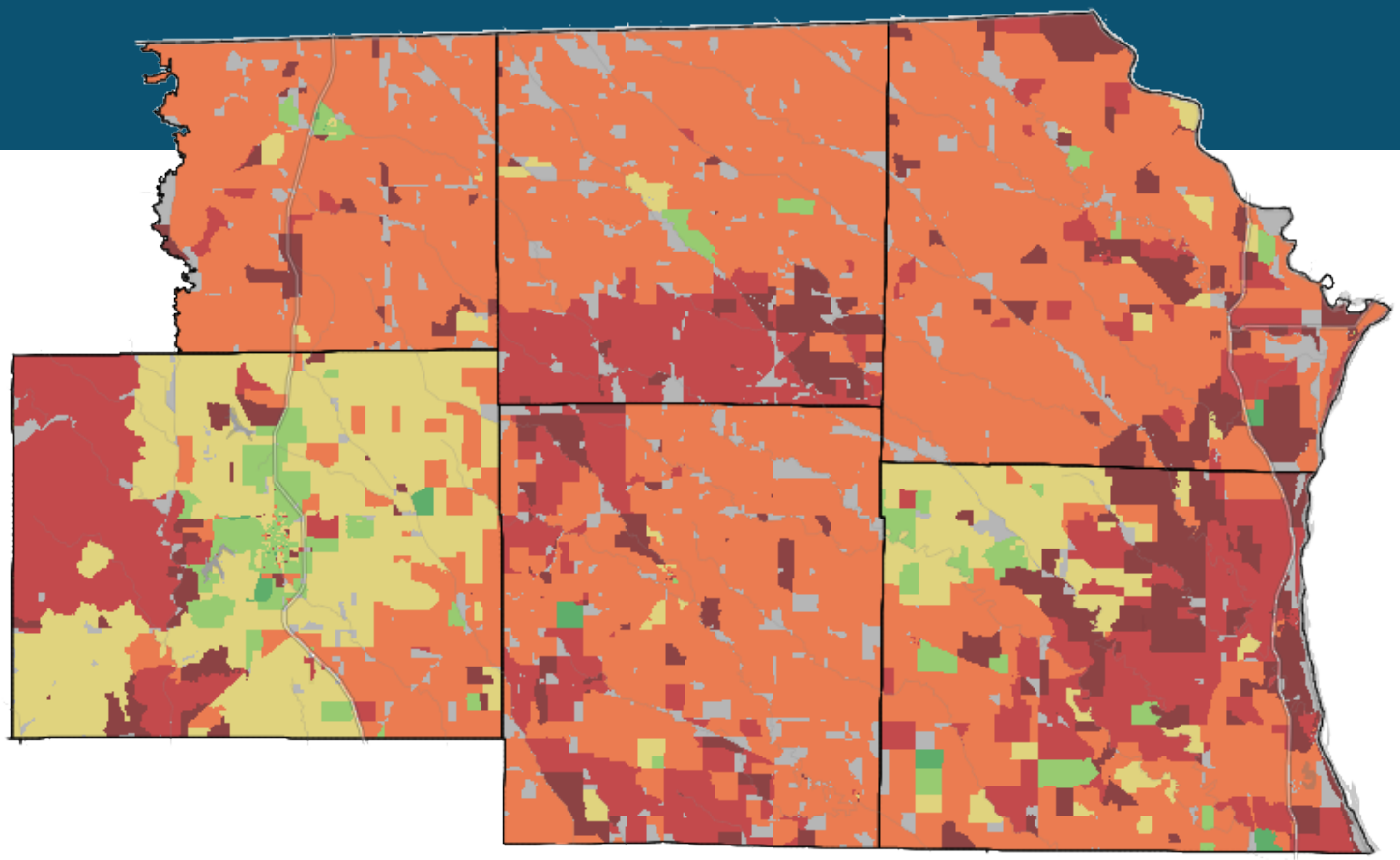
Northeast Missouri
Regional Planning Commission

64% – **18,683** *locations without access to 50/10 Mbps*

3,631 *miles of fiber needed*



Below 10/1 Mbps
Above 10/1; Below 25/3 Mbps
Above 25/3; Below 50/10 Mbps
Above 50/10; Below 100/20 Mbps
Above 100/20; Below 200/50 Mbps
Above 200/50 Mbps
null / no data

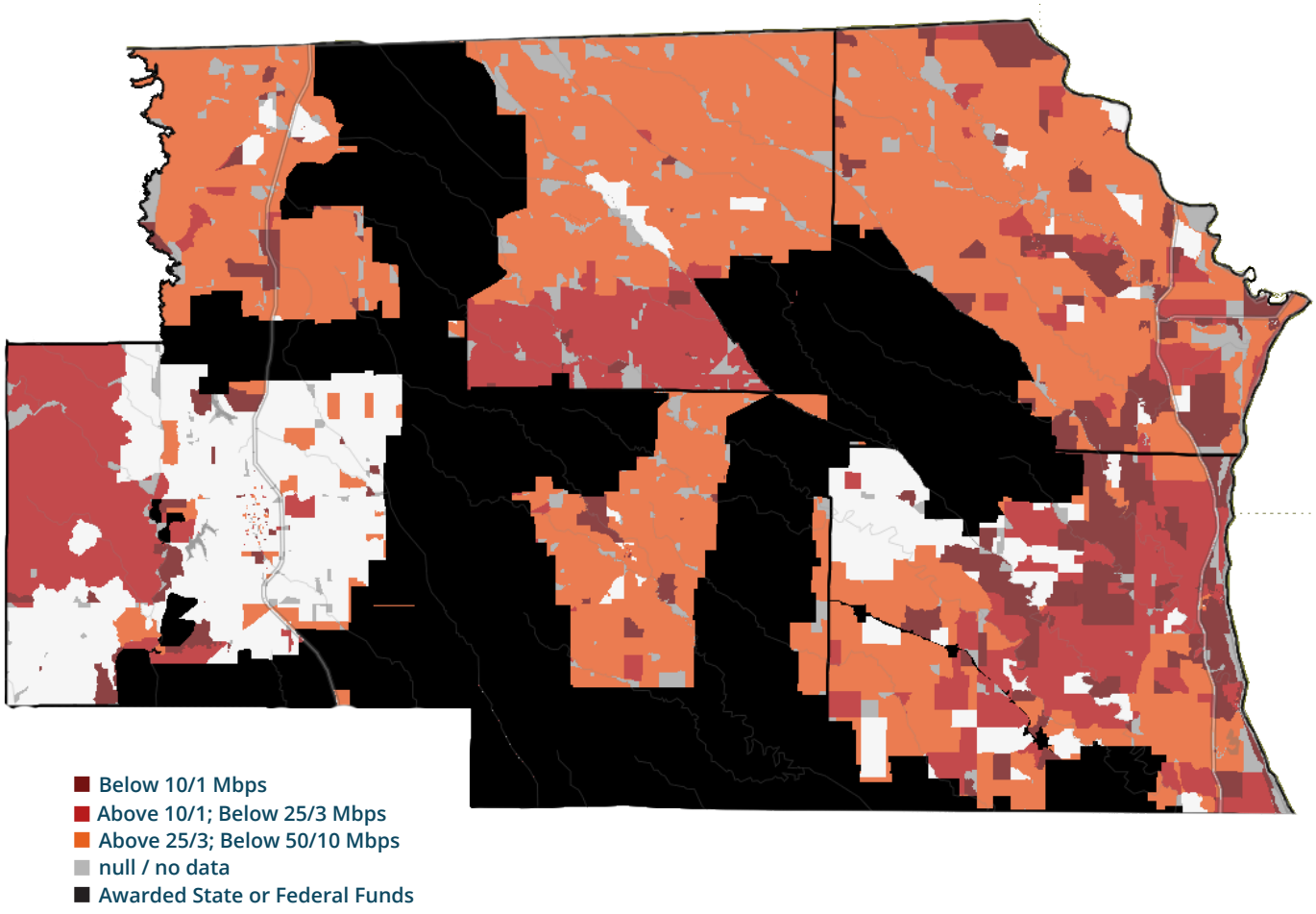
*Coverage ratings reflect multiple sources, including Ookla Speedtest Intelligence® data licensed by MACOG for the months of December 2020 through July 2023. See Appendix 1 for detailed methodology

FUNDED AREAS

The state of Missouri received federal funding from USDA ReConnect, The Rural Digital Opportunity Fund, and the NTIA. Additional funds from the state were awarded to providers from the Missouri Broadband CARES program, American Rescue Plan Act (ARPA), and the state broadband grant program.

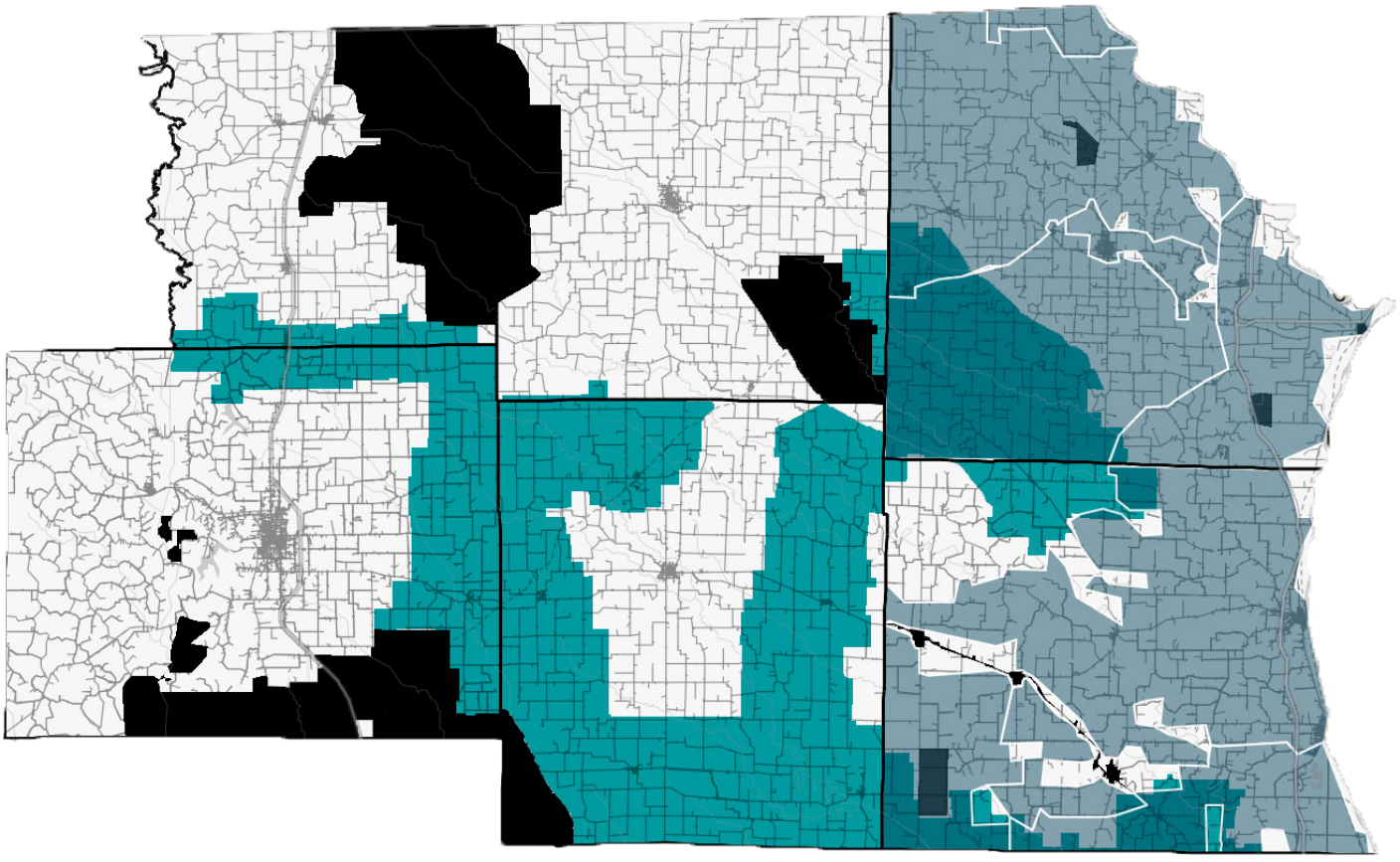
Blocked out areas show existing federal and state awards that were not in default at the time of this report. The remaining areas in red and orange are below 25/3 and 50/10 Mbps respectively and were the areas of focus for the county cluster project planning.

While the Federal definition of "underserved" applies to any location below 100/20, the below 50/10 threshold generates logical, contiguous service areas that remain in dramatic need of infrastructure investment.



The FCC's Connect America Model (CAM) is a long-standing subsidy program that pays telecommunications carriers to offer broadband in their landline telephone territories. The original model targeted 10/1 Mbps. The "alternative" model (ACAM) upped that to 25/3 Mbps. The most recent, "enhanced alternative" model (E-ACAM) offers additional subsidy to carriers who agree to increase speeds to 100/20 Mbps. By the late October 2023 deadline, several of the Missouri-based ACAM providers elected to accept the FCC's E-ACAM offer. As such, these areas become ineligible for BEAD and most other sources of broadband grant funding.

E-ACAM elections will affect 29 project areas in 13 cluster counties, including 10 project areas that have at least 75% of their total area covered by E-ACAM. Because this development came at the end of RCG's period of performance, there was not enough time to redraw project boundaries and recalculate the financial estimates for those areas. Instead, we have flagged the affected project areas in each county cluster report and have excluded project areas with 75% or more E-ACAM coverage from our summary numbers. Project areas with less than 75% coverage remain in the overall calculations, but it should be noted that actual costs and scope will be lower for those areas once the E-ACAM overlap has been excluded.



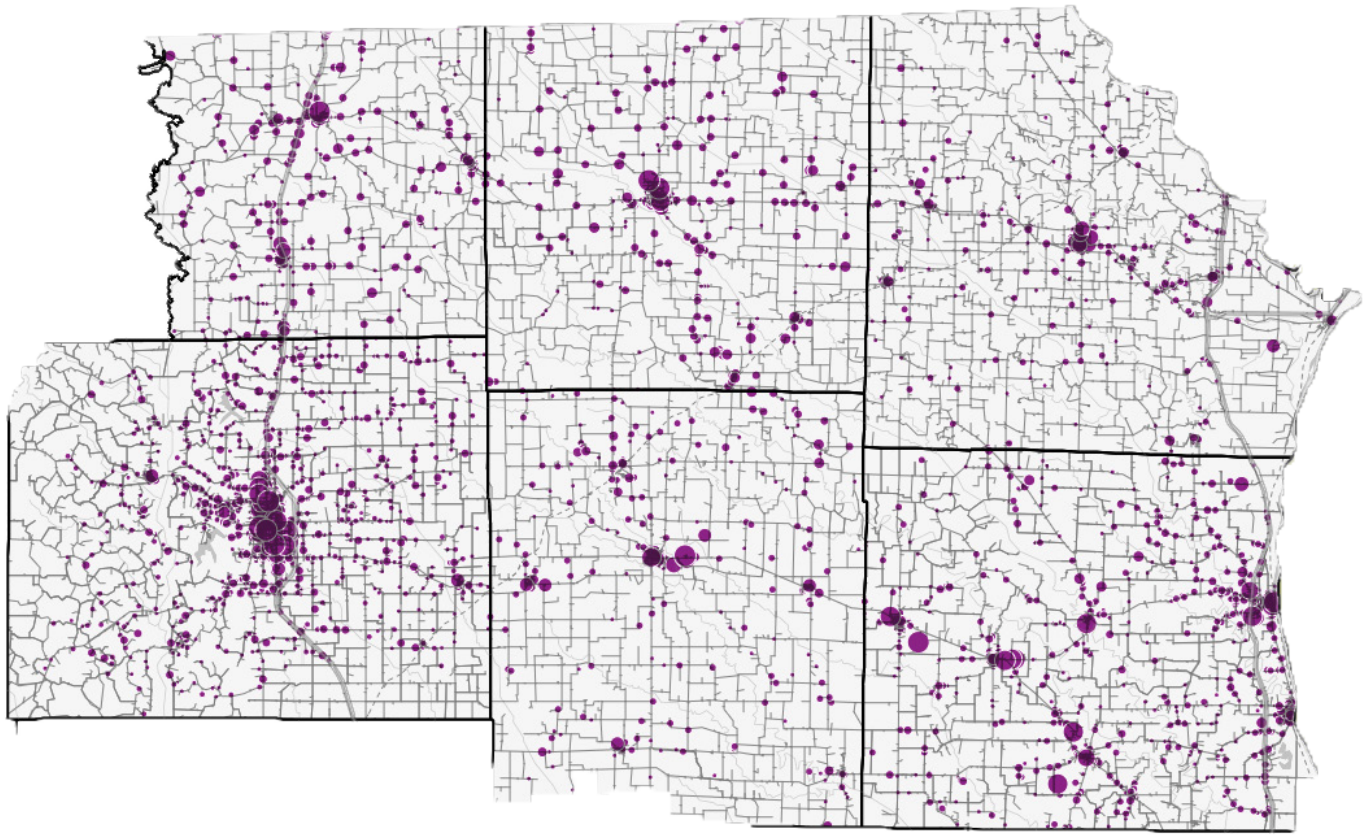
Proposed Project Areas
E-ACAM Carrier Elections
Awarded State or Federal Funds

BUSINESS OPPORTUNITY AREAS

Business demand for broadband varies based on company size and economic sector.

The greater the demand, the bigger the dot. The presence of a high-demand business or multiple businesses of any size will make that area significantly more attractive to a broadband provider.

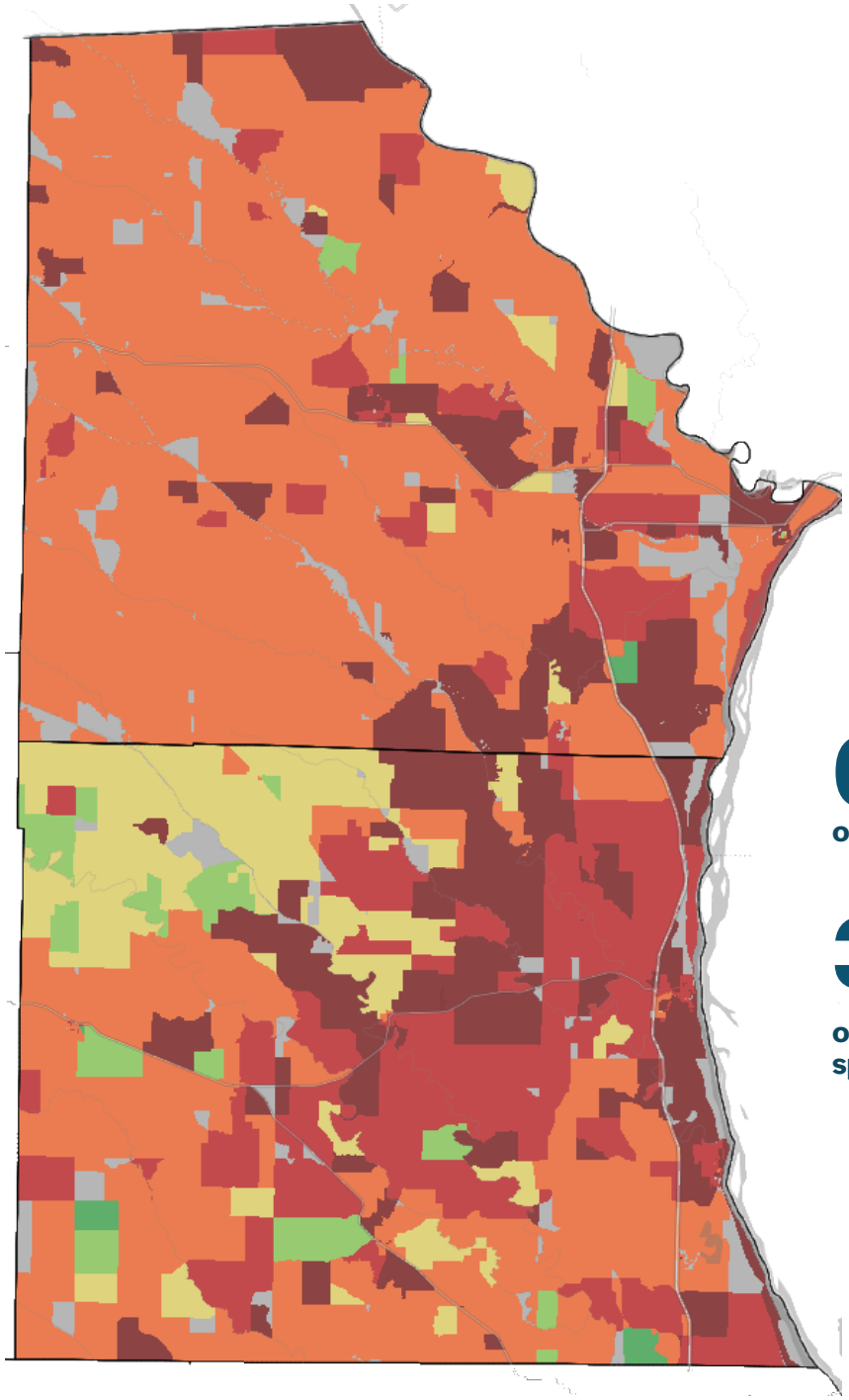
*See “Business Broadband Opportunity Index” in Appendix 1 for a detailed explanation of how dot size was determined



Business Locations *[the larger the dot the greater the broadband demand]*

Lewis / Clark

Project Cluster ▪ Northeast Missouri Regional Planning Commission



66%
of the populated area is unserved

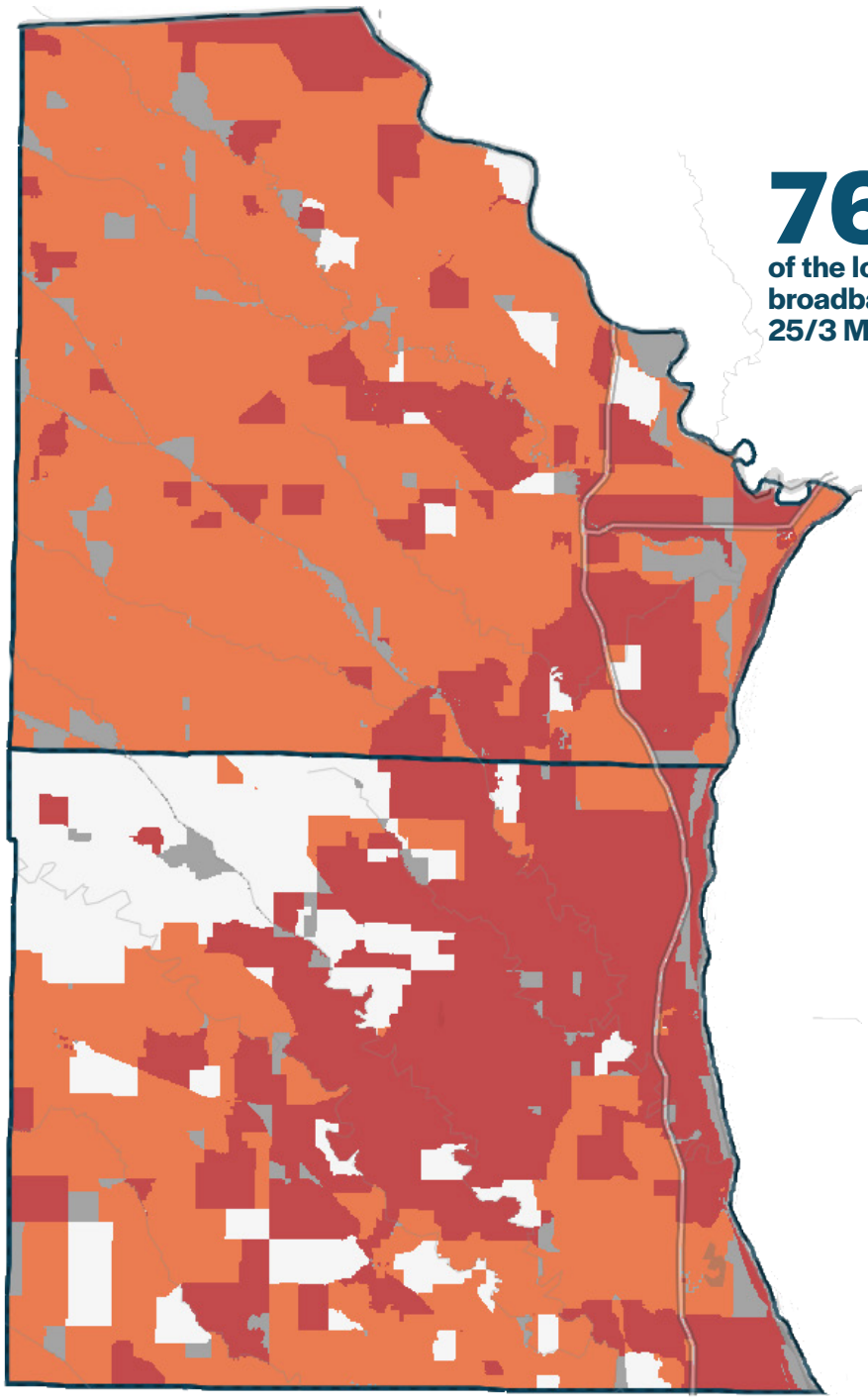
34,012
of the locations cannot achieve speeds greater than 25/3 Mbps

Below 10/1 Mbps
Above 10/1; Below 25/3 Mbps
Above 25/3; Below 50/10 Mbps
Above 50/10; Below 100/20 Mbps
Above 100/20; Below 200/50 Mbps
Above 200/50 Mbps
null / no data

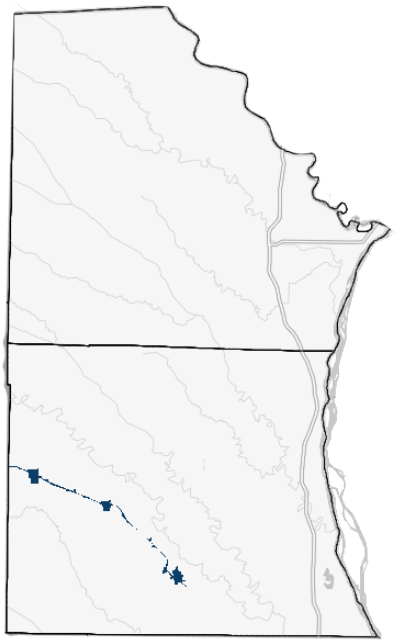
Lewis / Clark

Project Cluster ▪ Northeast Missouri Regional Planning Commission

AREAS OF FOCUS



76%
of the locations cannot achieve broadband speeds greater than 25/3 Mbps

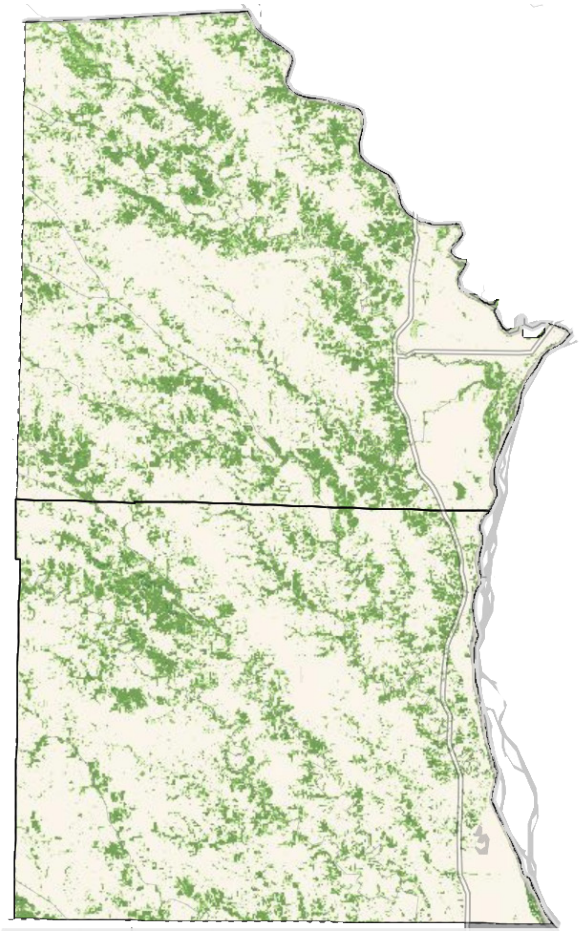


Areas below 25/3 Mbps
Areas above 25/3 Mbps and below 50/10 Mbps

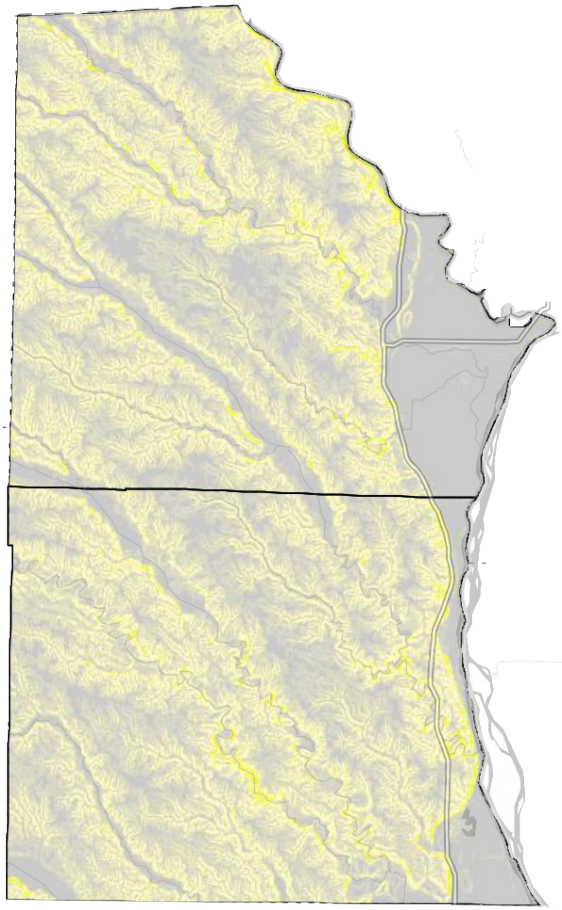
Areas that have been awarded project funds

PLANNING CONSIDERATIONS

Rugged terrain and dense canopy cover can impact deployment costs, route considerations and technology options.



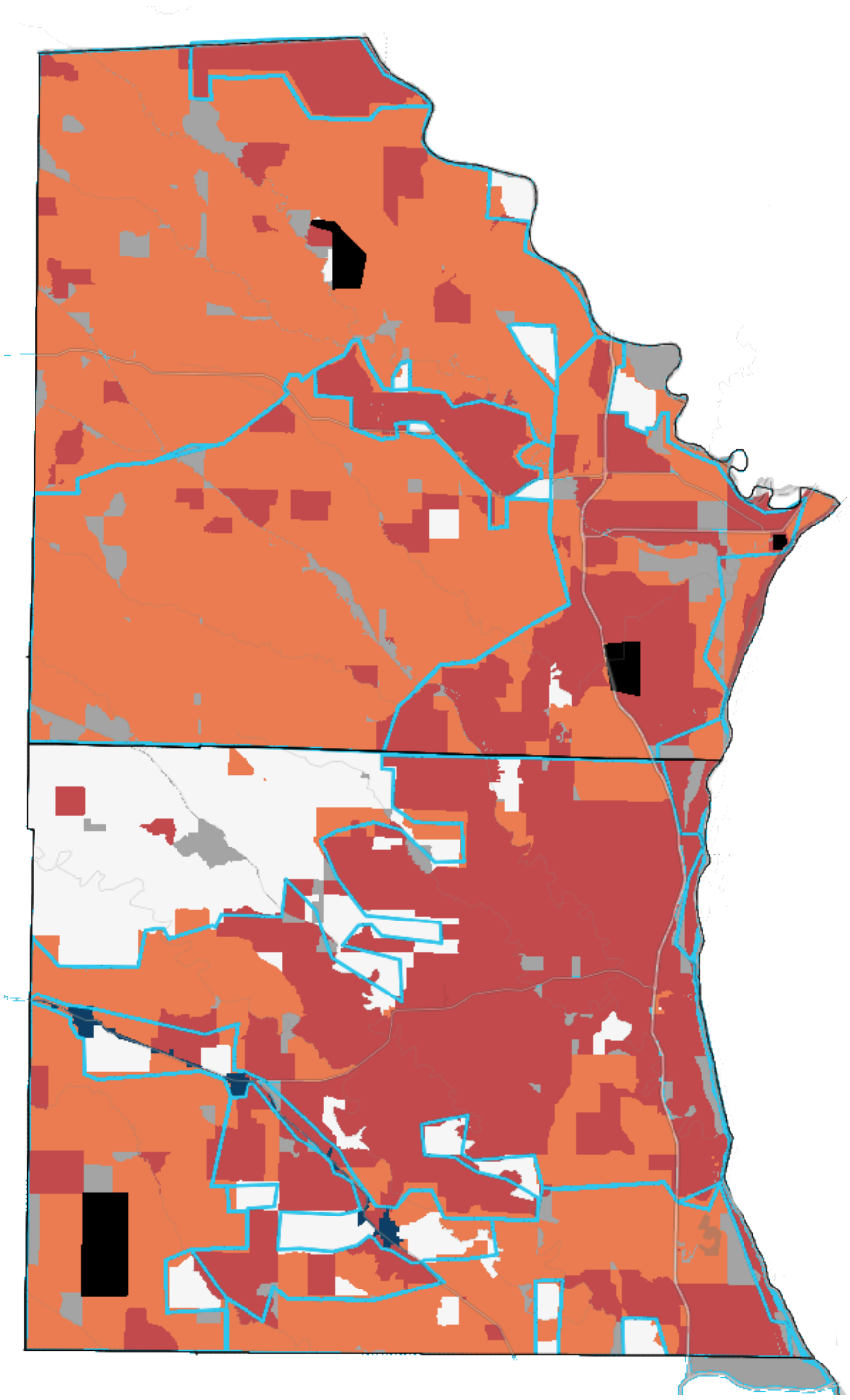
- >75%
- 50% - 75%
- 25% - 50%
- 1% - 25%
- < 1%
- Unsurveyed



- Flat (0°)
- Nearly Level (1°)
- Gently Level (2°)
- Gently Sloping (3° - 5°)
- Strongly Sloping (6° - 10°)
- Gently Steep (11° - 15°)
- Moderately Steep (16° - 20°)
- Steep (21° - 30°)
- Very Steep (31° - 90°)

Lewis / Clark

Project Cluster ▪ Northeast Missouri Regional Planning Commission



PROJECT AREAS

7,712
LOCATIONS

2,134
BUSINESSES

1449
MILES OF FIBER NEEDED

- Areas below 25/3 Mbps
- Areas above 25/3 Mbps and below 50/10 Mbps
- Areas awarded project funds
- Proposed Project Areas

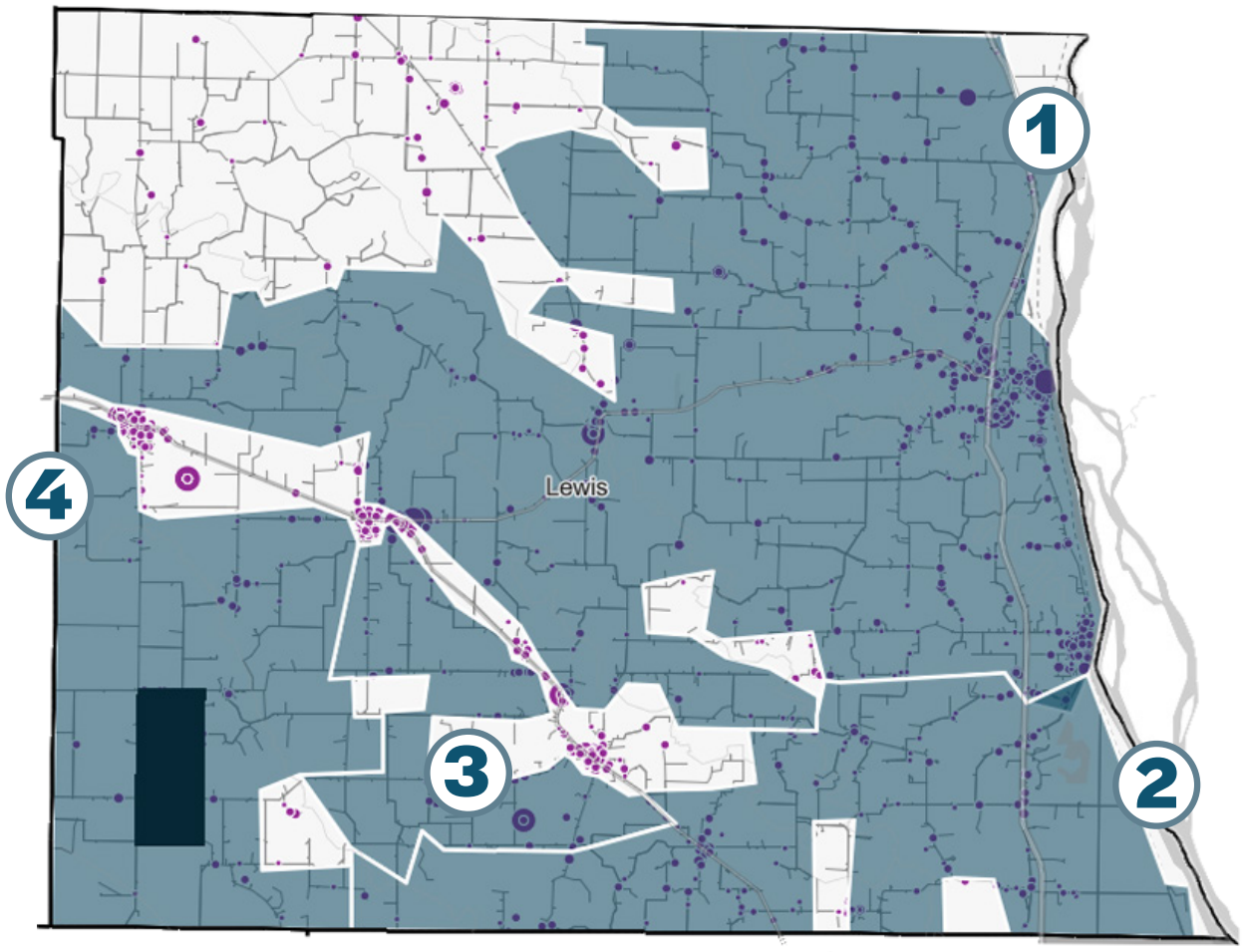
Investment Range = $129 - $283.4 million

**Investment projections take into account the total number of fiber miles, deployment type [aerial or underground] and the computation of low, mid and high project cost. A full explanation of our methodology and calculation tables can be found in the Appendix 1 and 2.*

† The Investment range for this cluster area may be lower; due to carrier electing to participate in E-ACAM that can impact eligibility for BEAD funding

LEWIS COUNTY
PROJECT AREAS

Approximately three quarters of Lewis County's area rates as underserved or unserved. The greatest need can be found in the northeast and central parts of the county where most blocks have speed ratings below 25/3 Mbps and many are unable to reach 10/1 Mbps. The southern part of the county is significantly underserved, with most blocks rating below 50/10 Mbps.



Proposed Project Area

Business Locations *[the larger the dot, the greater the broadband demand]*

528	3,465	1,145	6.6
fiber miles	locations	business locations	locations per mile

INVESTMENT = $54.2 - $120 million

**Investment projections take into account the total number of fiber miles, deployment type [aerial or underground] and the computation of low, mid and high project cost. A full explanation of our methodology and calculation tables can be found in the Appendix 1 and 2.*

LEWIS COUNTY
PROJECT DETAILS

1

*This project area may be marginally impacted by E-ACAM Carrier participation, and some locations may not be eligible for BEAD funding.

AERIAL		UNDERGROUND
$33.4M - $44.6M	COST TO PASS	$43.6M - $73.3M
$2.6M - $10.6M	ISP INVESTMENT	$2.6M - $10.6M
$22.8M - $41.9M	FUNDING GAP	$33M - $70.6M
$286 - $528	annual cost per location over 30 years	$416 - $889

375 fiber miles

2,648 locations

7.1 locations per mile

2

*This project area may be partially impacted by E-ACAM Carrier participation, and some locations may not be eligible for BEAD funding.

AERIAL		UNDERGROUND
$9.4M - $12.5M	COST TO PASS	$12.3M - $20.6M
$634K - $2.5M	ISP INVESTMENT	$634K - 2.5M
$6.8M - $11.9M	FUNDING GAP	$9.7M - $19.9M
$359 - $626	annual cost per location over 30 years	$511 - $1,050

105 fiber miles

634 locations

6.0 locations per mile

3

*This project area may be marginally impacted by E-ACAM Carrier participation, and some locations may not be eligible for BEAD funding.

AERIAL		UNDERGROUND
$4.3M- $5.7M	COST TO PASS	$5.6M- $9.4M
$183K - $732K	ISP INVESTMENT	$183K - $732K
$3.6M - $5.6M	FUNDING GAP	$4.9M - $9.3M
$648- $1,012	annual cost per location over 30 years	$889 - $1684

48 fiber miles

183 locations

3.8 locations per mile

4

*This project area may be partially impacted by E-ACAM Carrier participation, and some locations may not be eligible for BEAD funding.

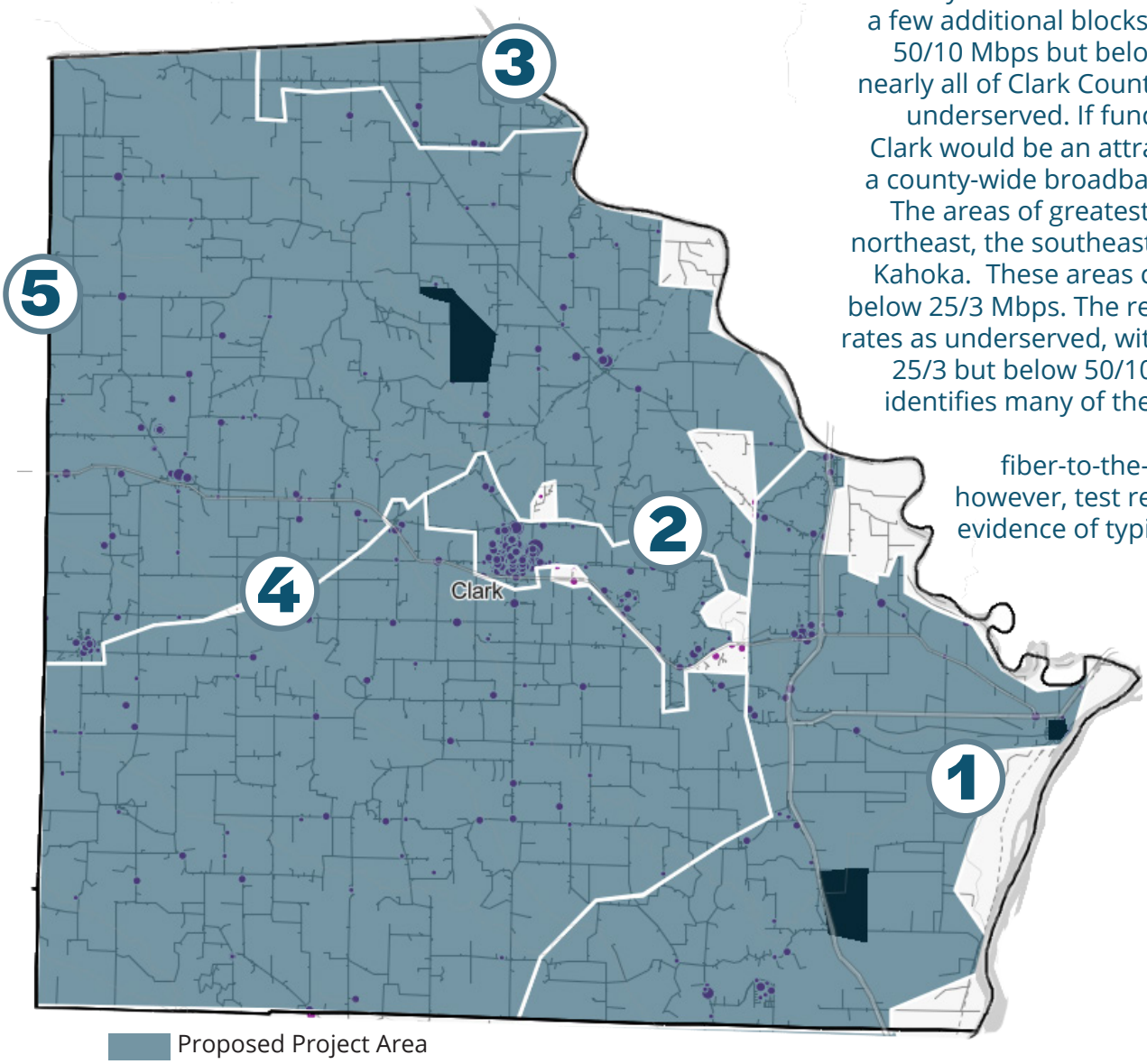
AERIAL		UNDERGROUND
$7.2M - $9.6M	COST TO PASS	$9.4M - $15.8M
$192K - $768K	ISP INVESTMENT	$192K - $768K
$6.4M - $9.4M	FUNDING GAP	$8.7M - $15.6M
$1,117 - $1,638	annual cost per location over 30 years	$1502 - $2,714

81 fiber miles

192 locations

2.4 locations per mile

CLARK COUNTY
PROJECT AREAS



With only a handful of served blocks and a few additional blocks that rate above 50/10 Mbps but below 100/20 Mbps, nearly all of Clark County is significantly underserved. If funding is available, Clark would be an attractive option for a county-wide broadband deployment. The areas of greatest need are in the northeast, the southeast, and in/around Kahoka. These areas consistently rate below 25/3 Mbps. The rest of the county rates as underserved, with speeds above 25/3 but below 50/10 Mbps. The FCC identifies many of these underserved areas as having fiber-to-the-home available; however, test results show little evidence of typical fiber speeds

Proposed Project Area

Business Locations *[the larger the dot, the greater the broadband demand]*

840	4,055	940	4.8
fiber miles	locations	business locations	locations per mile

INVESTMENT = $74 - $164 million

**Investment projections take into account the total number of fiber miles, deployment type [aerial or underground] and the computation of low, mid and high project cost. A full explanation of our methodology and calculation tables can be found in the Appendix 1 and 2.*

CLARK COUNTY
PROJECT DETAILS

1

**This project area may be marginally impacted by E-ACAM Carrier participation, and some locations may not be eligible for BEAD funding.*

AERIAL		UNDERGROUND
$16.4M - $22M	COST TO PASS	$21.5M - $36.1M
$989K - $4M	ISP INVESTMENT	$989K - $4M
$12.5M - $21M	FUNDING GAP	$17.5M - $35M
$420 - $707	annual cost per location over 30 years	$591 - $1,183

185 fiber miles

989 locations

5.4 locations per mile

2

AERIAL		UNDERGROUND
$5.1M - $6.9M	COST TO PASS	$6.7M - $11.3M
$1.3M - $5.1M	ISP INVESTMENT	$1.3M - $5.1M
$42K - $5.6M	FUNDING GAP	$1.6M - $10M
$1 - $146	annual cost per location over 30 years	$42 -$262

58 fiber miles

1,275 locations

22.1 locations per mile

3

AERIAL		UNDERGROUND
$2M - $2.7M	COST TO PASS	$2.7M - $4.5M
$78K - $312K	ISP INVESTMENT	$78K - $312K
$1.7M - $2.6M	FUNDING GAP	$2.3M - $4.4M
$733- $1,125	annual cost per location over 30 years	$1,000-$1,871

23 fiber miles

78 locations

3.4 locations per mile

CLARK COUNTY
PROJECT DETAILS

4

**This project area may be partially impacted by E-ACAM Carrier participation, and some locations may not be eligible for BEAD funding.*

AERIAL		UNDERGROUND
$24M - $32.2M	COST TO PASS	$31.5M - $53M
$686K - $2.7M	ISP INVESTMENT	$686K - $2.7M
$21.3M - $31.5M	FUNDING GAP	$28.7M - $52.2M
$1,307 - $1,531	annual cost per location over 30 years	$1,397 - $2,538

271 fiber miles

686 locations

2.5 locations per mile

5

**This project area may be marginally impacted by E-ACAM Carrier participation, and some locations may not be eligible for BEAD funding.*

AERIAL		UNDERGROUND
$27M - $36.2M	COST TO PASS	$35.4M - $59.5M
$1M - $4.1M	ISP INVESTMENT	$1M - $4.1M
$22.9 - $35.2M	FUNDING GAP	$31.3M - $58.5M
$746 - $1,142	annual cost per location over 30 years	$1,016 -$1,899

304 fiber miles

1,027 locations

3.4 locations per mile

APPENDIX 1
Broadband Mapping and Methodology

ABOUT THE MAPPING

Statewide, Regional, and County profiles were created under contract by Reid Consulting Group, LLC. for Missouri Association of Councils of Government (MACOG).

Broadband coverage maps are based on a rating system developed by Reid Consulting Group, LLC. Data sources include Ookla Speedtest Intelligence® data licensed by MACOG for the months of December 2020 through December 2023, carrier filings of available speeds with the FCC Fabric, carrier reports of actual broadband deployments to USAC (HUBB), RDOF Phase 1 eligibility, and population density.

Unserved and underserved ratings are color coded at the census block and block group level:

- **Dark Red: Below 10/1 Mbps**
- **Red: Above 10/1; Below 25/3 Mbps**
- **Orange: Above 25/3; Below 50/10 Mbps**
- **Yellow: Above 50/10; Below 100/20 Mbps**
- **Light Green: Above 100/20; Below 200/50 Mbps**
- **Green: Above 200/50 Mbps**
- **Grey: Areas with no data/ speedtests submitted / no population**

We conducted analysis of the raw Ookla® data for the months of December 2020 through July 2023, applying the following filters:

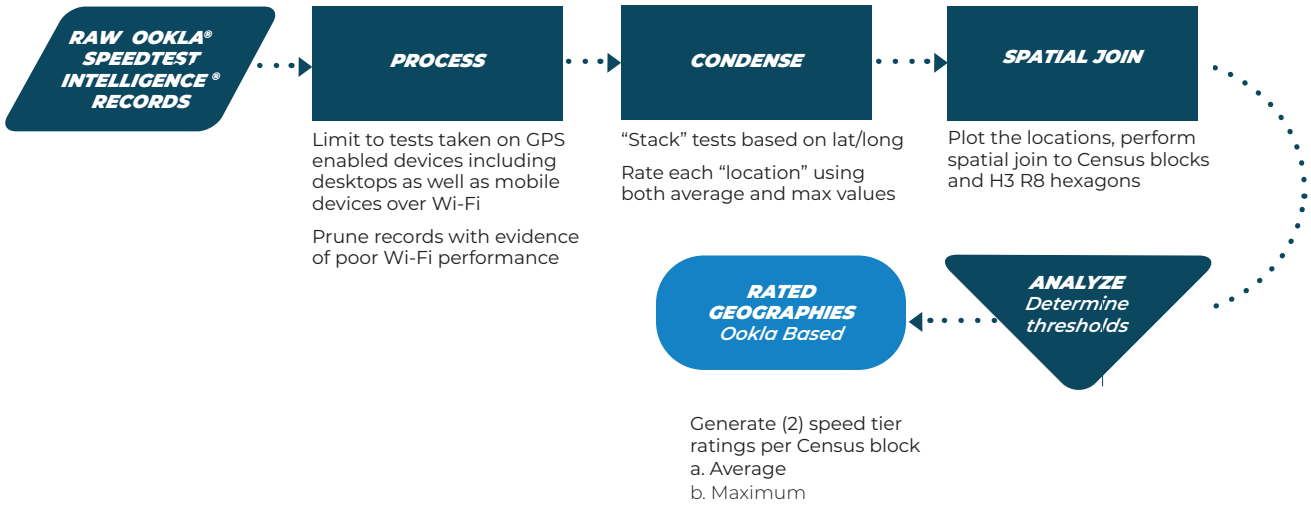
Filter
Include desktop, iOS, and Android app results*
Exclude results with GPS precision of greater than 200 meters**
Include only results from fixed broadband providers

**iOS and Android results were included only if the device was connected to wi-fi during the speed test.*
*** To protect consumer privacy, Ookla® limits location precision to +/-100 meters. As a result, a single location may include multiple households and many individual tests.*

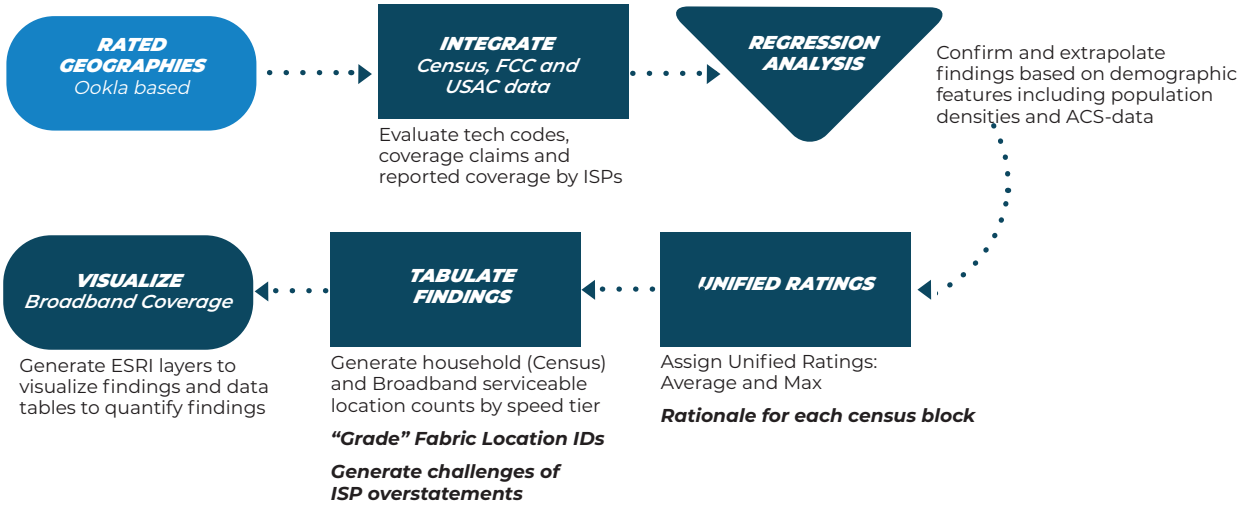
ANALYZING THE DATA

Using the Ookla® results we rated each location based on the maximum of up/down speeds for all tests at that location. We then graded census blocks based on the median up/down rating of all locations within each block. Block-by-block ratings were further refined based on RDOF eligibility, past HUBB deployments, and Form 477/ Fabric availability data. For blocks with no Ookla test results, extrapolated ratings were assigned where possible via comparative analysis of population density, block group ratings, FCC Fabric, HUBB data, and RDOF Phase 1 awards. Areas that could not be assigned an extrapolated rating are shown in gray on the map.

Generating Speed Ratings



Layering Additional Data Sources



BUSINESS BROADBAND OPPORTUNITY INDEX

Business demand for broadband varies based on company size and economic sector. The more employees at any given business location, the greater the demand will be for that location. Certain types of businesses also tend to consume more bandwidth regardless of size. For example, a medical clinic with 50 employees will need significantly more capacity than a construction contractor of similar size.

When planning for broadband expansion, it is important to consider the effect businesses have on overall need. The presence of a high-demand business or multiple businesses of any size in a particular area may make that area significantly more attractive to a broadband provider than the surrounding population density would predict.

The Business Broadband Opportunity Index helps planners visualize this economic impact by mapping the location of every business (as identified by Dun & Bradstreet) with a dot size proportional to that business' expected broadband demand. The larger the dot, the greater the demand. Calculations are as follows:

OPPORTUNITY INDEX = BUSINESS SIZE * INDEX MULTIPLIER

Business Size

Number of employees as reported in Dun & Bradstreet. If count is blank, assume 1 employee.

Index Multiplier

A number from 1-5 based on industry sector.

On the Map

The greater the demand, the bigger the dot. To aid with visualization, comparative rankings from 1 to 10 are also assigned.

Category	Multiplier
Healthcare	5
Education & Libraries	5
Telecom and IT	5
Banking and Finance	5
Professional Services	4
Publishers	4
Real Estate	3
Hospitality	3
Non-Profit	3
Wholesalers	2
Dealers and Retail	2
Transportation	2
Childcare	2
Sports, Music & Arts	2
Religious and Fraternal	2
Manufacturing	2
Printing	2
Restaurants & Food	2
Farming	1
Hunting, Fishing	1
Energy	1
Raw Materials	1
Contractors	1
Textiles	1
Unclassified	1

APPENDIX 2
Budget Projections

The budget is based on a fiber-to-the-home network with enough capacity to meet demand for the next 30 years. Expected investments and the funding gap will vary based on the area to be served, the population density, and the presence or absence of other services.

COST ESTIMATES

Investment Range

The Project Cluster Investment Range represents the lowest cost to the highest cost of to serve the total number of locations that are identified as below 50/10 Mbps the entire County Cluster. In most cases the lowest cost represents aerial fiber deployment and the highest cost represents underground fiber deployment. For the individual counties, it is the average of the lowest and cost of each project area.

The total cost for each project area is the sum of make-ready and cost-to-pass multiplied by the number of unserved state, county, township, and unincorporated road miles.

Unserved Miles * (Make-Ready + Cost-to-Pass) + (Number of locations * Network electronics)

Fiber Miles to Reach Target * Cost per Mile = Cost to Pass

ISP Investment

This is the total an internet provider can spend to install fiber and still make a profit, estimated between $1000 and $4000 per household. As population density goes down, costs go up while expected investment remains the same.

Households in Service Area * Investment per household

Funding Gap

The funding gap is the difference between the total cost of the project and the available or anticipated private investment. For an internet service offering to be sustainable, grant or other public funding must be used to close this gap.

Funding Gap = Total Projected Cost - ISP Investment

30 Year Annual Cost

The 30 year amortized gap per household is calculated by dividing the funding gap by 30, then dividing the resulting figure by the total number of locations in the project area.

Gap per location = (Funding Gap ÷ Number of households) ÷ 30 years

Fiber Miles

Fiber distance is based on the number of unserved state, county, local municipal and unincorporated road miles within the county.

Locations per Mile

Total number of unserved households divided by the number of unserved state, county, township, and unincorporated road miles.

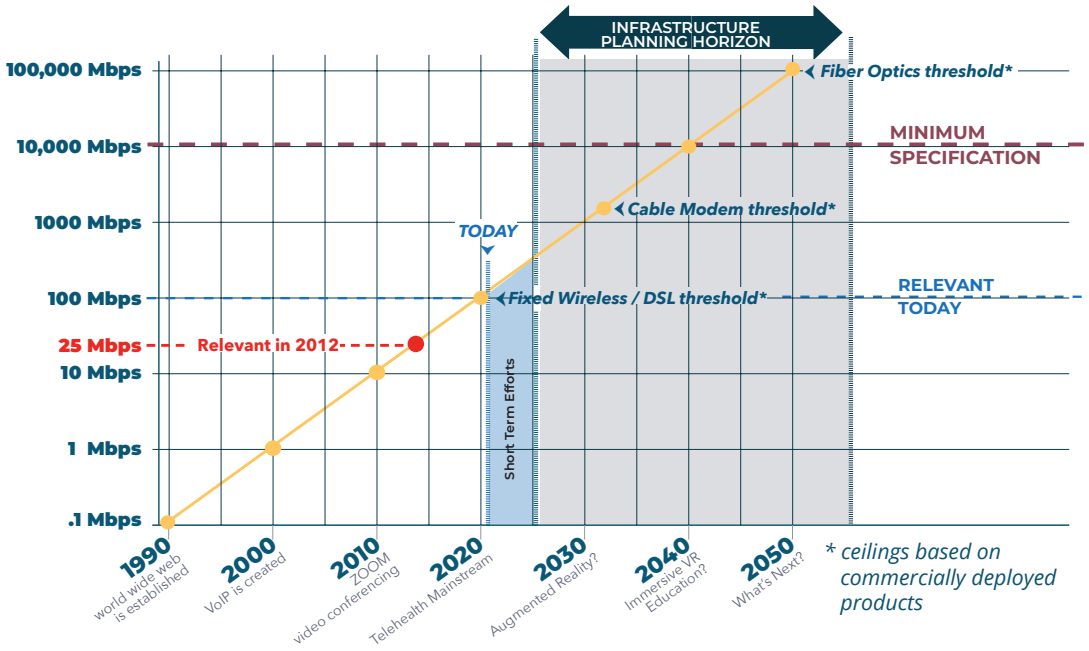
APPENDIX 3
Planning for the Future

BUILDING FOR THE FUTURE

For planning purposes, broadband deployments must be treated like infrastructure projects. Much like water, sewer, and roads, broadband networks should be designed to last decades rather than years. Networks installed today should utilize technologies, materials, and design specifications that will deliver 30-to-40-year longevity. Networks also should have sufficient capacity to meet not only current needs but also those of 2055.

Given the capital costs and construction requirements for broadband, we recommend a planning window that starts in 2025 and continues through 2055. This timeline assumes a three to four year deployment window which will vary based on project size, supply chain complexities and labor availability.

Since the web was invented in 1990, broadband demand has increased ten-fold every decade.



When home internet first became common, most households connected using landline modems that operated at 56 Kbps (0.056 Mbps). By 2000, speeds had increased to 1 Mbps. A decade later, a well-served household could expect 10 Mbps. The FCC's current 25/3 Mbps threshold was last relevant in 2012, when the average download speed reached 25 Mbps. Currently, someone living in a well-served area can expect at least 100 Mbps down/20 Mbps up.

With remote work and learning, telehealth, and virtual reality quickly becoming mainstream, it is not difficult to imagine the average speed reaching 1,000 Mbps (1 Gbps) ten years from now. In fact, many internet providers already offer 1 Gbps and 2 Gbps plans with business connections and some residential connections routinely operating at 10 Gbps. Some backbone and middle mile networks already operate on 100 Gbps and 400 Gbps connectivity.

APPENDIX 4
Challenge Process

Reid Consulting Group filed multiple rounds of FCC bulk challenges on behalf of MACOG. These challenges included addresses from across the state and targeted exaggerated claims from DSL providers and licensed fixed wireless carriers. Justification for these challenges combined knowledge of existing infrastructure with statistical analysis of crowdsourced speed test data. Because the FCC does not consider speed test data alone to be a valid basis for challenge, we cited our speed test analysis only as corroborating evidence to our primary infrastructure arguments. Those arguments were as follows:

DSL Cable Plant in Disrepair

DSL service, not only in rural Missouri but also across the rest of rural America, is delivered via twisted pair copper telephone cables that were originally installed in the 1940s-1960s. Most of those cables remain in service today. When delivered over well-maintained lines, DSL is capable of delivering reliable broadband service; however, almost all of our country's landline copper telephone cables are 50+ years old. With a useful lifespan of just 30 years, those cables are no longer to deliver reliable telephone service, let alone broadband.

Based on the decrepit condition of the country's twisted pair landline infrastructure, we challenged any location where a DSL provider claimed speeds above 25/3 Mbps.

Speed Rating Threshold

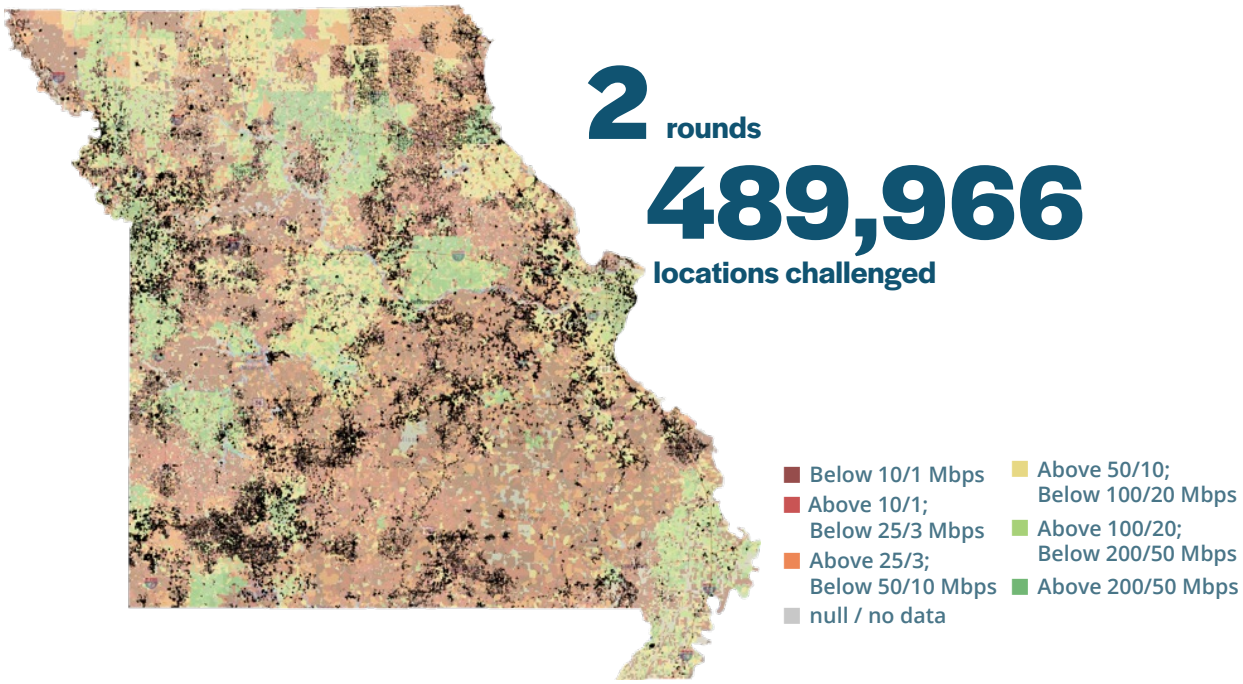
For all technologies, we only challenged locations where our maps showed speeds were below 25/3 Mbps and carrier claims were at least two speed tiers higher. For example, in our first round of fixed wireless challenges, we challenged nearly 48,000 locations that were claimed to be between 100/20 and 200/50 Mbps but which tested below 25/3 Mbps. An additional 27,000+ locations had no test results above 10/1 Mbps. The FCC does not accept this sort of analysis as a challenge justification. We included the data with our challenges anyway, to provide corroboration of our primary justifications and to ensure that the stark difference between carrier claims and citizen reality was documented in public record via the FCC Docket.

Fixed Wireless not a Mass Market Solution

Fixed wireless providers have significantly overstated their technology's geographic coverage and its ability to provide speeds above 100/20 Mbps at mass market take-rates. Our bulk challenge justification cited two specific justifications:

Overly optimistic signal propagation model: Fixed wireless carriers draw a 5-mile radius around each of their macro-towers and claim to offer 100/20 (or in some cases, gigabit speeds) to every location within that radius. Because fixed wireless requires line-of-sight transmission, such coverage is possible only in flat terrain. In hilly areas, particularly the steep terrain of the Ozarks, many subscribers will be unable to "see" a fixed wireless tower. To demonstrate just how widespread this problem can be, we conducted detailed, multi-tower viewshed analyses of multiple areas in the state, each representative of the kind of terrain found in that part of the state. Our analysis showed that even moderately rolling terrain included at least some signal shadows. In steep terrain, more locations were without signal than with. To make matters worse, frequencies above 3 GHz are readily absorbed by the water in tree leaves. These microwave band frequencies are now the most popular fixed wireless frequencies, in part because as frequencies rise, so does theoretical data capacity. With much of the southern part of the state heavily forested, signal attenuation makes fixed wireless even less viable.

Limited bandwidth on macro sites: Even if signal propagation were not an issue, bandwidth still would be a problem. For fixed wireless to be a mass-market solution, it must be able to support speeds of at least 100/20 Mbps for 80% of the locations within its coverage radius. Small cell wireless technology is capable of meeting this standard, but all of the providers in Missouri are using only macro towers. For macro-tower fixed wireless, all customers share bandwidth on the same transceiver or, in the best case, on a handful of directional transceivers that divide that tower's territory into quadrants. These transceivers are capable of delivering 100/20 Mbps to a small number of subscribers simultaneously, but if hundreds of subscribers were to connect at the same time, that tower's limited bandwidth would quickly be oversubscribed.



STATEWIDE CHALLENGES

Missouri Combined Challenges | Round 1

ISP Reported	Max observed	Rating Delta	Location Count	Challenge Status
6, Above 200/50	1, Below 10/1	5	1,243	Challenged
6, Above 200/50	2, Above 10/1; Below 25/3	4	2,776	Challenged
5. Above 100/20; Below 200/50	1, Below 10/1	4	27,545	Challenged
5. Above 100/20; Below 200/50	2, Above 10/1; Below 25/3	3	47,880	Challenged
4. Above 50/10; Below 100/20	1, Below 10/1	3	6,109	Challenged
4. Above 50/10; Below 100/20	2, Above 10/1; Below 25/3	2	15,658	Challenged
3. Above 25/3; Below 50/10	1, Below 10/1	2	60,546	Challenged
3. Above 25/3; Below 50/10	2, Above 10/1; Below 25/3	1	124,639	Not Challenged

Locations with a Rating Delta of 2 or higher	**161,757**	**Challenged**
Locations with a Rating Delta of 1	**124,639**	**Not Challenged**

Missouri Fixed Wireless

ISP Reported	Max observed	Rating Delta	Location Count	Challenge Status
6, Above 200/50	1, Below 10/1	5	1,182	Challenged
6, Above 200/50	2, Above 10/1; Below 25/3	4	2,537	Challenged
5. Above 100/20; Below 200/50	1, Below 10/1	4	26,302	Challenged
5. Above 100/20; Below 200/50	2, Above 10/1; Below 25/3	3	44,930	Challenged
4. Above 50/10; Below 100/20	1, Below 10/1	3	2,727	Challenged
4. Above 50/10; Below 100/20	2, Above 10/1; Below 25/3	2	7,741	Challenged
3. Above 25/3; Below 50/10	1, Below 10/1	2	43,362	Challenged
3. Above 25/3; Below 50/10	2, Above 10/1; Below 25/3	1	92,144	Not Challenged

Locations with a Rating Delta of 2 or higher	**128,781**	**Challenged**
Locations with a Rating Delta of 1	**92,144**	**Not Challenged**

Missouri DSL

ISP Reported	Max observed	Rating Delta	Location Count	Challenge Status
6, Above 200/50	1, Below 10/1	5	61	Challenged
6, Above 200/50	2, Above 10/1; Below 25/3	4	239	Challenged
5. Above 100/20; Below 200/50	1, Below 10/1	4	1,243	Challenged
5. Above 100/20; Below 200/50	2, Above 10/1; Below 25/3	3	2,950	Challenged
4. Above 50/10; Below 100/20	1, Below 10/1	3	3,382	Challenged
4. Above 50/10; Below 100/20	2, Above 10/1; Below 25/3	2	7,917	Challenged
3. Above 25/3; Below 50/10	1, Below 10/1	2	17,184	Challenged
3. Above 25/3; Below 50/10	2, Above 10/1; Below 25/3	1	32,495	Not Challenged

Locations with a Rating Delta of 2 or higher	**32,976**	**Challenged**
Locations with a Rating Delta of 1	**32,495**	**Not Challenged**

Missouri Combined Challenges | Round 2

ISP Reported	Max observed	Rating Delta	Location Count	Challenge Status
6, Above 200/50	1, Below 10/1	5	31,510	Challenged
6, Above 200/50	2, Above 10/1; Below 25/3	4	29,801	Challenged
6, Above 200/50	3, Above 25/3; Below 50/10	3	68,770	Challenged
5, Above 100/20; Below 200/50	1, Below 10/1	4	44,655	Challenged
5, Above 100/20; Below 200/50	2, Above 10/1; Below 25/3	3	46,371	Challenged
5, Above 100/20; Below 200/50	3, Above 25/3; Below 50/10	2	51,870	Challenged
4, Above 50/10; Below 100/20	1, Below 10/1	3	6,136	Challenged
4, Above 50/10; Below 100/20	2, Above 10/1; Below 25/3	2	7,681	Challenged
3, Above 25/3; Below 50/10	1, Below 10/1	2	41,415	Challenged
3, Above 25/3; Below 50/10	2, Above 10/1; Below 25/3	1	48,398	Not Challenged
Totals			**328,209**	**Challenged**
			48,398	**Not Challenged**

Missouri Fixed Wireless Challenges | Round 2

ISP Reported	Max observed	Rating Delta	Location Count	Challenge Status
6, Above 200/50	1, Below 10/1	5	810	Challenged
6, Above 200/50	2, Above 10/1; Below 25/3	4	2,450	Challenged
5, Above 100/20; Below 200/50	1, Below 10/1	4	30,521	Challenged
5, Above 100/20; Below 200/50	2, Above 10/1; Below 25/3	3	30,065	Challenged
4, Above 50/10; Below 100/20	1, Below 10/1	3	3,673	Challenged
4, Above 50/10; Below 100/20	2, Above 10/1; Below 25/3	2	3,420	Challenged
3, Above 25/3; Below 50/10	1, Below 10/1	2	25,400	Challenged
3, Above 25/3; Below 50/10	2, Above 10/1; Below 25/3	1	26,683	Not Challenged
Totals			**96,339**	**Challenged**
			26,683	**Not Challenged**

Missouri DSL Challenges | Round 2

ISP Reported	Max observed	Rating Delta	Location Count	Challenge Status
6, Above 200/50	1, Below 10/1	5	497	Challenged
6, Above 200/50	2, Above 10/1; Below 25/3	4	774	Challenged
5, Above 100/20; Below 200/50	1, Below 10/1	4	921	Challenged
5, Above 100/20; Below 200/50	2, Above 10/1; Below 25/3	3	1,531	Challenged
4, Above 50/10; Below 100/20	1, Below 10/1	3	2,463	Challenged
4, Above 50/10; Below 100/20	2, Above 10/1; Below 25/3	2	4,261	Challenged
3, Above 25/3; Below 50/10	1, Below 10/1	2	16,015	Challenged
3, Above 25/3; Below 50/10	2, Above 10/1; Below 25/3	1	21,715	Not Challenged
Totals			**26,462**	**Challenged**
			21,715	**Not Challenged**

Missouri Fiber Challenges | Round 2

ISP Reported	Max observed	Rating Delta	Location Count	Challenge Status
6, Above 200/50	1, Below 10/1	5	24,189	Challenged
6, Above 200/50	2, Above 10/1; Below 25/3	4	18,746	Challenged
6, Above 200/50	3. Above 25/3; Below 50/10	3	45,664	Challenged
5. Above 100/20; Below 200/50	1, Below 10/1	4	1,925	Challenged
5, Above 100/20; Below 200/50	2, Above 10/1; Below 25/3	3	2,074	Challenged
5, Above 100/20; Below 200/50	3. Above 25/3; Below 50/10	2	5,861	Challenged
Totals			**98,459**	**Challenged**

Missouri Cable Modem Challenges | Round 2

ISP Reported	Max observed	Rating Delta	Location Count	Challenge Status
6, Above 200/50	1, Below 10/1	5	6,014	Challenged
6, Above 200/50	2, Above 10/1; Below 25/3	4	7,831	Challenged
6, Above 200/50	3. Above 25/3; Below 50/10	3	23,106	Challenged
5. Above 100/20; Below 200/50	1, Below 10/1	4	11,288	Challenged
5, Above 100/20; Below 200/50	2, Above 10/1; Below 25/3	3	12,701	Challenged
5, Above 100/20; Below 200/50	3. Above 25/3; Below 50/10	2	46,009	Challenged
Totals			**106,949**	**Challenged**

REGIONAL CHALLENGES BY COUNTY: ROUND 2

Provider Claimed Speed	Above 25/3; Below 50/10		Above 50/10; Below 100/20		Above 100/20; Below 200/50			Above 200/50			
Maximum Speed Test at Location	Below 10/1	Above 10/1; Below 25/3	Above 25/3; Below 50/10	Above 10/1; Below 25/3	Above 10/1; Below 25/3	Above 25/3; Below 50/10	Above 25/3; Below 50/10	Above 10/1; Below 25/3	Above 25/3; Below 50/10	Above 25/3; Below 50/10	Grand Total
Adair County	**59**	**45**	**150**	**144**	**18**	**23**	**359**	**173**	**716**	**518**	**2205**
Cable								**111**	**115**	**359**	**585**
Sparklight								111	115	359	585
DSL			**4**								**4**
Mark Twain Rural Telephone Company			4								4
Fiber					**18**	**22**	**359**	**62**	**601**	**159**	**1221**
Bluebird Network LLC								9	6	58	73
Mark Twain Rural Telephone Company					15	22	359	3		1	400
Northeast Missouri Rural Telecommunications					3			45	595	77	720
Socket Telecom, LLC								5		23	28
Fixed Wireless	**59**	**45**	**146**	**144**		**1**					**395**
Mark Twain Communications Company	30	45	121	143		1					340
T-Mobile US				1							1
UNITED STATES CELLULAR CORPORATION	29		25								54
Clark County	**713**	**417**	**629**	**419**	**497**	**484**	**523**	**531**	**545**	**465**	**5223**
DSL	**151**			**1**							**152**
Brightspeed	151			1							152
Fiber					**17**	**23**	**523**	**531**	**545**	**465**	**2104**
Bluebird Network LLC								29	80	62	171
Mark Twain Rural Telephone Company					17	23	521			6	567
Northeast Missouri Rural Telecommunications							2	7	9	381	399
yondoo Broadband, LLC								495	456	16	967
Fixed Wireless	**562**	**417**	**629**	**418**	**480**	**461**					**2967**
FullSpeed LLC	125		36		2						163
Mark Twain Communications Company	161	175	370	332	103	88					1229
T-Mobile US	136	242	127	86	286	373					1250
UNITED STATES CELLULAR CORPORATION	140		96		89						325
Knox County	**13**		**72**	**353**	**7**	**4**	**713**	**4**	**10**	**273**	**1449**
DSL	**1**		**31**	**309**							**341**
Mark Twain Rural Telephone Company	1		31	309							341
Fiber					**7**	**4**	**713**	**4**	**10**	**273**	**1011**
Mark Twain Communications Company								2	10	105	117
Mark Twain Rural Telephone Company					7	4	707			26	744
Northeast Missouri Rural Telecommunications							6	2		142	150
Fixed Wireless	**12**		**41**	**44**							**97**
Mark Twain Communications Company			41	44							85
UNITED STATES CELLULAR CORPORATION	12										12
Lewis County	**455**	**532**	**105**	**99**	**341**	**778**	**399**	**403**	**1186**	**74**	**4372**
DSL	**127**		**32**	**2**							**161**
Brightspeed	85										85
Mark Twain Communications Company	42										42
Mark Twain Rural Telephone Company			32	2							34
Fiber					**42**	**2**	**399**	**403**	**1186**	**74**	**2106**
Bluebird Network LLC								31	93	12	136
Mark Twain Communications Company								3	2	23	28
Mark Twain Rural Telephone Company					42	2	399			8	451
yondoo Broadband, LLC								369	1091	31	1491
Fixed Wireless	**328**	**532**	**73**	**97**	**299**	**776**					**2105**
Mark Twain Communications Company	35	16	69	97							217
T-Mobile US	138	516	4		214	776					1648
UNITED STATES CELLULAR CORPORATION	155				85						240
Schuyler County	**3**		**2**	**1**	**17**	**9**	**280**	**346**	**12**	**406**	**1076**
Fiber							**280**	**346**	**12**	**406**	**1044**
CITIZENS MUTUAL TELEPHONE										13	13
Mark Twain Rural Telephone Company							280			9	289
Northeast Missouri Rural Telecommunications								346	12	384	742
Fixed Wireless	**3**		**2**	**1**	**17**	**9**					**32**
Mark Twain Communications Company			2	1	17	9					29
UNITED STATES CELLULAR CORPORATION	3										3
Scotland County	**10**		**186**	**38**	**11**	**2**	**32**	**9**	**507**	**1701**	**2496**
Fiber					**11**	**2**	**32**	**9**	**507**	**1701**	**2262**
CITIZENS MUTUAL TELEPHONE										3	3
Mark Twain Rural Telephone Company					11	2	31			1	45
Northeast Missouri Rural Telecommunications							1	9	507	1697	2214
Fixed Wireless	**10**		**186**	**38**							**234**
Mark Twain Communications Company	10		186	38							234
Grand Total	**1253**	**994**	**1144**	**1054**	**891**	**1300**	**2306**	**1466**	**2976**	**3437**	**16821**

APPENDIX 5
Myths, Realities, and Responses

Successful broadband planning requires collaboration between governments, internet service providers, and consumers. Speed test analysis is an essential part of that collaboration, but some internet service providers may object that the maps are inaccurate. Some of these objections may cite common myths about speed testing, but others will be valid concerns. When sharing this report with providers, the following explanations can help steer the conversation toward collaboration.

MYTHS	Bad tests are because of poor Wi-Fi.	Residents only subscribe to low speed packages.	People only test when there is a problem.
REALITIES	Our analysis eliminates speed tests with weak Wi-Fi and includes tests from GPS-enabled wired devices.	According to NRECA, in areas where rural electric cooperatives offer broadband, 25% to 33% of rural subscribers opt for the top speed offered.	Network problems prompt tests, as do resolutions of problems. Sometimes the tests will show the network is working but a streaming service is slow. We focus on the **maximum** speed ever shown

Problem: Network throttling

When a provider limits subscriber bandwidth (e.g., 35 or 50 Mbps down instead of 100), then speed test maps will show those customers as underserved, even though the underlying technology can deliver much higher speeds.

Solution: Conduct max speed tests during installation and service calls

ISPs can improve their speed ratings by having their technicians conduct GPS-enabled Ookla speed tests as part of each customer premise visit. When installing new service or completing a repair, the technician should:

- Temporarily remove any bandwidth caps on the customer's account.
- Connect to the customer's wi-fi using a GPS-enabled iOS/Android device or plug directly into the fiber interface's Ethernet port using a GPS-enabled laptop.
- Using the Speedtest by Ookla app with precise location tracking enabled, conduct multiple tests to reveal the fastest speed available. Always use the Ookla app. The speedtest.net website does not gather precise enough location data.

This approach should not be considered "gaming the system." For grant planning purposes, it is important to document the highest practical speeds available in each area, even if an ISP does not routinely allow customers full access to those speeds.

Problem: Mis-attributed IP address ranges

Smaller ISPs sometimes purchase or lease their network address ranges from a middle mile provider. If those address ranges do not have the ISP's name associated with them, then those tests will be filtered out of the results as belonging to an infrastructure device instead of a home or business.

Solution: Update IP block ownership data

Ookla uses the Maxmind service to identify ISP network address owners. ISPs can update their address attribution by visiting maxmind.com and completing the form found under Correct a GeoIP ISP or Organization.

Problem: Poor upload speeds

Cable modem-based systems can support download speeds as fast as 2 Gbps, but they often struggle to deliver upload speeds above 10 Mbps. This is a fundamental limitation of the medium, especially for older cable TV networks.

Solution: Network upgrade

Cable companies can perform what is known as a "high split upgrade" that increases upload speeds for less than it would cost to deploy fiber. While this is not a long-term solution, it does help older cable plants to meet current federal minimums.

Problem: Recent upgrades not showing up

Because speed test data relies on organic consumer behavior patterns, test results can lag behind network changes, especially when a provider raises or removes a speed cap on its customers' accounts without notifying them.

Solution: Technician-conducted speed tests and customer test campaigns

If an ISP wants to see a more immediate reflection of recent changes to its existing network, they should add speed testing to their technicians' customer premise visit procedure. We also recommend encouraging customers to conduct their own speed tests. As noted above, these tes