73 percent of respondents report receiving Internet service through DSL, cable modem, cellular (air card), or fixed wireless technologies – technologies considered capable of providing broadband access (another 5.4 percent report that they do not know what technology they subscribe to). However, when asked if they consider their current Internet service as high speed Internet, only 65.8 percent of respondents said yes. This may reflect the disparity in the base speeds used to define broadband and those needed to support many of today's user applications.

Missourians with Internet service report paying on average $46.95/month for home Internet service. Those without home Internet service report a willingness to pay $17.75/month for basic Internet service and $28.87 month for broadband – a difference of $20-$30/month. This disparity reflects cost as a barrier to adoption (reported by 43 percent of non-adopters as a reason for not having Internet service).

Eight States – Broadband and Missouri's Neighbors

Arkansas **Access:** 97.3% **About:** The Connect Arkansas Broadband Act was signed into law by Arkansas Governor Mike Beebe on March, 28, 2007 to improve the lives or Arkansas residents and create economic opportunity in the state. *Connect Arkansas* is a private, non-profit corporation and project of the Arkansas Corporation Group. *Connect Arkansas* works to demonstrate the applications of the Internet in daily life using a "community-by-community approach" and focusing on mapping, community strategic planning, and the development of public access points. **Online:** www.connect-arkansas.org	**Kansas** **Access:** 98.1% **About:** The Kansas Statewide Broadband Initiative (KSBI) is an initiative of the Kansas Department of Commerce to maximize the use and application of broadband technologies across the state. KSBI works with broadband service providers to create service maps and pinpoint gaps in broadband availability across the state. Kansas has produced county-level broadband service maps, completed a residential technology assessment, and is collecting stories from Kansas about how broadband access has impacted their lives. Local technology planning efforts are being piloted in several communities to establish and foster best practices to improve broadband access across the state, particularly in rural underserved areas. **Online:** www.kansascommerce.com
Illinois **Access:** 99.5% **About:** *Broadband Illinois* (Partnership for a Connected Illinois) is a statewide non-profit working to ensure that Illinoisans have both access to broadband and the ability to use broadband by collaborating with service providers to collect data and create coverage and speed maps, convening stakeholders to find solutions for underserved areas of the state, and supporting broadband education. *Broadband Illinois* has 10 regional eTeams working across the state to address challenges related to broadband and create "an organized system for ongoing development of broadband access" throughout Illinois. In 2012, *Broadband Illinois* launched the Illinois Broadband Innovation Fund, which awarded $500,000 to 14 projects with the goal of enhancing quality of life through broadband technology. Illinois also launched the Illinois Gigabit Communities Challenge, which has awarded a total of $4 million to three projects – in Evanston, Aurora, and Mid-South Chicago neighborhoods – to the deployment of promising ultra-high speed projects as part of Illinois Jobs Now!, an economic development program. **Online:** www.broadbandillinois.org	**Kentucky** **Access:** 95.7% **About:** The Commonwealth Office of Broadband Outreach and Development (OBOD) was established by Governor Beshear in 2010 to identify areas of Kentucky that are underserved and unserved by affordable broadband and to build the understanding and partnerships necessary to expand broadband access and adoption to all Kentuckians. OBOD maps broadband providers and technologies, reviews and supports grants requests related to the expansion of broadband infrastructure in Kentucky, works with communities to educate residents and businesses on economic development benefits of expanded broadband access, and works to promote an understanding of broadband technologies. OBOD has established five regional planning teams and has developed five e-learning modules: the cloud, online security, remote work, e government, and rural broadband. **Online:** http://finance.ky.gov/initiatives/broadband/

Iowa **Access:** 98.4% **About:** In May 2009, Iowa established the Iowa Broadband Deployment Governance Board through I-JOBS (the Iowa Infrastructure Investment Initiative) to serve as a governance board for broadband technology grants and for the deployment of a sustainable broadband infrastructure in Iowa. Iowa contracted with Connected Nation for broadband mapping and planning. *Connect Iowa*, a subsidiary of Connected Nation, is working in partnership with the Iowa Economic Development Authority, on mapping efforts. *Connect Iowa* is also creating a plan for broadband deployment in Iowa. In September 2013, Gov. Terry Branstad announced "Connect Every Iowan," an initiative to increase adoption, access, and use of broadband technologies. **Online:** www.connectiowa.org	**Nebraska** **Access:** 98.4% **About:** The *Nebraska Broadband Initiative* sees broadband as the foundation for economic growth, job creation, global competitiveness, and improved quality of life in Nebraska. The initiative has three primary goals: increasing broadband adoption and utilization, particularly in unserved and underserved areas; working regionally to develop broadband adoption and utilization plans; and increasing the understanding of broadband's importance for economic growth in the Nebraska. In November 2011, the Nebraska Public Service Commission established the Nebraska Broadband Pilot Program under the Nebraska Universal Service Fund to provide support for broadband and reduce the deployment gap in under- and unserved areas of the state. **Online:** www.broadband.nebraska.gov
Oklahoma **Access:** 98.6% **About:** The *Oklahoma Broadband Initiative* is working to expand "easy and accessible broadband to citizens, community anchor institutions and businesses across the state." The Initiative has two phases: the Oklahoma Broadband Mapping project and the Oklahoma Community Anchor Network. The Oklahoma Broadband Mapping project collects broadband data and identifies assets and gaps. The comprehensive mapping data is used to make decisions and allocate resources to under- and unserved areas. The Oklahoma Community Anchor Network, which will address demand for better broadband infrastructure, the need of increased bandwidth, and the urban-rural disparity in access. **Online:** www.ok.gov/broadband	**Tennessee** **Access:** 97.9% **About:** *Connected Tennessee* partners with businesses, government entities, and universities to accelerate technology deployment and adoption in the state. In 2007, a widening divide was found between Tennesseans with access to broadband and those without access, particularly between those Tennesseans living in urban areas and those in rural areas. *Connected Tennessee* is working to change the "technological landscape" of the state by creating both a forum for interaction among stakeholders and incentive to bring these stakeholders together around the topics of technology deployment, technology use, and digital literacy. *Connected Tennessee* has two primary programs: C4K and Every Community Online (ECO). Through $2.3 million in federal funding, the C4K program has given more than 4,000 computers to disadvantaged youth across the state, including 1,400 youth aging out of the Department of Children's Services (foster care) program. C4K has also offered over 43,000 hours of computer training to Boys & Girls Clubs. ECO offers free online skills training courses with the goal of connecting Tennesseans with their communities through increased knowledge of how to use a computer, navigate the Internet, and use e-mail as a communication tool. Online: www.connectedtn.org

Broadband in the Delta Region

The Delta Regional Authority (DRA) is a Federal Agency working to improve quality of life and enhance economic development for 10 million people in 252 counties and parishes in Alabama, Arkansas, Illinois, Kentucky, Louisiana, Mississippi, Missouri, and Tennessee. DRA has the iDelta initiative, which is working to expand broadband infrastructure, increase both computer and Internet adoption, and enhance economic development through technology in the Delta Region.

The Delta Region is falling behind the rest of the country when it comes to broadband access and adoption. Seven of the eight states in the Delta Region are at or below the national average of 98.2 percent broadband access. Additionally, the DRA estimates that 18 percent of the counties and parishes in the region lack high speed Internet access.

Recognizing the challenges posed by portions of the Delta Region being under- or unserved by broadband, and broadband's potential as a driver of economic growth, the DRA published two reports in 2007 – *iDelta: Recommendations for Information Technology in the Delta*, Volumes I and II. The first report found that "DRA counties and parishes generally trail non-DRA counties and parishes in U.S. in accessibility, awareness, and utilization of broadband infrastructure and resources" and that these resources are "absolute necessities for individual, business, government and instructional success." The report made specific recommendations related to Geographic Information Systems (GIS), telehealth, community access, awareness, distance education, workforce development, and e-government.

In October 2012, the DRA hosted a Broadband Summit in Memphis, Tennessee, to discuss challenges and opportunities related to broadband in the delta region. A full-length recording of the event is available on Connect Arkansas TV: http://www.livestream.com/connectartv.

State Broadband Priorities

The regional planning process, with its wide base of citizen engagement, helped to build the foundation for a state broadband plan. Increasing broadband availability and adoption can have wide-reaching benefits for Missouri statewide, as well as its regions. Focusing on specific sectors can help leverage the fullest potential of broadband for Missouri residents, businesses, and communities. This report explores five priority sectors identified through the regional planning process and their related broadband applications.

Healthcare

Enabled by high-speed broadband connections, telemedicine has the potential to change the face of healthcare in rural Missouri. Telemedicine allows information to be shared between local healthcare facilities, often small hospitals or rural clinics, and specialists at other locations. Large files, such as MRIs, x-rays, or CT scans can be sent for interpretation, sometimes in real time. Telemedicine can help local health care providers make critical and time sensitive decisions – such as when treating a stroke – and can save patients undergoing routine care time and expenses in transportation and working days lost. Broadband is essential to the implementation of Health Information Technology, particularly Electronic Health Records (EHR), or electronic versions of patients' paper charts, which can improve the quality and coordination of patient care, result in better health outcomes and cost savings, and allow patients to participate more fully in their care.[13]

HEALTHCARE

The use of broadband in rural Missouri is a very personal thing to me. In 2007, I suffered a major heart attack that resulted in the placement in my chest of a combination pacemaker and defibrillator known, as an ICD. This device both regulates my heart rate and can serve as an on board defibrillator to shock my heart if needed. These new devices also contain what amounts to a small computer that tracks and stores information about my heart. This is where broadband comes into the picture.

I live in a rural area over a half hour from the nearest hospital and nearly two hours from Washington University, where my heart information is reviewed. Through the use of broadband, I am able to upload the information gathered on my heart each week at home. The device takes less than a minute to scan my implant and then sends that information to my cardiologist for review. This allows me to only visit the doctor twice a year for a checkup.

My use of broadband for my medical care is at the bottom level of what technology can do. Imagine where we can go and how we can save patients' time and money in the future by gathering information for medical providers without the need to travel. In many cases and certainly for an aging population scattered in rural areas, the use of broadband can literally be a lifesaver.

-Telemedicine patient, Meramec Region

In cardiology we can also have the ability to do ECG analysis from the ambulance. This can save precious time. Now if a patient activates 911, the ambulance arrives, does an ECG and remotely sends it to the physician for an instant read…In a heart emergency saving precious minutes can make all the difference because 'time is muscle' when you are having a heart attack.

- Nurse Practitioner, Kaysinger Basin Region

[13] For more information on EHRs, visit http://www.healthit.gov/

Broadband also allows for real-time health monitoring of chronic conditions with in-home monitoring devices.

- Ensure that all healthcare providers have access to affordable broadband at the speeds they need to reduce costs and improve efficiency and quality of care
- Ensure that everyone – from healthcare providers to patients – has the training they need to use the relevant technology effectively

Agriculture

Missouri does $12 billion a year in agricultural sales –$8 billion in crop sales and $4 billion in livestock sales.[14] Agriculture is an information dependent industry, and broadband can provide the agricultural community with real-time access to information for tracking markets, watching weather forecasts, and remotely monitoring crops or livestock. These technologies are already being deployed in the field to enable precision agriculture applications. In addition to those benefits, broadband can help build new connections and relationships between producers and consumers through social media or web-based direct marketing.

- Engage farmers in the use of on-farm technology applications to encourage the long-term sustainability of agriculture in Missouri
- Engage providers and policy makers in conversations about the broadband needs of the agriculture sector and our rural agricultural communities

ECONOMIC DEVELOPMENT

I am a freelance reporter in Greenview, Missouri. I write for several newspaper, radio and online publications on a weekly basis. I cover breaking news, municipal meetings, events and I also write feature stories about local persons of interest. I also publish photo galleries of local events.

I have dial up internet and when I have to send large photo files I have to go to places that have WiFi. This is expensive and time consuming.

It is important that I get the news out fast. Old news is not news.With dial up it is pretty much impossible to compete with other news organizations.

I also volunteer as a promoter for many non-profit organizations helping them with fundraisers and other events. I very much need faster Internet in order to survive in this business.

In this economy I found writing freelance from home for several publications paid better than writing for one small local newspaper. I still don't make enough money to cover my needs but if I had high speed Internet I could improve my income.

- Freelance Writer, Lake of the Ozarks Region

As a business in northern Missouri, broadband could help support our efforts of expansion in the future. Because we depend on fast connection to Internet services, upgrading the speed for our users would be a benefit to our company and to future employees. While we now have approximately 300 employees within our brick/mortar location, excellent broadband service could help our business expand into virtual work. It is vital we have the fastest, best broadband available before entertaining the idea of adding to our workforce. We currently have a virtual group of employees in one of our California offices…Virtual work seems to be the way of the future with a study indicating about 76% of work may be done from home bases as early as 2014 for our industry.

- Research Center Manager, Northeast Missouri Region

[14] Data from the Missouri Department of Agriculture.

Economic Development

Broadband is increasingly recognized as an important economic development driver – one that can enhance and expand markets for existing businesses and provide opportunities to attract new businesses, including technology-based and information services companies. Broadband is highlighted in Missouri's Strategic Initiative for Economic Growth, a roadmap for future economic growth led by the Department of Economic Development.[15] The final report notes the potential of broadband to make Missouri a national leader in "rural-sourced jobs." Reliable, high speed Internet can also provide opportunities for telework and home-based businesses.

- Put broadband at the forefront of regional economic development strategies, helping to keep Missouri's regions competitive in the 21st century economy
- Provide the broadband infrastructure necessary to allow Missourians to take advantage of opportunities for telework, whether it be occasional or full time
- Provide small businesses and their employees with the tools and training necessary to effectively use broadband and remain competitive in the 21st century economy

Public Safety

Broadband can provide a number of benefits to the public safety community, from improving emergency response to sending critical emergency information and connecting with communities. Broadband can improve 9-1-1 services, allowing 9-1-1 call centers to receive information in multiple formats (text, image, video) and can provide first-responders and emergency personnel access to critical communications and information on the scene. The First Responder Network Authority (FirstNet), a central component of the National Broadband Plan, is working to create an interoperable nationwide public safety broadband network.[16] This will allow first responders to send and receive information quickly and in multiple formats, and to communicate with other first responders across jurisdictional lines. Broadband also offers opportunities for public safety entities to communicate directly with communities – either by communicating formally through notification and alert systems or by connecting and sharing information more informally through social media.[17] However challenges remain – in Missouri, there are still 16 counties without E-9-1-1, which allows 9-1-1 call center operators to locate a call made from a wireless device or cell phone.

[15] The final report on the Strategic Initiative for Economic Growth can be found at http://www.ded.mo.gov/Content/Missouri%20Strategic%20Initiative%20for%20Economic%20Growth,%204-11-11%20final.pdf

[16] For more on FirstNet, visit http://www.ntia.doc.gov/category/firstnet

[17] The Seattle, Washington Police Department has 51 twitter accounts, called "Tweets by Beat," which inform communities about local crime, with a one hour delay to protect officers and crime scenes. For more information about Tweets by Beat, visit http://www.seattle.gov/police/tweets/.

- Assess the use of broadband and related technologies by public safety agencies across the state
- Determine if the right tools are in place for public safety personnel to leverage broadband
- Work to expand E-911 coverage to counties that are currently without it by working with broadband providers and other state and local stakeholders

Education

Broadband can have many positive impacts on education, from extending learning beyond the classroom, to increasing opportunities for distance learning, as well as increasing curriculum offerings at the elementary, secondary, and higher education levels. Access to broadband and related learning platforms can provide Missouri's students at all levels with skills that are critical for jobs in the 21st century workforce. Missouri has already show commitment with the Missouri Virtual Instruction Program (MoVIP), a virtual online instruction program for students statewide started in 2007. MoVIP has expanded course offerings and made courses available to students who may not have those offerings in their districts, or who cannot attend school for medical reasons.[18] In 2013, Missouri partnered with Western Governors University, an accredited online university, to form WGU Missouri through an Executive Order, expanding online post-secondary education access in Missouri.[19]

EDUCATION

In order to reduce the social achievement gap and to produce educational equality for all students, we must be responsive to improvements in educational quality. This would include expanding the opportunity for cost efficient broadband to schools and communities in rural Missouri. The argument that broadband expansion in the most outlying rural areas is cost prohibitive is offensive when we consider the opportunities lost for our children.

Technology has already changed the learning experience of students in tertiary education several times during the last generation. The introduction of the personal computer gave instructors and students new ways to compose documents and to compute or maintain databases. The switch from chalkboards to projectors and interactive media changed the format of classroom instruction. The introduction of online course delivery and parent grade and lesson portals now give unprecedented access to material.

The students of today are not those for which the current educational infrastructure is designed. With the increasing pace of technological development, teachers attempt to apply strategies to communicate with students of the net generation and to shape enticing educational experiences for them. Technology advances such as mobile devices in the classroom (i.e., the iPad), offer immediate access for every student to engage in flexible, adaptive learning. As schools transform their formats to deal with the new generation of students and their new ways of learning, the lack of broadband or reliable Internet in rural schools, creates a chasm of disparity and an unleveled playing field.

-Director of Curriculum, South Central Ozark Region

[18] More information on MoVIP is available on the MoVIP website: http://www.movip.org/
[19] More information on WGU Missouri is available on the WGU Missouri website: http://missouri.wgu.edu/

- Increase access to online instruction and distance learning opportunities
- Ensure that all Missouri schools have the broadband connections they need to support new and emerging learning and testing platforms
- Ensure that educators have the training they need to effectively use broadband technology in the classroom

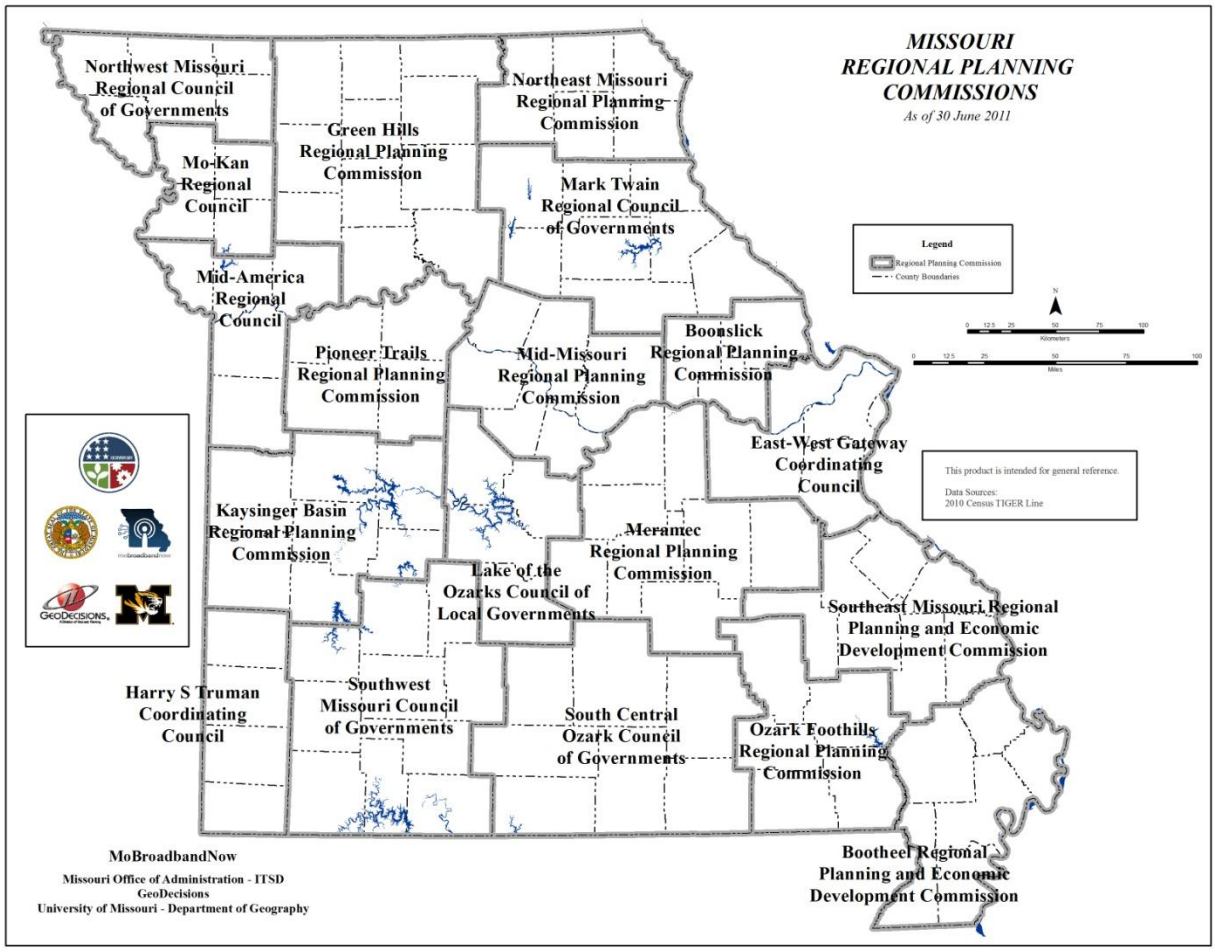
Conclusion

Since 2009, significant federal, state, and private sector investment has been made in broadband in Missouri. With that investment, rates of access have increased and many of the under- and unserved areas of the state have seen improvements in service and in broadband options. In 2009, overall broadband availability for the state was calculated at 79.7 percent at a speed of 768kbps downstream and 200kbps upstream. According to the most recent data from the National Broadband Map, 97.8 percent of the state has access to broadband at speeds of 3Mbps downstream and 768kbps upstream – including both wired and wireless service. In rural areas, 92.5 percent of residents have access to broadband at these speeds. The data show that both geographic coverage and speeds have increased – in fact, high-speed connections are now available to many Missourians who, just a couple of years ago, only had access to dial-up.

While much progress has been made, there is still much to do. Missouri still lags much of the nation in broadband adoption rates – ranking 41st out of 50 states and the District of Columbia[20] – and within the state, there are disparities in both access and adoption between urban areas and rural ones. Broadband offers significant potential in Missouri, and continued investment, both in expansion and in sector-specific applications, will be key to realizing its full potential for the state and its residents.

[20] For more information on states and broadband adoption, see "Exploring the Digital Nation." http://www.ntia.doc.gov/files/ntia/publications/exploring_the_digital_nation_-_americas_emerging_online_experience.pdf. Missouri also ranks 40th in terms of computer adoption, and 43rd in urban broadband adoption. However, Missouri is 29th in broadband adoption in rural areas. Nationally, 69 percent of households have adopted broadband. In Missouri, 63.6 percent of households have adopted broadband.

Appendix A: Missouri Regional Planning Commissions



Appendix B: Broadband Resources

General:

Connected Nation: www.connectednation.org

Delta Regional Authority: www.dra.gov

FCC Broadband: www.fcc.gov/broadband

National Broadband Map: www.broadbandmap.gov

National Broadband Plan: www.broadband.gov

NTIA State Broadband Initiative: www2.ntia.doc.gov/SBDD

Pew Internet & American Life Project: www.pewinternet.org

"Exploring the Digital Nation: America's Emerging Online Experience." NTIA, Economics and Statistics Administration, and US Department of Commerce. www.ntia.doc.gov/files/ntia/publications/exploring_the_digital_nation_-_americas_emerging_online_experience.pdf

"Understanding Internet Non-adoption: Fulfilling Missouri's Digital Promise." www.mobroadbandnow.com

"US Broadband Availability, June 2010-June 2012." NTIA Broadband Brief. www.ntia.doc.gov/files/ntia/publications/usbb_avail_report_05102013.pdf

Agriculture:

"The Benefits of Expanded Broadband for Missouri Farms and Agribusinesses." Community Policy Analysis Center, University of Missouri. www.cpac.missouri.edu

"Broadband Access, Usage, and Potential on Missouri's Farms and in Rural Communities." www.mobroadbandnow.com

Broadband Planning:

"Planning and Broadband: Infrastructure, Policy, and Sustainability." www.planning.org/apastore/Search/Default.aspx?p=4193

Digital Literacy:

Connect2Compete. www.connect2compete.org

Building Digital Communities. www.imls.gov/about/building_digital_communities.aspx

DigitalLearn.org. www.digitallearn.org

DigitalLiteracy.gov. www.digitalliteracy.gov

"Dissecting Missouri's Digital Divide: A Study of Residential Broadband Adoption and Availability in the State of Missouri." www.mobroadbandnow.com

Everyone On. www.everyoneon.org

NTIA Broadband Adoption Toolkit. www2.ntia.doc.gov/files/toolkit_042913.pdf

Healthcare:

American Telemedicine Association. www.americantelemed.org

Healthcare Connect Fund Fact Sheet. www.fcc.gov/document/healthcare-connect-fund-fact-sheet

Missouri Telehealth Network. http://medicine.missouri.edu/telehealth/

Libraries:

"Building Digital Inclusion: Broadband and Missouri's Public Libraries." www.mobroadbandnow.com

Information Policy and Access Center, Community Access and Public Libraries. http://ipac.umd.edu/survey/analysis/community-access-public-libraries

"Opportunity for All: How the American Public Benefits from Internet Access at US Libraries." Institute of Museum and Library Services. http://tascha.washington.edu/usimpact

Rural Communities:

"Broadband Availability Beyond the Rural/Urban Divide." NTIA Broadband Brief. www.ntia.doc.gov/files/ntia/publications/broadband_availability_rural_urban_june_2011_final.pdf

"Broadband Internet's Value for Rural America." USDA Economic Research Service. www.ers.usda.gov/publications/err-economic-research-report/err78.aspx

"Rural Broadband at a Glance, 2013 Edition." USDA Economic Research Service. www.ers.usda.gov/publications/eb-economic-brief/eb23.aspx

USDA Rural Utilities Service Broadband Initiatives Program. www.rurdev.usda.gov/utp_bip.html

Appendix C: Glossary of Broadband Terms

4G – Fourth generation of cellular wireless standards; the successor to 2G and 3G networks.

Backbone - The part of a communications network that acts like the central nervous system, a central hub from which all parts of the network extend.

Backhaul – The communications link that is used to transport voice and traffic from a remote point, such as a wireless base station, to a central network location.

Bandwidth – The amount of data that can flow in a given amount of time, measured in kilobits per second or megabits per second. Along with latency, bandwidth is a key factor in how end-user experience broadband performance.

Broadband -- Internet that is faster than dial-up and that is always on. Broadband Internet can be delivered through a range of technologies, including cable, telephone lines, and fiber. The speed definitions for broadband continue to change with user demands. Currently, the National Broadband Map uses a definition of 3Mbps downstream and 786kbps upstream. The Federal Communications Commission uses a definition of 4Mbps/1Mbps. At this speed, applications include email and web browsing, Voice over Internet Protocol (VoIP), streaming music, and streaming standard definition video.

BPL (Broadband over PowerLine)- Delivery of broadband over the existing low- and medium-voltage electric power distribution network at speeds that are comparable to DSL and cable modem speeds. BPL is an emerging technology with significant potential -- power lines are installed virtually everywhere.

Cable Modem- Enables cable operators to provide broadband using the same coaxial cables that deliver pictures and sound to your TV set. Most are external devices with two connections: one to the cable wall outlet, the other to a computer. They provide transmission speeds of 1.5 Mbps or more.

Community Anchor Institutions- Schools, libraries, medical/healthcare providers, public safety institutions and other community support organizations and agencies that provide outreach, access, equipment and support services. They work to facilitate increased use of broadband service by underserved populations.

Dark Fiber – Fiber optic cable that has been installed but that is not in use, in contrast to lit fiber.

Dial-up connection- A data communications link that is established when the communication equipment dials a phone number and negotiates a connection with the equipment on the other end of the link. It provides the ability to dial-up the Internet, at speeds up to 56 Kilobits per second (Kbps), via a modem over standard telephone lines.

DSL (Digital Subscriber Line)- Wireline transmission technology that transmits data faster than dial-up over traditional copper telephone lines already installed to homes and businesses. DSL-based broadband provides transmission speeds ranging from several hundred Kbps to Mbps.

End User – A customer (residential, business, or institutional) that uses broadband for its own purposes and does not resell it.

Fiber Optics - A technology that converts electrical signals carrying data to light and sends the light through transparent glass fibers about the diameter of a human hair. Fiber optic transmits data at speeds far exceeding current DSL or cable modem speeds, typically by tens or even hundreds of Mbps.

Fiber-to-the-Home (FTTH) – Also called Fiber-to-the-Premise (FTTP), a last mile technology in which fiber is extended all the way to the customer's location.

Gbps – Billions of bits per second, a unit used to measure data speed.

Internet Service Provider (ISP) – A company that connects homes and businesses to the Internet and often owns, operates, and maintains the last-mile infrastructure that connects end-users to the Internet.

Kbps - Kilobits or thousands of bits per second, a unit used to measure data speed.

Last mile- Portion of network that provides broadband service to end users or end-user devices (including households, businesses, community anchor institutions, public safety entities, and critical community facilities).

Latency – The time it takes for a packet of data to travel from one point in a network to another. Along with bandwidth, latency, which is usually measured in milliseconds, is a key factor in how end-user experience broadband performance.

Long Term Evolution (LTE) – A standard in mobile network technology that supports an increase in the capacity and speeds of wireless networks, with peak download speeds of 100mbps and peak upload speeds of 50mbps.

Mbps – Megabits per second, a unit used to measure data speed.

Megabyte – One million bytes, a unit used to measure data storage capacity or computer memory.

Middle mile - Network infrastructure providing transport and transmission of data communications, but not delivering services to end users. May include interoffice transport, backhaul, internet connectivity, or special access.

Point of Presence – A physical location that houses servers, routers, switches and aggregation equipment, and where an communications provider allows other providers to connect to its network.

Rural – For the purposes of this report, rural refers to non-metropolitan and non-micropolitan counties. For more information on rurality, visit http://www.raconline.org/amirural.

Satellite- Another form of wireless broadband that is also useful for serving remote or sparsely populated areas. Speeds may be slower than DSL and cable modem, but can be about 10 times faster than the download speed available with dial-up Internet access.

Served Area- Service area where more than half of households meet minimum access and speed requirements and adoption/subscription rates exceed 40%.

Service Area – The area within which an Internet Service provider offers broadband service.

State Broadband Initiative – Funded by NTIA through the American Reinvestment and Recovery Act, the State Broadband Initiative is led by state entities and non-profits and works "to facilitate the integration of broadband and information technologies into state and local economies." NTIA awarded $176 million to collect broadband availability data and $117 million for state-driven projects, such as regional broadband planning and technical assistance.

Take Rate – The number of potential customers that subscribe to broadband service within a defined service area.

Triple play – The provision of broadband, cable, and telephone as a bundled service by an Internet Service Provider.

Underserved Area- Service area, consisting of one or more contiguous census blocks, where half the households lack access to minimum broadband service, or an area where no land or mobile service offers broadband with at least 3 Mpbs, or areas where less than 40% of households subscribe to any service.

Unserved Area- Service area, made up of one or more contiguous census blocks, where at least 90% of households lack access to facilities-based minimum broadband service, either fixed or mobile.

Urban – For the purposes of this report, urban refers to metropolitan and micropolitan counties, non-rural.

Wireless- Connects a home or business to the Internet using an over-the-air radio link between the customer's location and the service provider's facility. Wireless broadband can be mobile or fixed.(see also, fixed wireless).

Appendix D. Speed Availability by County[21]

County	Download > 0.768 Mbps, Upload > 0.2 Mbps	Download > 3 Mbps, Upload > 0.768 Mbps
Adair County	100%	100%
Andrew County	100%	100%
Atchison County	99.1%	87.9%
Audrain County	99.8%	99.9%
Barry County	97.8%	90.0%
Barton County	99.8%	91.6%
Bates County	100%	98.1%
Benton County	97.3%	77.6%
Bollinger County	90.2%	88.4%
Boone County	100%	99.9%
Buchanan County	100%	100%
Butler County	99.9%	99.5%
Caldwell County	100%	99.6%
Callaway County	100%	100%
Camden County	98.1%	96.4%
Cape Girardeau County	99.7%	99.6%
Carroll County	100%	99.7%
Carter County	98.6%	97.5%
Cass County	100%	100%
Cedar County	99.4%	66.5%
Chariton County	99.8%	96.8%
Christian County	99.5%	97.8%
Clark County	99.5%	79.6%
Clay County	100%	100%
Clinton County	100%	100%
Cole County	100%	100%
Cooper County	100%	99.9%
Crawford County	99.4%	98.2%
Dade County	99%	64.4%
Dallas County	96.3%	75.1%
Daviess County	100%	98.4%
DeKalb County	100%	99.0%
Dent County	96.8%	90.7%
Douglas County	92.5%	62.3%

[21] County data from the National Broadband Map, www.broadbandmap.gov

Dunklin County	100%	99.5%
Franklin County	99.9%	99.9%
Gasconade County	99.6%	97.8%
Gentry Country	100%	83.9%
Greene County	100%	100%
Grundy County	100%	85.2%
Harrison County	100%	94.9%
Henry County	100%	99.6%
Hickory County	92.0%	45.6%
Holt County	100%	98.6%
Howard County	99.8%	98.0%
Howell County	100%	87.0%
Iron County	90.5%	73.1%
Jackson County	100%	100%
Jasper County	100%	99.5%
Jefferson County	99.8%	99.8%
Johnson County	100%	99.8%
Knox County	100%	99.1%
Laclede County	98.6%	89.1%
Lafayette County	100%	99.9%
Lawrence County	100%	96.6%
Lewis County	100%	99.5%
Lincoln County	99.0%	96.7%
Linn County	99.6%	89.6%
Livingston County	100%	97.9%
Macon County	100%	99.0%
Madison County	92.2%	91.6%
Maries County	99.5%	96.5%
Marion County	99.9%	92.5%
McDonald County	99.5%	92.3%
Mercer County	99.6%	91.0%
Miller County	99.5%	96.8%
Mississippi County	99.9%	99.9%
Moniteau County	99.9%	93.3%
Monroe County	99.0%	97.9%
Montgomery County	99.9%	99.4%
Morgan County	99%	99.0%
New Madrid County	100%	100%
Newton County	100%	99.2%
Nodaway County	99.9%	92.3%

Oregon County	86.3%	43.4%
Osage County	100%	100%
Ozark County	98.2%	57.8%
Pemiscot County	100%	100%
Perry County	97.9%	97.4%
Pettis County	100%	100%
Phelps County	99.7%	98.7%
Pike County	99.5%	93.6%
Platte County	100%	100%
Polk County	99.9%	91.5%
Pulaski County	99.5%	98.7%
Putnam County	100%	92.5%
Ralls County	100%	99.2%
Randolph County	99.9%	100%
Ray County	100%	99.0%
Reynolds County	81.4%	69.2%
Ripley County	90.8%	76.0%
Saline County	100%	100%
Schuyler County	99.8%	98.2%
Scotland County	100%	99.9%
Scott County	100%	100%
Shannon County	88.1%	51.7%[22]
Shelby County	99.9%	99.3%
St. Charles County	100%	100%
St. Clair County	96.0%	48.1%
St. Francois	99.6%	99.5%
St. Louis City	100%	100%
St. Louis County	100%	100%
Ste. Genevieve	99.1%	98.0%
Stoddard County	100%	100%
Stone County	99.0%	96.0%
Sullivan County	99.9%	83.5%
Taney County	99.8%	98.1%
Texas County	97.0%	68.0%
Vernon County	99.0%	93.6%
Warren County	99.9%	99.0%
Washington County	94.3%	75.4%
Wayne County	88.8%	85.7%

[22] Not a complete record.

Webster County	100%	100%
Worth County	99.0%	63.5%
Wright County	97.6%	74.8%[23]

[23] Not a complete record.

Appendix E: Broadband Providers in Missouri

Broadband Providers in Missouri	
PROVIDER	**URL**
Adams Networks	http://adams.net/
Alma Telephone Company	http://www.almanet.net/index.php
Alsat Wireless	http://www.alsatwireless.com/
American Fiber Systems, Inc.	http://www.americanfibersystems.com/
AT&T Corp, Inc.	http://www.att.com/
AT&T Mobility, LLC.	http://www.att.com/
AT&T Southwest	http://www.att.com/
AT&T Southwest	http://www.att.com/
Bay's Internet	http://www.bayscomputerservice.com/
BlueBird Network, LLC.	http://bluebirdnetwork.com
Boycom Cablevision, Inc.	http://www.boycomonline.com/pages.php?section=index
Big River Telephone, LLC	https://www.bigrivertelephone.com/Default.aspx
BPS Networks	http://www.bpsnetworks.com/
BPS Telephone Company	http://www.bpsnetworks.com/
Brown Dog Networks	http://www.browndognetworks.com/
Cable America Missouri, LLC	http://www.cableamerica.com/
Cable One, Inc.	http://www.cableone.net/Pages/default.aspx
Carthage Water & Electric	http://www.ecarthage.com/
CenturyLink	http://www.centurylink.com/?pid=p_80745140
Chariton Valley Telecom Corp.	http://www.cvalley.net/
Chariton Valley Telephone Corp.	http://www.cvalley.net/
Charter Communications, Inc.	http://www.charter.com/Visitors/Home.aspx
Choctaw Telephone Company	http://choctaw.mokancomm.net/
Citizens Telephone Company of Higginsville, Missouri	http://www.ctcis.net/
City of Poplar Bluff	http://www.pbutilities.com/
Cogent Communications, Inc.	http://www.cogentco.com/us/
Comcast	http://www.comcast.com/default.cspx
Co-Mo Connect	http://co-mo.net/Co-Mo_Connect/HomePage.html
Covad Communications Company	http://www.covad.com/
Craw-Kan Telephone	http://www.ckt.net/ckt_html/internet.htm
Cricket Communications, Inc.	http://www.leapwireless.com/
Easy Net	http://easynetwireless.com/
Ellington Telephone Company	http://elmo.ocssemo.net/
FairPoint Kearney	http://www.fairpoint.com/residential/
FairPoint Communications	http://www.fairpoint.com/

Farber Telephone Company	http://www.ftco.net/
Fidelity Cablevision, Inc.	http://www.fidelitycommunications.com/
Fidelity Communications Services I, Inc.	http://www.fidelitycommunications.com/
Fidelity Telephone Company	http://www.fidelitycommunications.com/
Goodman Telephone Company, Inc.	http://www.sgotelco.com/
Granby Telephone Company	http://granby.jscomm.net/
Grand River Mutual Telephone Corp.	http://grm.net/
Green Hills Technologies	http://www.greenhills.net/
Green Hills Telecommunications Services	http://www.greenhills.net/
Green Hills Telephone ILEC	http://www.greenhills.net/
Haug Communications, Inc.	http://www.hciws.com/
Holway Telephone Company	http://www.abbmissouri.com/holway_default.asp
Hughes Network Systems, LLC	http://www.hughes.com/Pages/Default.aspx
I-Land Internet Services	http://www.iland.net/
KC Coyote - Isotech	http://www.kccoyote.com/
KLM Telephone Company	http://www.abbmissouri.com/KLM_default.asp
KTIS	http://www.ktis.net/
Lathrop Telephone Company	http://grm.net/index.htm
Le-Ru Telephone Company	http://www.leru.net/
Level 3 Communications, LLC	http://www.level3.com/index.cfm?pageID=546
liNKCity	http://www.nkc.org/
LTO Communications, LLC	http://www.ltocom.net/
Mark Twain Communications Company	http://portal.marktwain.net/
Mark Twain Rural Telephone	http://portal.marktwain.net/
MCC Missouri LLC (Mediacom)	http://mediacomcable.com/index.php
McDonald County Telephone Company	http://www.olemac.net/
MCM Systems	http://www.mcmsys.com/
Mid-States Services, LLC	http://www.mid-states.net/
Midwest Data Center - Subsidiary of Rock Port Telephone	http://www.mwdata.net/
Miller Telephone Company	http://www.millertel.net/index.php
MoKan Dial, Inc.	http://online.mokancomm.net/
MyChoice	mychoicenetworks.com
N. W. Communications	http://www.abbmissouri.com/internet_map.asp
New Florence Telephone Company	http://www.directcom.com/newflorence/
New Wave Communications	http://www.newwavecom.com/

Northeast Missouri Rural Telephone Company	http://www.nemr.net/
Northeast Missouri Rural Telephone Company	http://www.nemr.net/
Northwest Missouri Cellular	http://mobile.nwmcell.com/
Oregon Farmers Mutual Telephone Company	http://www.ofmlive.net/
Otelco Mid Missouri LLC.	http://www.otelcomidmo.com/
Ozark Computers	http://www.ozarkbroadband.com/
Ozark Telephone Company	http://www.sgotelco.com/
Peace Valley Telephone Co., Inc.	http://www.pvbroadband.com/
ProTronics Technologies, Inc.	http://www.protronics.com/
Radio Wire, Inc.	http://www.radiowire.net/
Ralls Technologies - Ralls County Electric Cooperative	http://www.rallstech.com/
Rock Port Cablevision	http://www.rpt.coop/home.php
Seneca Telephone Company	http://www.sgotelco.com/
Sho-Me Technologies, LLC	http://www.shometech.com/
Skycasters	http://www.skycasters.com/
Socket Telecom, LLC	http://www.socket.net/
SpringNet	http://www.cityutilities.net/
Sprint	http://sprint.com
StarBand Communications, Inc.	http://www.starband.com/index.html
Steelville Telephone Exchange, Inc.	http://www.steelvilletelephone.com/
Suddenlink Communications	http://www.suddenlink.com/
TDS Telecom	http://www.tdstelecom.com/Residential/MO/Stoutland
Time Warner Cable	http://www.timewarnercable.com/
T-Mobile	http://www.telekom.com/dtag/cms/content/dt/en/6908
Total Highspeed Internet Service	http://www.totalhighspeed.com/
tw telecom	http://www.twtelecom.com/
U.S. Cellular	http://www.uscellular.com/uscellular/
United Services, Inc	http://www.ueci.coop/
Verizon Wireless	http://www.verizonwireless.com/b2c/index.html
Video Direct	https://www.video-direct.tv/
WIFI Midwest, Inc.	http://www.wifimw.com/
WildBlue Communications, Inc.	http://www.wildblue.com/
Windjammer Communications LLC	http://www.windjammercable.com/
Windstream Corporation	http://www.windstream.com/
Wisper ISP, INC	http://gowisper.com/
YHTI	http://www.yhti.net/yhti-billing.php

AccuBak Data Systems, Inc.	http://www.accubak.com/
Blue Mule Wireless	http://bluemulewireless.com/
Crystal Broadband	http://crystalbn.com/
Finally Broadband, LLC.	http://finallybroadband.com/
IAMO Telephone Company	http://www.iamotelephone.com/
KC Web Internet Services, LLC	http://kcweb.net/
KEI Internet Service	http://keinet.net/
New Edge Holding Company	http://www.newedgenetworks.com/
Ritter Cable Corporation	http://www.rittercable.com/cable_about.php
SureWest Kansas, LLC - Everest Midwest LLC	http://www.surewest.com/
TA Highspeed	http://www.tahighspeed.com/
Tower Internet	http://www.towerinternet.com/
US Cable of Coastal-Texas, L.P.	http://www.uscable.com/internet
CorpraNet	http://corpranet.net/
Cox Communications	http://ww2.cox.com/
Dexter Broadband	http://www.ruralcom.net/
Enventis Telecom Inc.	http://www.enventis.com/services/internet.aspx
First Cable of MO (Mississippi Valley)	NA
Galactic Broadband	http://galacticbroadband.com/2.html
Iowa Telecommunications Services, Inc.	www.iowatelecom.com
Mid Missouri Broadband & Cable LLC	http://www.midmobroadband.com/index.html
Mo-Ark Communications – (Wasp Wireless)	http://alpha.waspwireless.com/
Momentum	NA
SES Americom	http://www.ses.com/ses/welcome/
St Joe Wireless	http://www.stjoewireless.net/
True Broadband Networks	http://www.truebtv.com/
Verizon Business Global LLC dba Verizon Business	http://smallbusiness.verizon.com/bundles/
Birch Telecom of Missouri, Inc.	http://www.birch.com/about/
Ionex Communications, Inc.	NA
Pixius Communications	http://www.pixius.com/
Poplar Bluff Internet, Inc (SEMO)	http://semo.net/
Semo Communications Inc.	http://www.semocommunications.com/
St Louis Broadband	http://stlbroadband.com/index.html

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