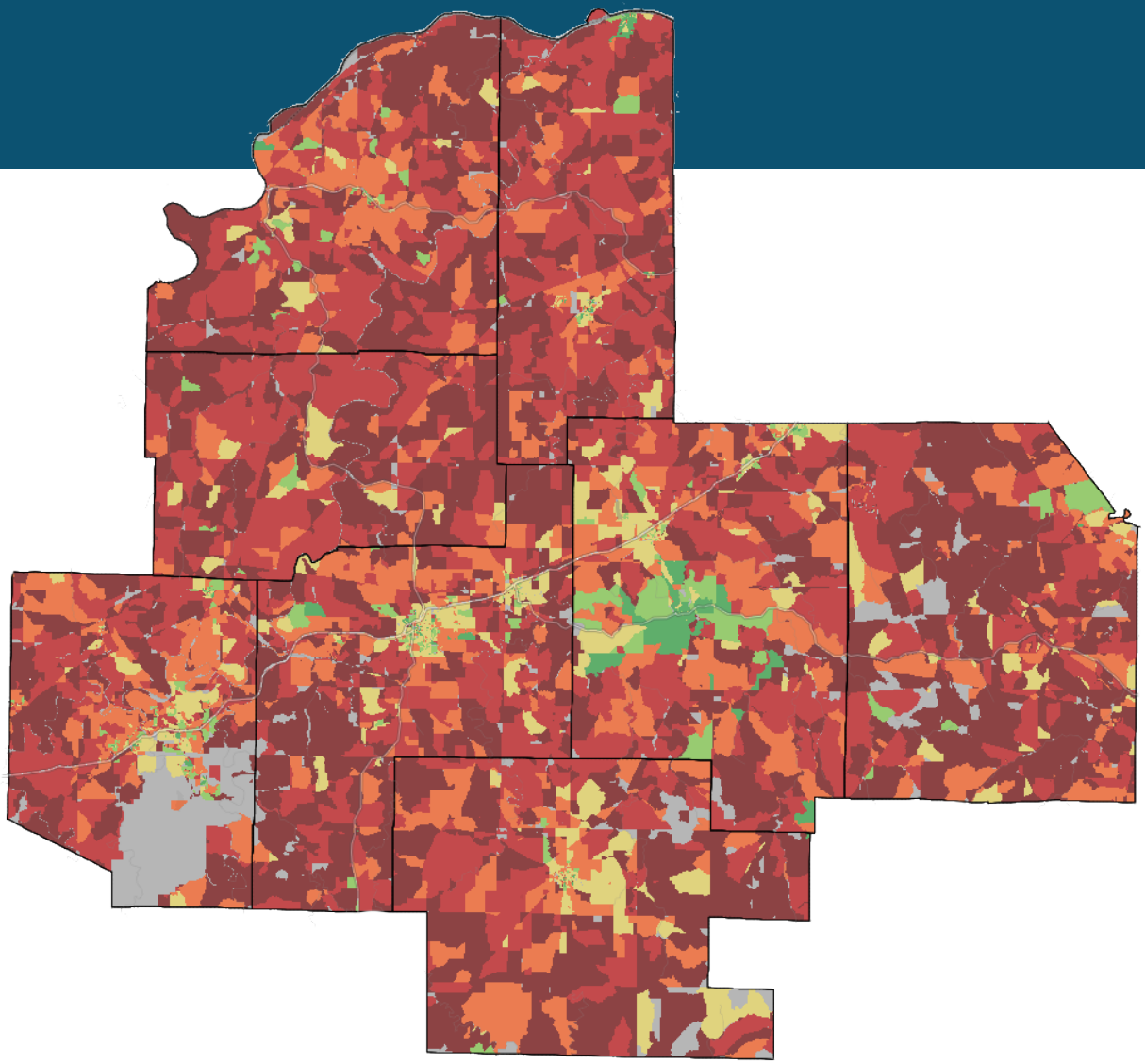
Meramec
Regional Planning Commission

70% – **60,102**
locations without access to 50/10 Mbps

6,517
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

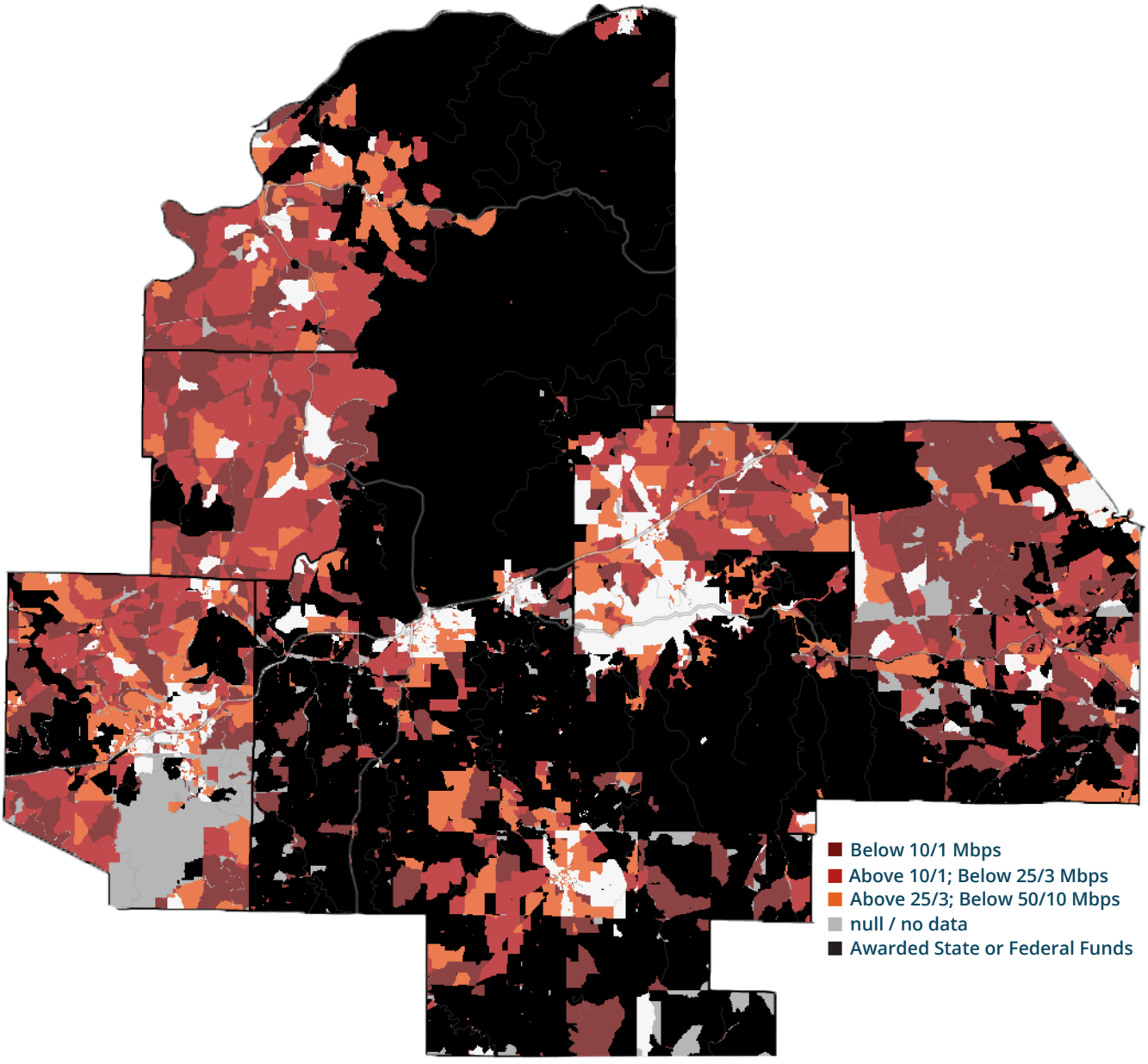
*Coverage ratings reflect multiple sources, including Ookla Speedtest Intelligence® data licensed by MACOG for the months of December 2020 through July 2023. See Appendix 1 for detailed methodology

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.

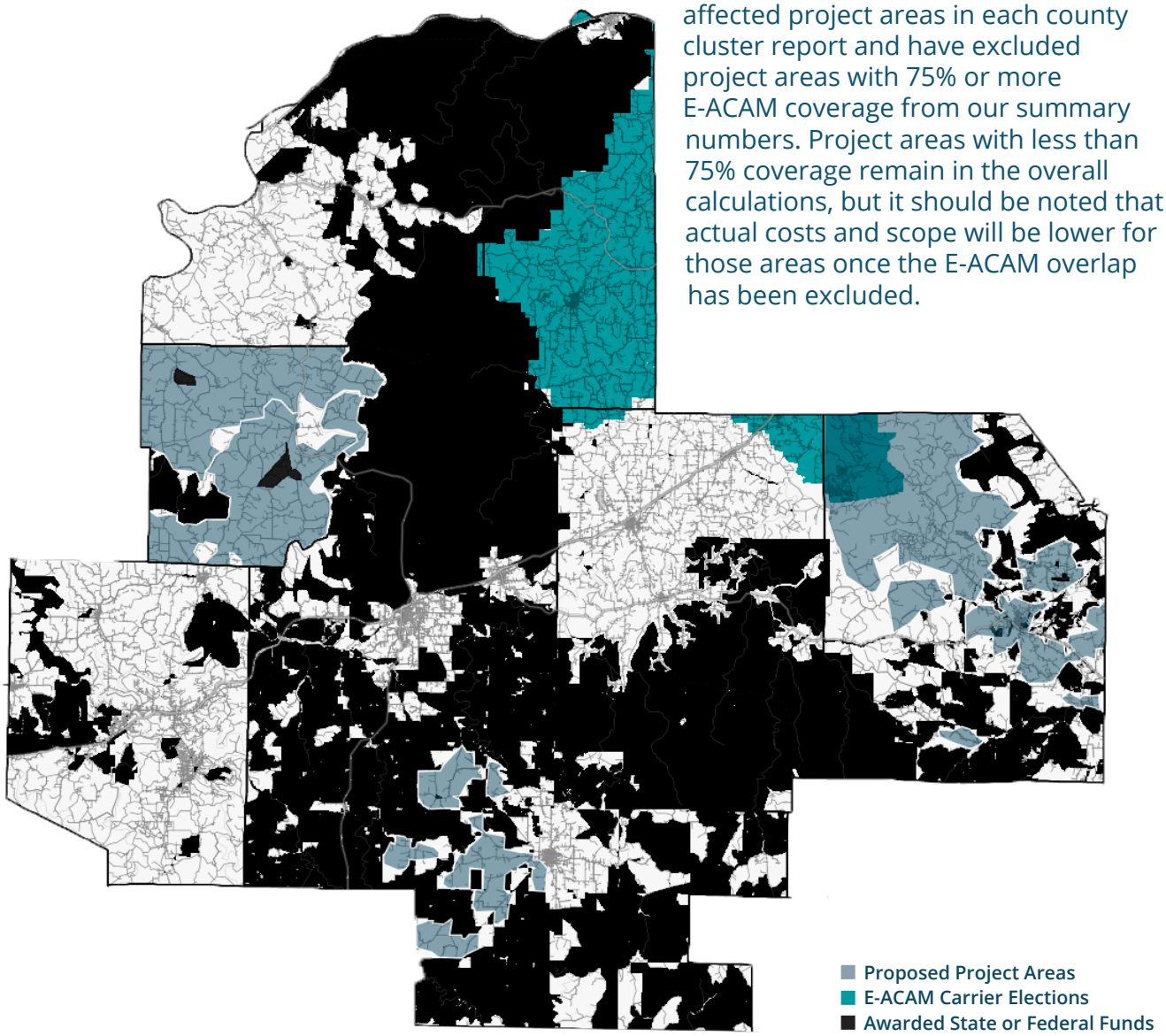
Blocked out areas show existing federal and state awards that were not in default at the time of this report. The remaining areas in red and orange are below 25/3 and 50/10 Mbps respectively and were the areas of focus for the county cluster project planning.

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.

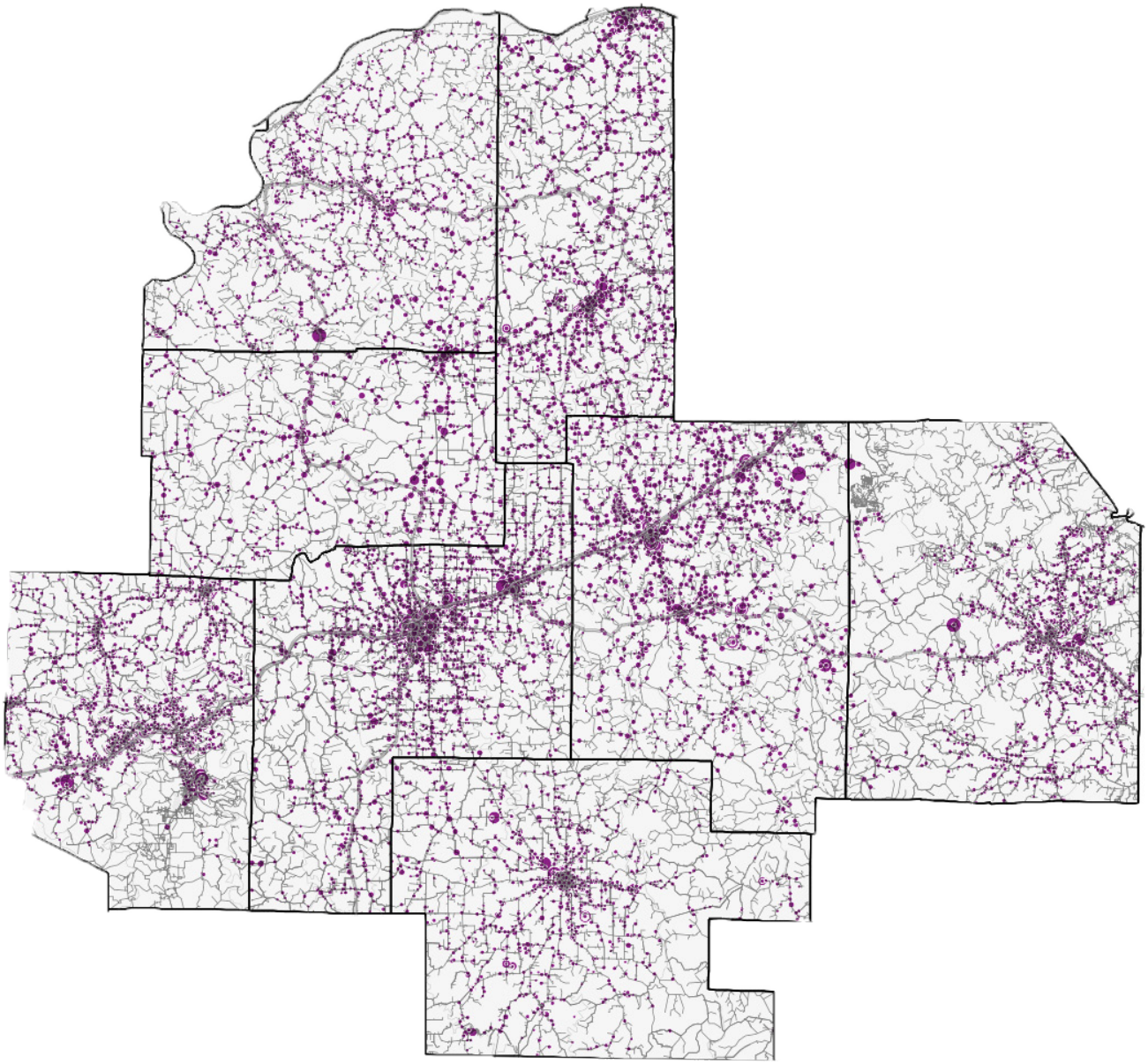


BUSINESS OPPORTUNITY AREAS

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.

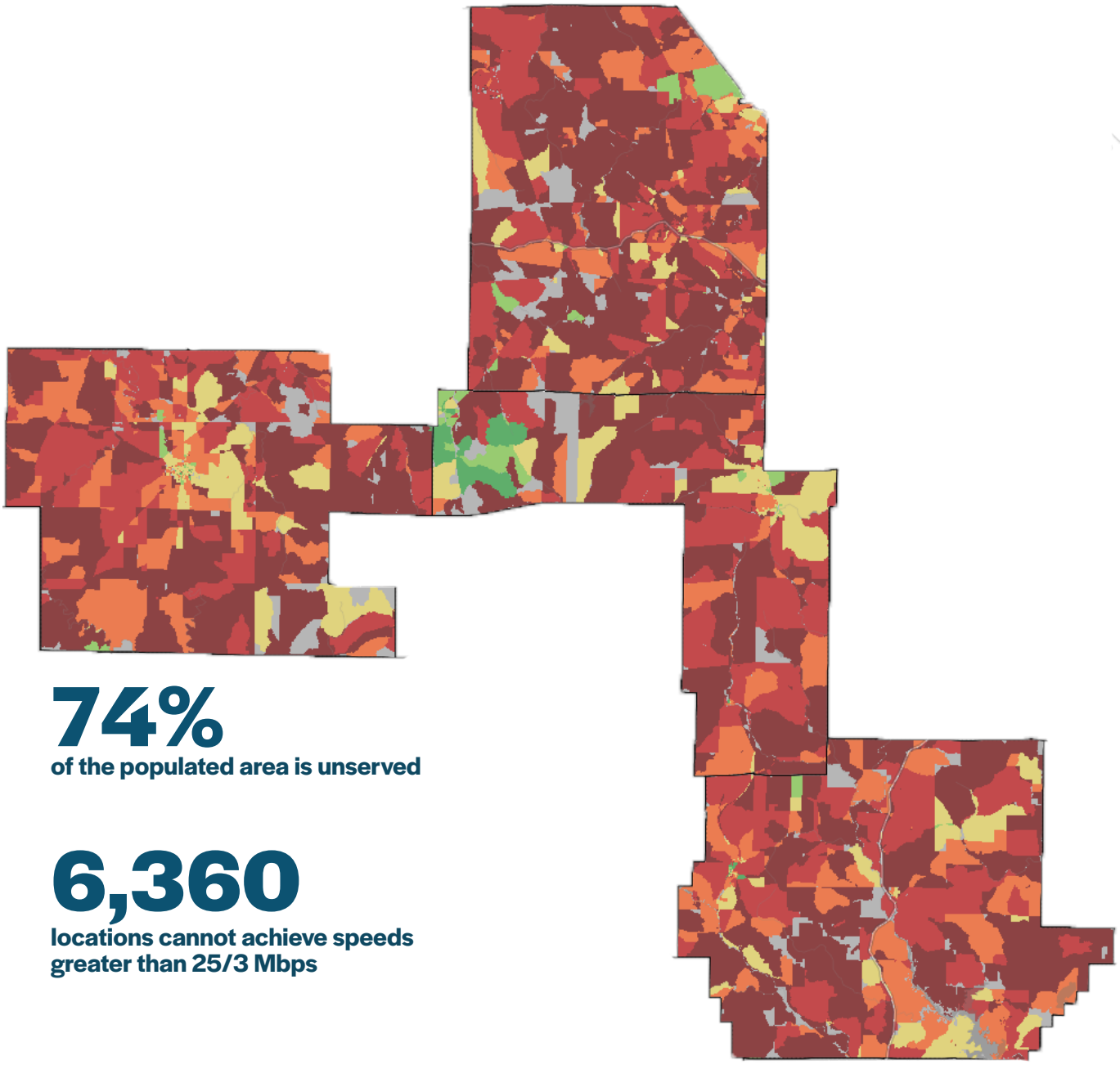
*See “Business Broadband Opportunity Index” in Appendix 1 for a detailed explanation of how dot size was determined



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

Dent / Iron / Washington / Wayne

Project Cluster ▪ Meramec - Ozark Foothills- Southeast Missouri Regional Planning Commissions



74%
of the populated area is unserved

6,360
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

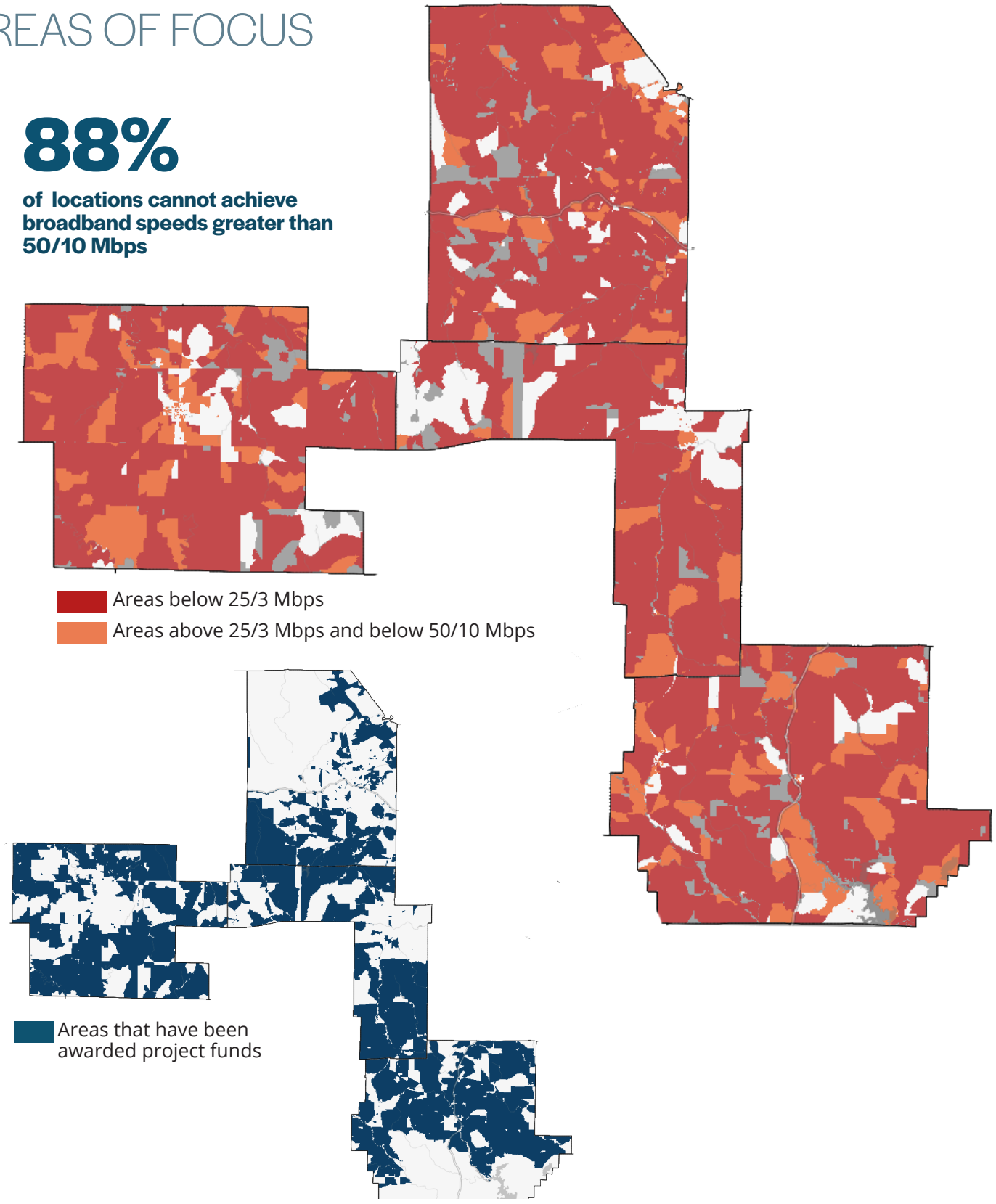
Dent / Iron / Washington / Wayne

Project Cluster ▪ Meramec - Ozark Foothills- Southeast Missouri Regional Planning Commissions

AREAS OF FOCUS

88%

of locations cannot achieve broadband speeds greater than 50/10 Mbps

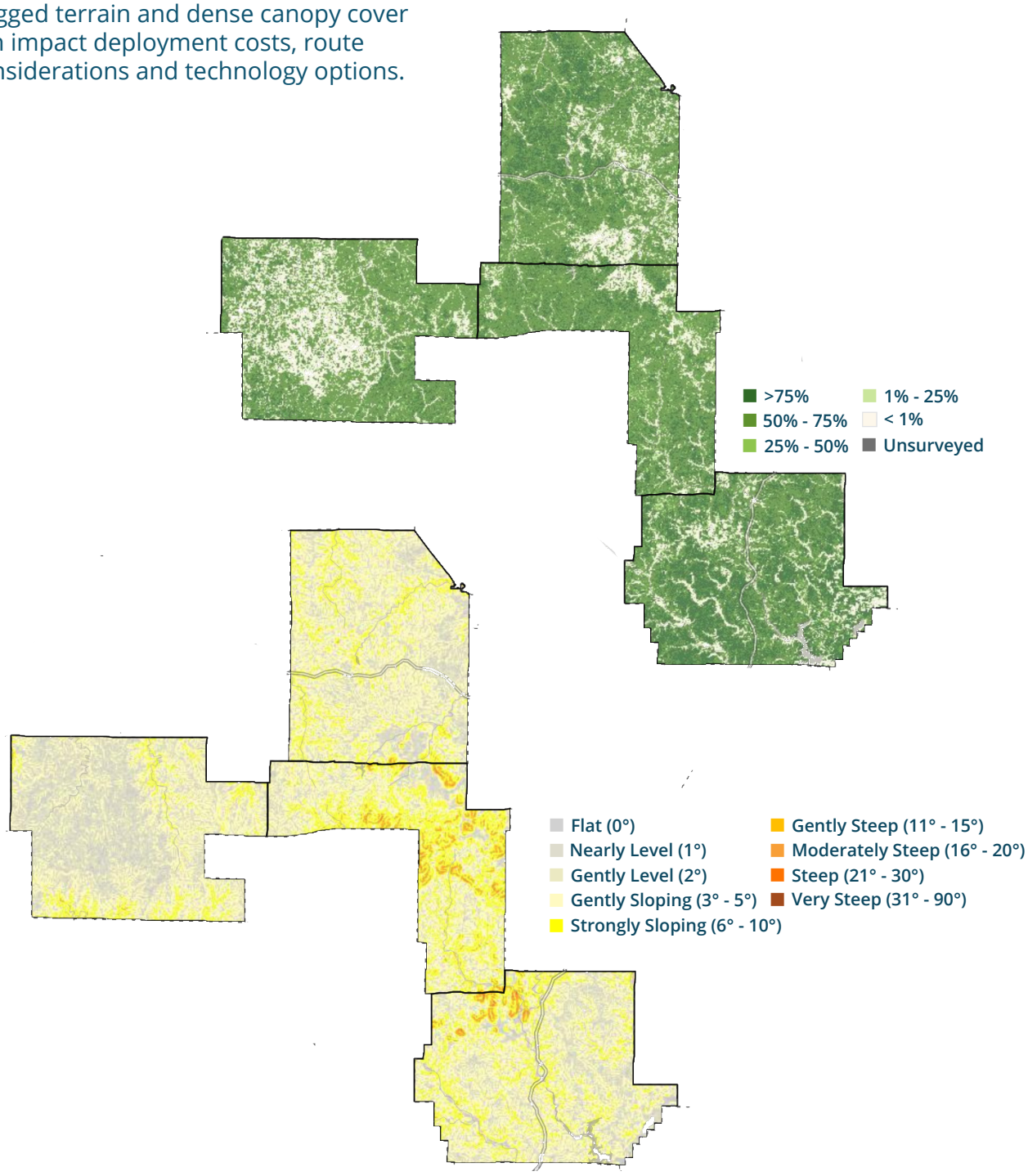


Dent / Iron / Washington / Wayne

Project Cluster ▪ Meramec - Ozark Foothills- Southeast Missouri Regional Planning Commissions

PLANNING CONSIDERATIONS

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



Dent / Iron / Washington / Wayne

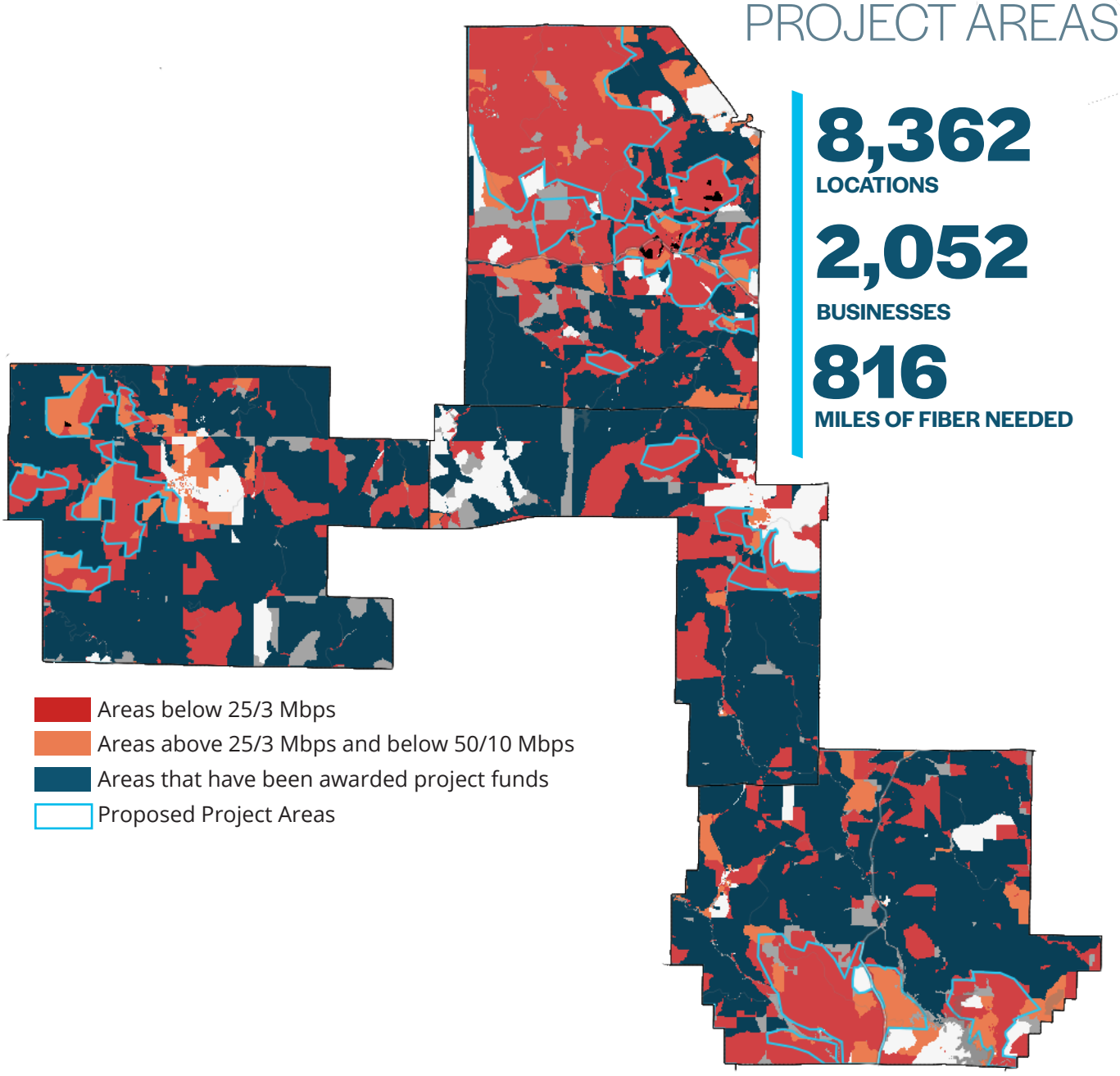
Project Cluster ▪ Meramec - Ozark Foothills- Southeast Missouri Regional Planning Commissions

PROJECT AREAS

8,362
LOCATIONS

2,052
BUSINESSES

816
MILES OF FIBER NEEDED



Investment Range = $73.7 - $162 million†

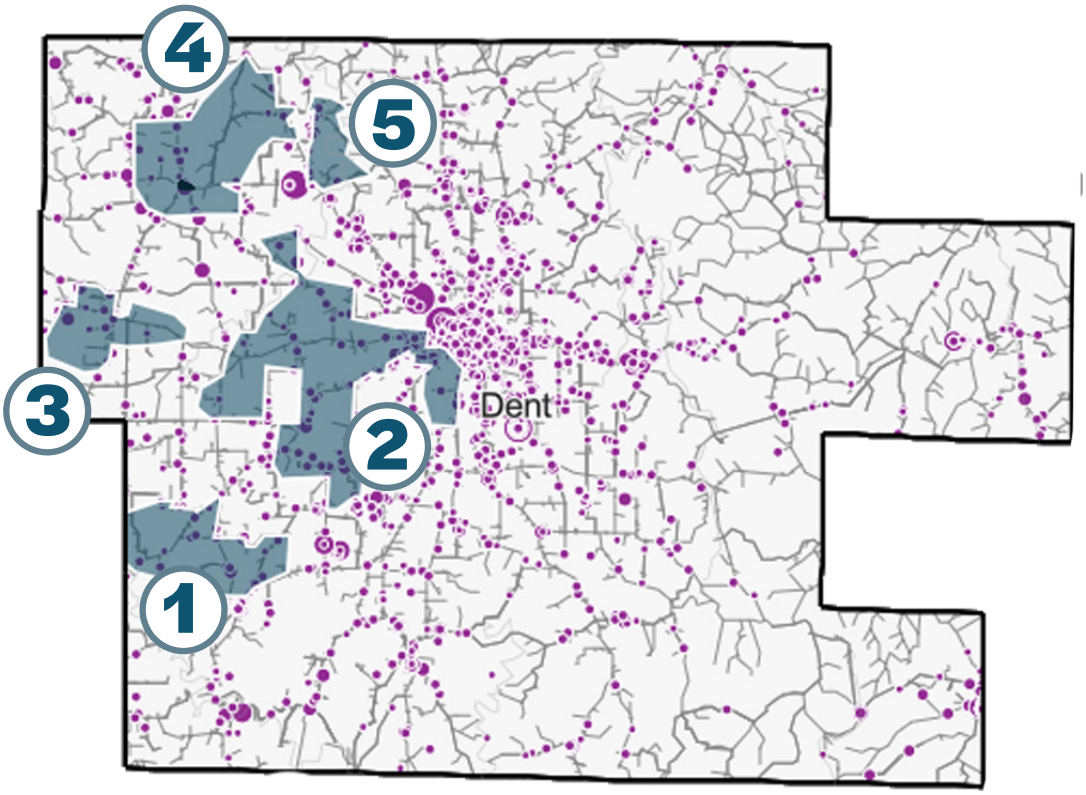
**Investment projections take into account the total number of fiber miles, deployment type [aerial or underground] and the computation of low, mid and high project cost. A full explanation of our methodology and calculation tables can be found in the Appendix 1 and 2.*

† 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

DENT COUNTY

PROJECT AREAS

While most of Dent County outside of Salem is unserved or underserved, much of that territory is funded-to-served via multiple existing grant awards. In the eastern half of the county, the blocks that remain unserved and unfunded contain mostly locations that are on roads that are part of existing award boundaries. These locations, while technically eligible for funding, are likely to be served as part of the existing funded deployment. In the west, we identified 5 project areas. Although these areas also are surrounded by existing awards, the population is distributed more evenly with many locations far enough away from boundary roads to merit applying for funding.



Proposed Project Area Funded or served excluded from calculation

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

98	778	198	8
fiber miles	locations	business locations	locations per mile

INVESTMENT = $8.7 - $19.1 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.*

DENT COUNTY
PROJECT DETAILS

1

AERIAL		UNDERGROUND
$1.4M $1.9M	COST TO PASS	$1.9M - $3.1M
$112K - $448K	ISP INVESTMENT	$112K - $448K
$981K - $1.8M	FUNDING GAP	$1.4M - $3M
$292 - $535	annual cost per location over 30 years	$423 - $902

16 fiber miles

112 locations

7 locations per mile

2

AERIAL		UNDERGROUND
$3.7M- $5M	COST TO PASS	$4.8M - $8.1M
$404MK - $1.6M	ISP INVESTMENT	$404K - $1.6M
$2M - $4.6M	FUNDING GAP	$3.2M - $7.7M
$172 - $375	annual cost per location over 30 years	$266 - $638

42 fiber miles

404 locations

9.7 locations per mile

3

AERIAL		UNDERGROUND
$924K- $1.2M	COST TO PASS	$1.2 - $2M
$73K - $292K	ISP INVESTMENT	$73K - $292K
$632K - $1.2M	FUNDING GAP	$916K - $2M
$289 - $531	annual cost per location over 30 years	$418 - $894

10 fiber miles

73 locations

7 locations per mile

DENT COUNTY
PROJECT DETAILS

4

AERIAL		UNDERGROUND
$2M - $2.7N	COST TO PASS	$2.6M - $4.4M
$146K - $584K	ISP INVESTMENT	$146K - $584K
$1.4M - $2.5M	FUNDING GAP	$2M - $4.1M
$320 - $573	annual cost per location over 30 years	$459 - $963

22 fiber miles

146 locations

6.5 locations per mile

5

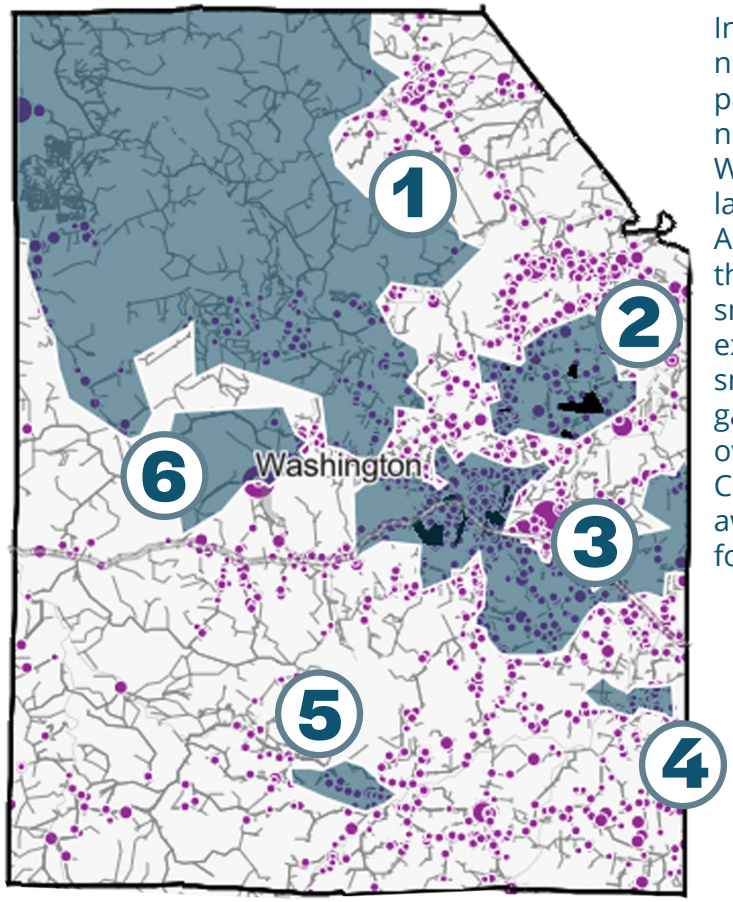
AERIAL		UNDERGROUND
$633K - $846K	COST TO PASS	$828K - $1.4M
$43K - $172K	ISP INVESTMENT	$43K - $172K
$461K - $803K	FUNDING GAP	$656K - $1.4M
$357 - $623	annual cost per location over 30 years	$508 - $1,045

7 fiber miles

43 locations

6 locations per mile

WASHINGTON COUNTY
PROJECT AREAS



In Washington County, the largest areas of need are in the northwestern and east-central parts of the county. Most of the southern and northeastern blocks are already funded-to-served. We identified 6 potential project areas, with the largest encompassing most of the northwest. Area #3, which includes Potosi, and area #2 to the northeast of Potosi both include multiple small existing award areas. Those locations were excluded from our budget calculations. The smaller areas in the south were designed to fill gaps between existing award territories. Given the overall patchwork nature of awards in Washington County, it is hard to predict whether existing awardees will apply for funds to expand their footprint or challenge competing applications.

Proposed Project Area Funded or served excluded from calculation

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

498	5,365	1,521	10.8
fiber miles	locations	business locations	locations per mile

INVESTMENT = $44.3 - $97.3 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.*

WASHINGTON COUNTY
PROJECT DETAILS

1

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

AERIAL		UNDERGROUND
$25.9M - $34.6M	COST TO PASS	$33.9M - $56.9M
$1.5M - $6M	ISP INVESTMENT	$1.5M - $6M
$19.9M - $33.1M	FUNDING GAP	$27.M - $55.4M
$443 - $738	annual cost per location over 30 years	$621 - $1,234

291 fiber miles

1,497 locations | **5.1** locations per mile

2

AERIAL		UNDERGROUND
$3.9M - $5.2M	COST TO PASS	$5.1M - $8.5M
$592K - $2.4M	ISP INVESTMENT	$592K - $2.4M
$1.5M - $4.6M	FUNDING GAP	$2.7M - $7.9M
$84 - $258	annual cost per location over 30 years	$151 - $445

44 fiber miles

592 locations | **13.6** locations per mile

3

AERIAL		UNDERGROUND
$10.5M - $14M	COST TO PASS	$13.7M - $23M
$2.8M - $11M	ISP INVESTMENT	$2.8M - $11M
$0 - $11.3M	FUNDING GAP	$2.7M - $20.3M
$0 - $136	annual cost per location over 30 years	$32 - $245

118 fiber miles

2,758 locations | **23.4** locations per mile

**In this area, density is high enough that an ISP may be willing to deploy with no subsidy.*

WASHINGTON COUNTY

PROJECT DETAILS

4

AERIAL		UNDERGROUND
$1.4M - $1.9M	COST TO PASS	$1.9M - $3.1M
$295K - $1.2M	ISP INVESTMENT	$295K - $1.2M
$240K - $1.6M	FUNDING GAP	$677K - $2.8M
$27 - $181	annual cost per location over 30 years	$76 - $319

16 fiber miles

295 locations

18.5 locations per mile

5

AERIAL		UNDERGROUND
$686K - $918K	COST TO PASS	$897K - $1.5M
$170K - $680K	ISP INVESTMENT	$170K - $680K
$6.2K - $748K	FUNDING GAP	$217K - $1.3M
$1 - $147	annual cost per location over 30 years	$43 - $262

8 fiber miles

170 locations

22 locations per mile

6

AERIAL		UNDERGROUND
$1.9M - $2.6M	COST TO PASS	$2.5M - $4.3M
$53K - $212K	ISP INVESTMENT	$53K - $212K
$1.8M - $2.5M	FUNDING GAP	$2.3M - $4.2M
$1,087 - $1,599	annual cost per location over 30 years	$1,463 - $2,650

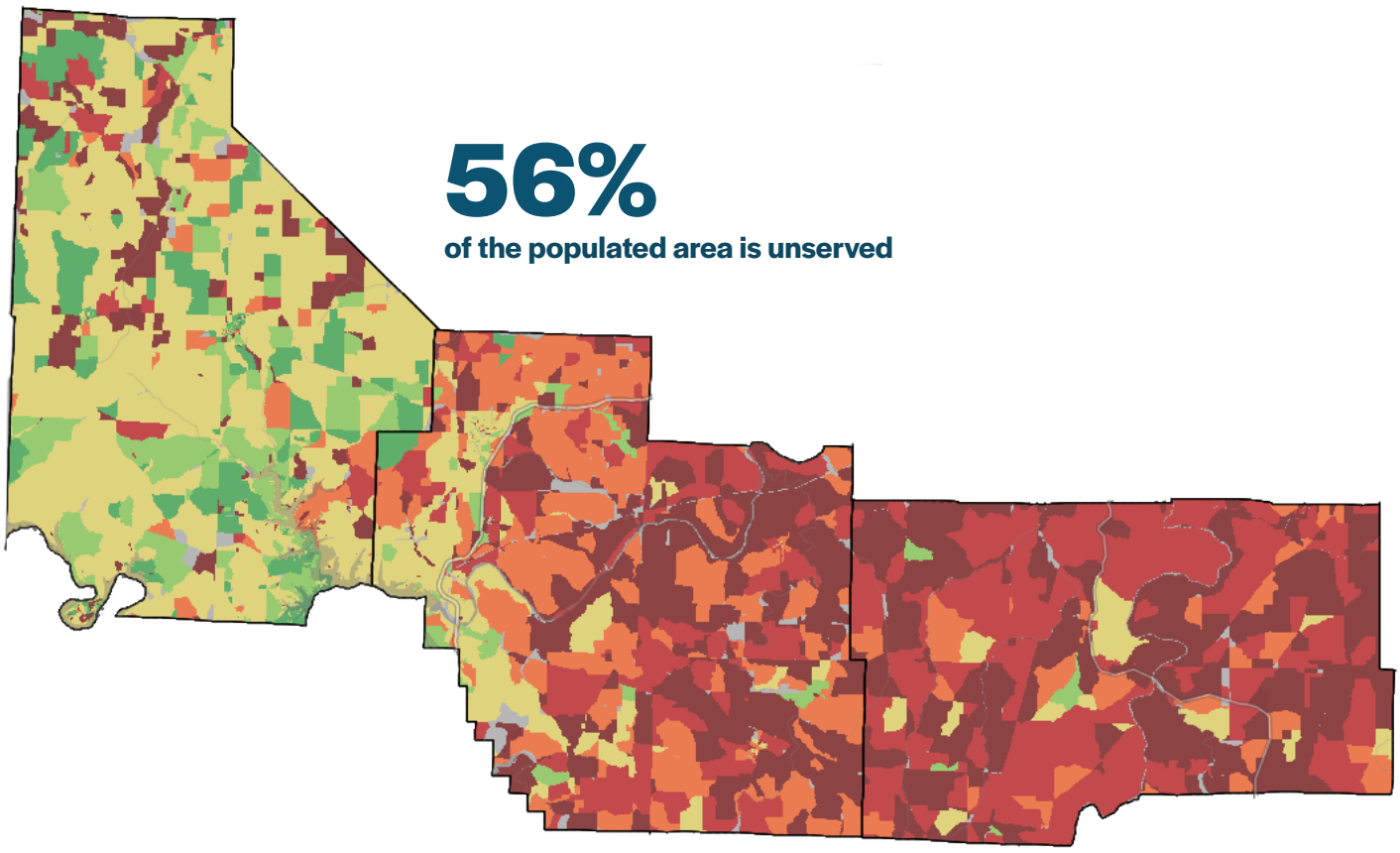
22 fiber miles

53 locations

2.4 locations per mile

Morgan / Miller / Maries

Project Cluster ▪ Lake of the Ozarks Council of Local Governments
Meramec Regional Planning Commission



56%
of the populated area is unserved

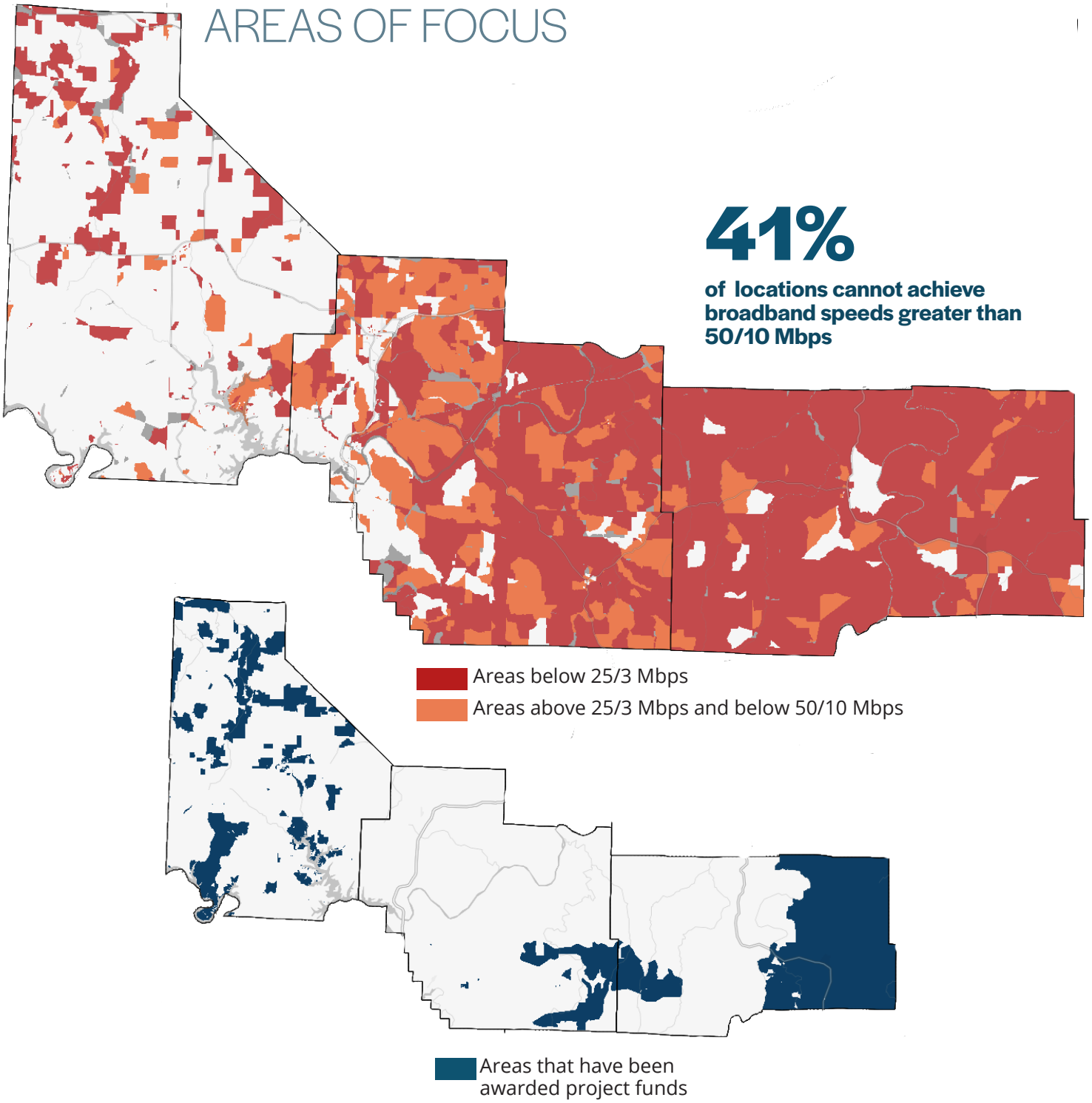
11,601
locations cannot achieve speeds greater than 25/3 Mbps

- 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

Morgan / Miller / Maries

Project Cluster ▪ Lake of the Ozarks Council of Local Governments
Meramec Regional Planning Commission

AREAS OF FOCUS

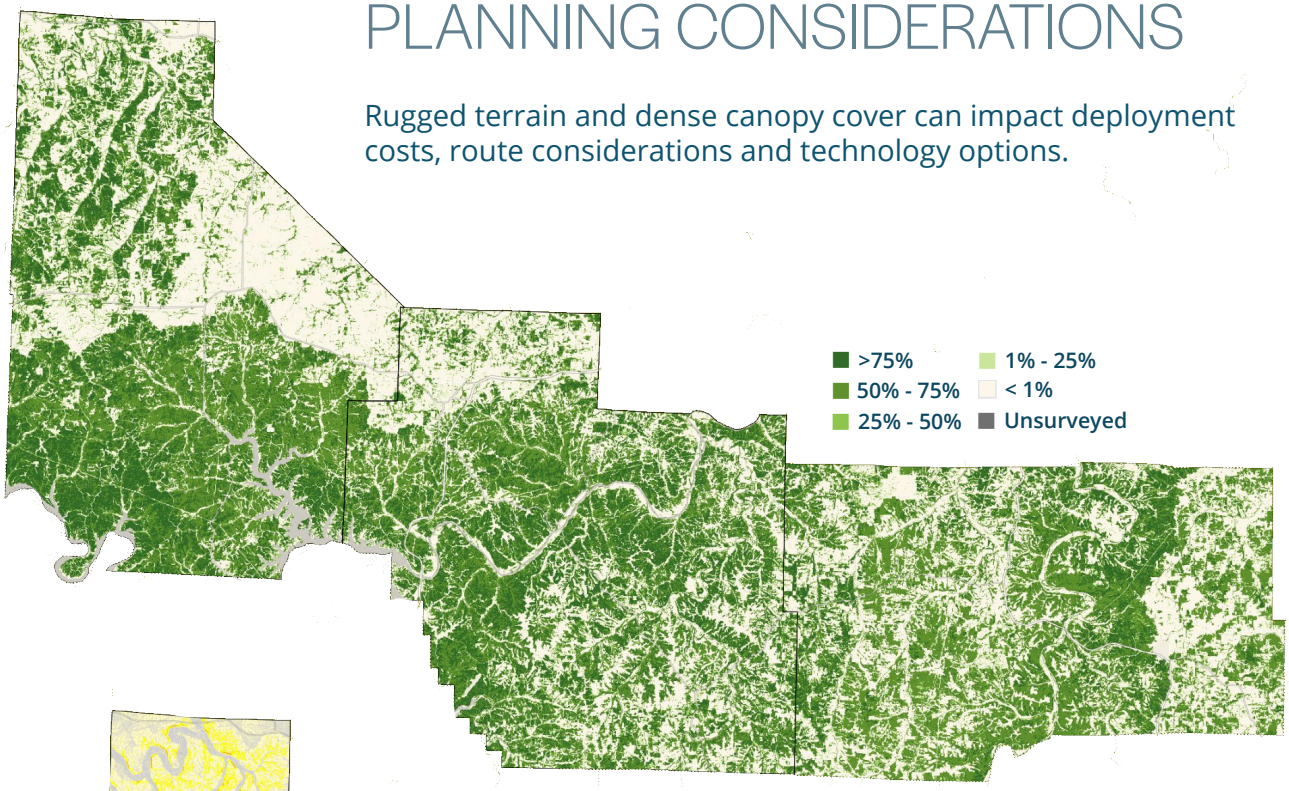


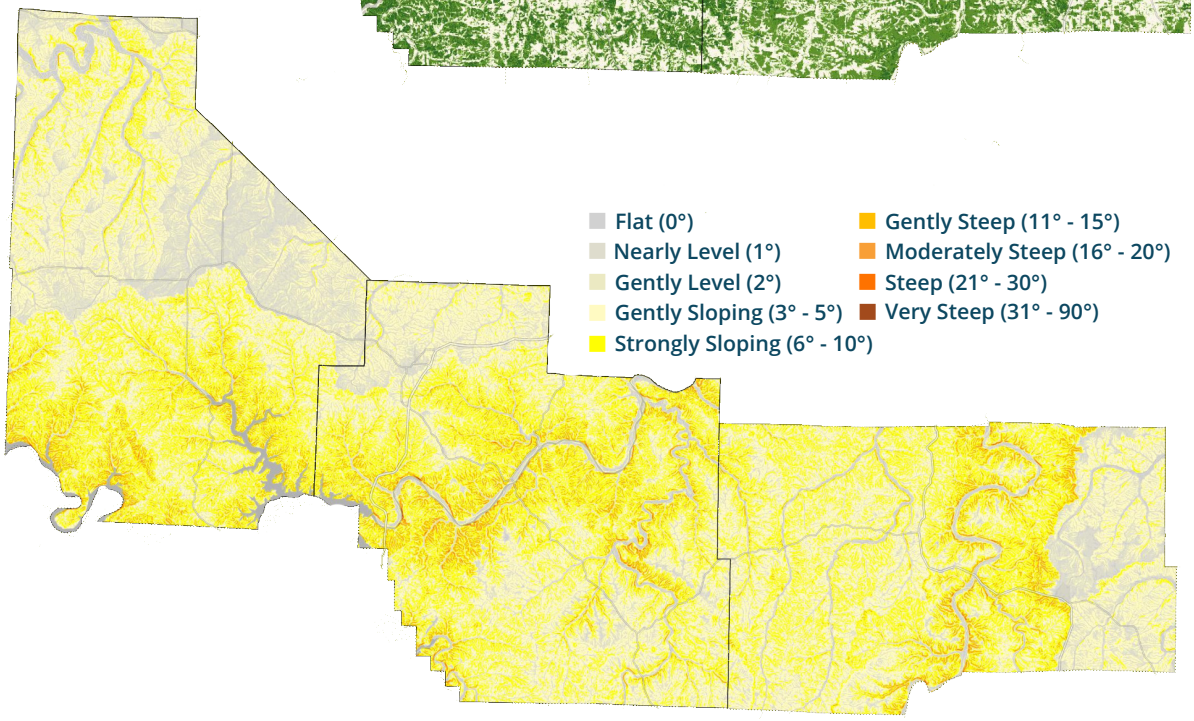
Morgan / Miller / Maries

Project Cluster ▪ Lake of the Ozarks Council of Local Governments
Meramec Regional Planning Commission

PLANNING CONSIDERATIONS

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





Morgan / Miller / Maries

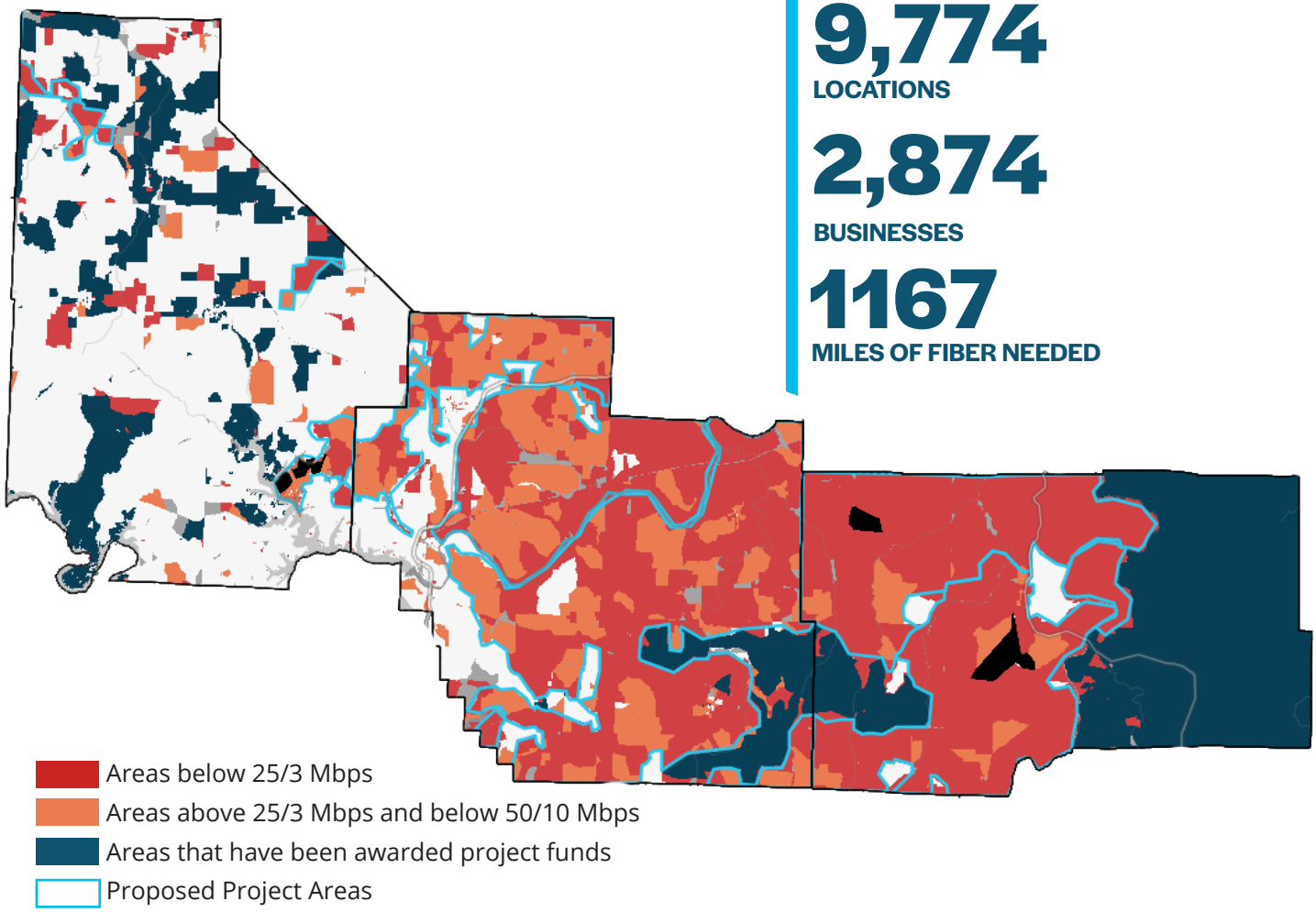
Project Cluster ▪ Lake of the Ozarks Council of Local Governments
Meramec Regional Planning Commission

PROJECT AREAS

9,774
LOCATIONS

2,874
BUSINESSES

1167
MILES OF FIBER NEEDED

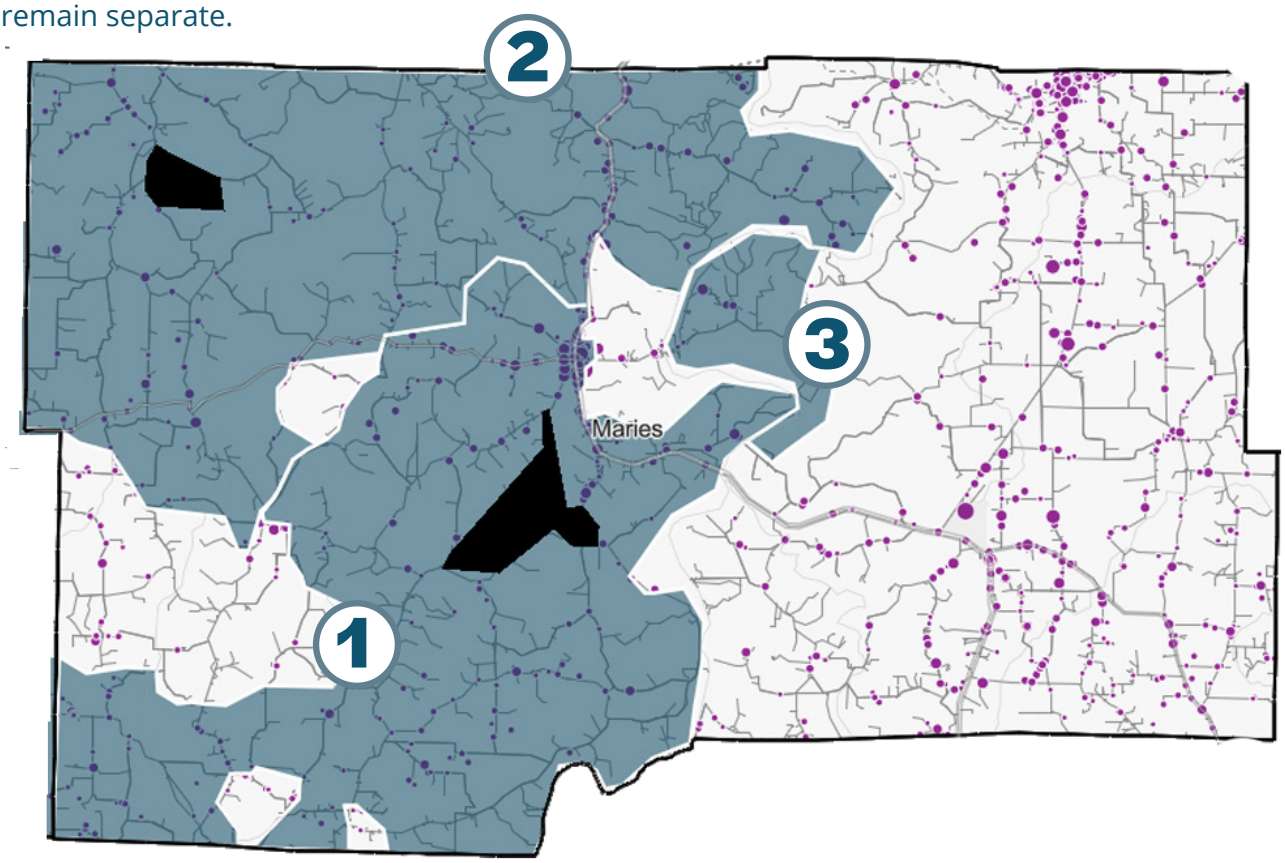


Investment Range = $104 - $228.7 million

**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.*

MARIES COUNTY
PROJECT AREAS

Except for a handful of blocks that rate above 50/10 Mbps, all of Maries County currently is unserved or underserved. Most of the county east of the Gasconade River has already received grant funding. In the west, a few awards will address some of the need; however, large areas remain unserved and unfunded. We divided this territory into 3 project areas. The two larger areas could be combined into a single project; however, depending on the presence or absence of existing river crossings, project 3 may need to remain separate.



Proposed Project Area Funded or served excluded from calculation

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

317	2,578	597	8.1
fiber miles	locations	business locations	locations per mile

INVESTMENT = $28.2 - $62.1 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.*

MARIES COUNTY
PROJECT DETAILS

1

AERIAL		UNDERGROUND
$14.7M - $19.7M	COST TO PASS	$19.3M - $32.3M
$1.6M - $6.5M	ISP INVESTMENT	$1.6M - $6.5M
$8.2M - $18M	FUNDING GAP	$12.7M - $30.7M
$167 - $369	annual cost per location over 30 years	$260 - $628

165 fiber miles

1,631 locations

9.9 locations per mile

2

AERIAL		UNDERGROUND
$13M - $17.3M	COST TO PASS	$17M - $28.5M
$878K - $3.5M	ISP INVESTMENT	$878K - $3.5M
$9.5M - $16.5M	FUNDING GAP	$13.5M - $27.6M
$359 - $625	annual cost per location over 30 years	$510 - $1,048

146 fiber miles

878 locations

6 locations per mile

3

AERIAL		UNDERGROUND
$561K - $750K	COST TO PASS	$733K - $1.2M
$69K - $276K	ISP INVESTMENT	$69K - $276K
$285K - $681K	FUNDING GAP	$457K - $1.2M
$138 - $329	annual cost per location over 30 years	$221 - $562

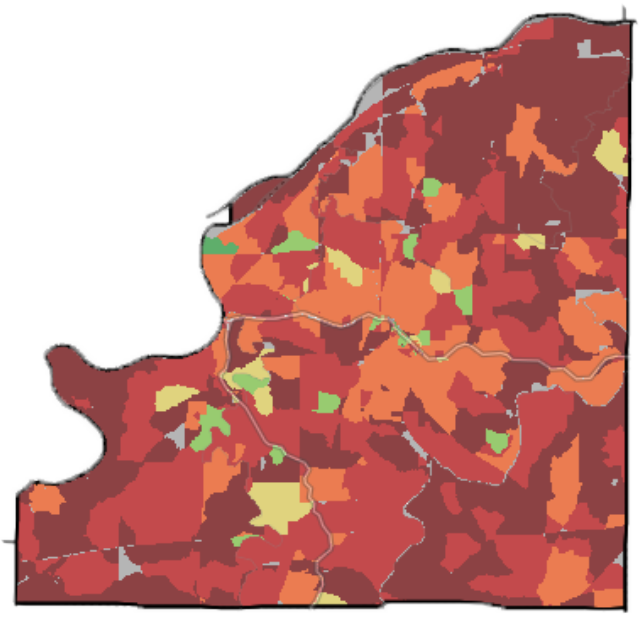
6 fiber miles

69 locations

11 locations per mile

Pulaski / Osage

Add-on Technical Assistance ▪ Meramec Regional Planning Commission

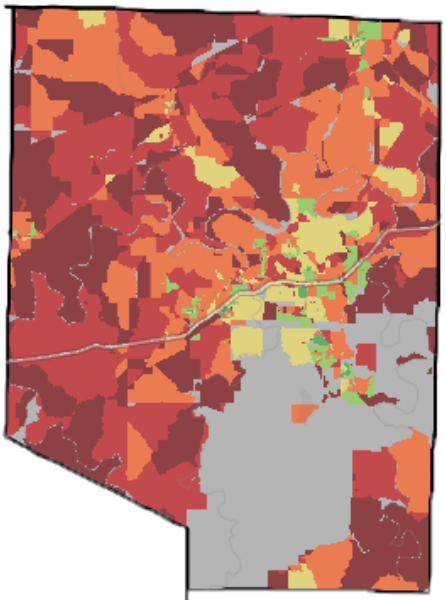


65%

of the populated area is unserved

9,815

locations cannot achieve speeds greater than 25/3 Mbps

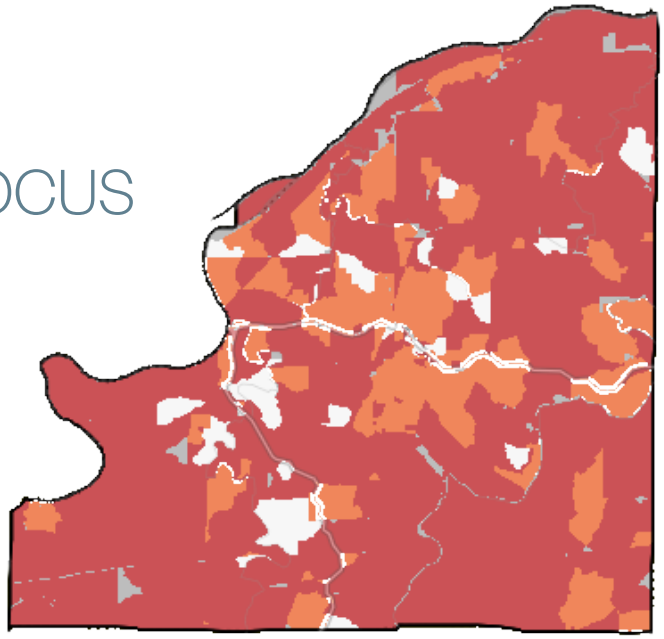


Below 10/1 Mbps
Above 10/1; Below 25/3 Mbps
Above 25/3; Below 50/10 Mbps
Above 50/10; Below 100/20 Mbps
Above 100/20; Below 200/50 Mbps
Above 200/50 Mbps
null / no data

Pulaski / Osage

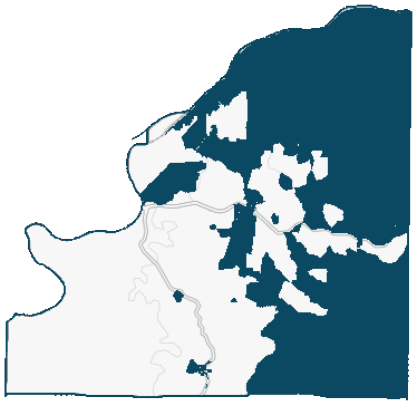
Add-on Technical Assistance ▪ Meramec Regional Planning Commission

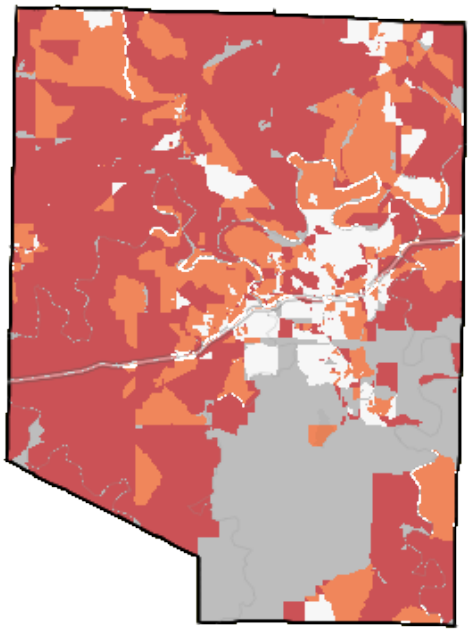
AREAS OF FOCUS

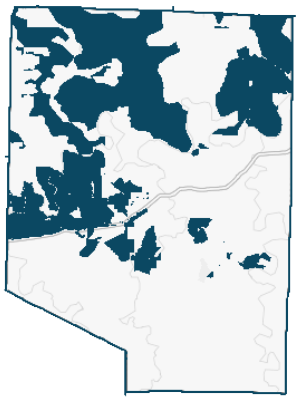


79%

of locations cannot achieve broadband speeds greater than 50/10 Mbps







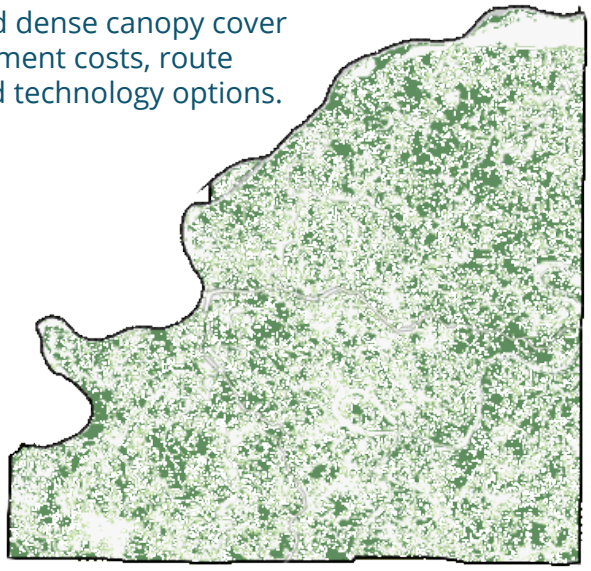
Areas below 25/3 Mbps

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

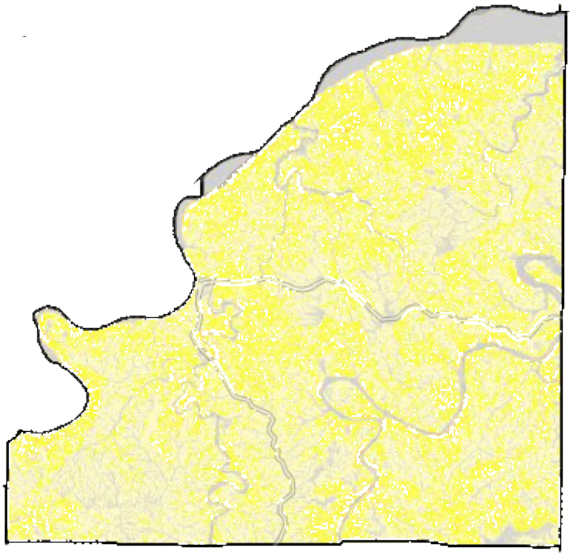
Areas that have been awarded project funds

PLANNING CONSIDERATIONS

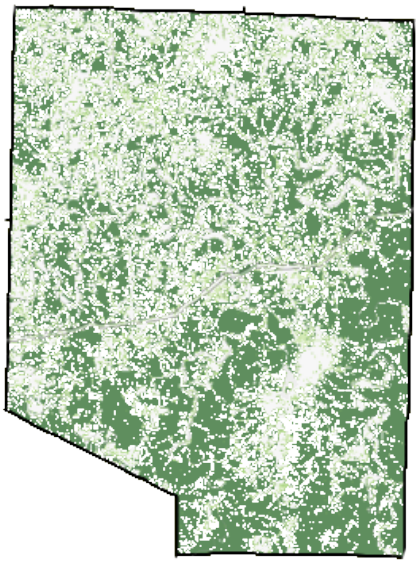
Rugged terrain and dense canopy cover can impact deployment costs, route considerations and technology options.

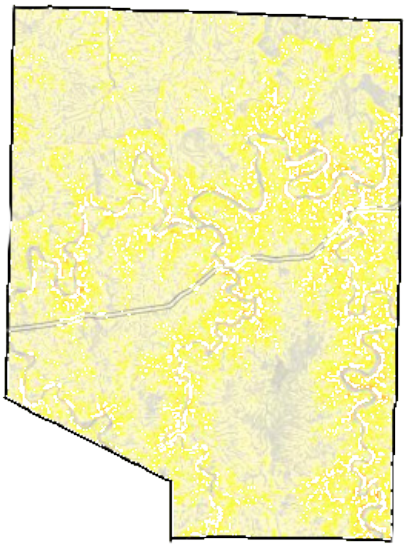


- >75%
- 50% - 75%
- 25% - 50%
- 1% - 25%
- < 1%
- Unsurveyed



- 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°)





Pulaski / Osage

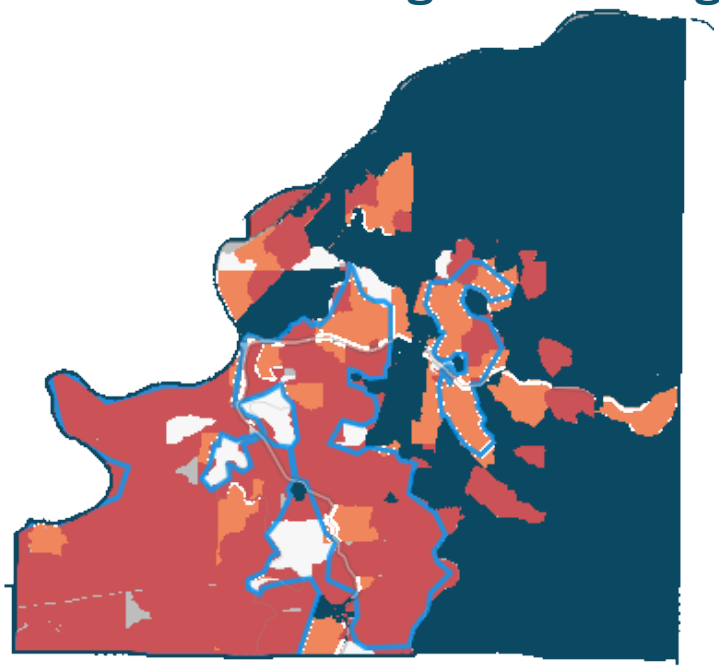
Add-on Technical Assistance ▪ Meramec Regional Planning Commission

PROJECT AREAS

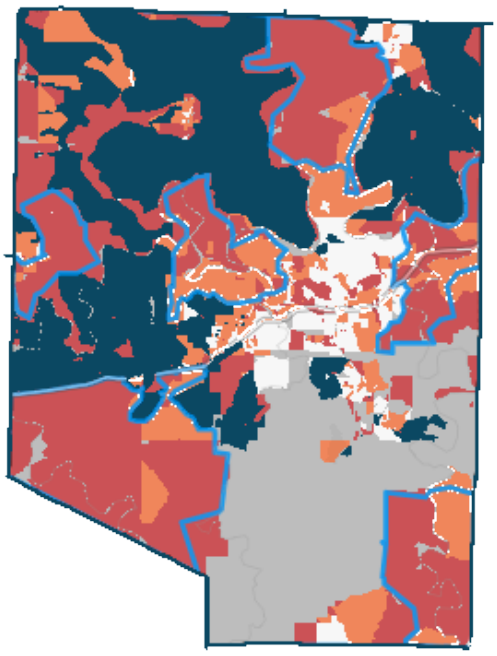
6,054
LOCATIONS

1,810
BUSINESSES

630
MILES OF FIBER NEEDED



Investment Range = $32.4 - $49.6 million

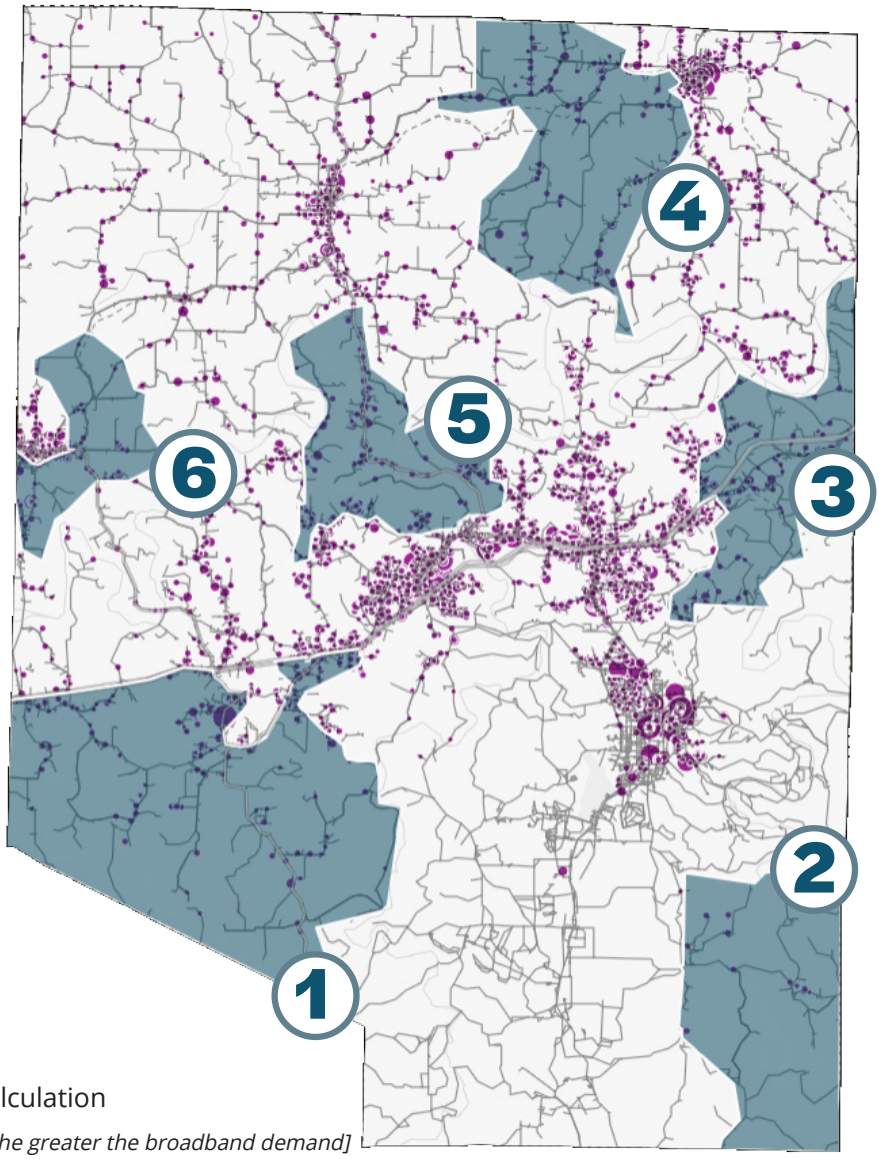


- Areas below 25/3 Mbps
- Areas above 25/3 Mbps and below 50/10 Mbps
- Areas that have been awarded project funds
- Proposed Project Areas

**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.*

PULASKI COUNTY
PROJECT AREAS

Pulaski County has received broadband funding for approximately half of its unserved/underserved territory; however, significant need remains. We identified six potential project areas. All but one of these lies along the perimeter of the county. It should be noted that Fort Leonard Wood's footprint was excluded from our calculations, as the FCC Fabric does not report location data for military bases. Speed test data does show the residential portions of the base as mostly served.



Proposed Project Area

Funded or served excluded from calculation

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

276	3,379	926	12.2
fiber miles	locations	business locations	locations per mile

INVESTMENT = $24.6 - $54 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.*

PULASKI COUNTY
PROJECT DETAILS

1

AERIAL		UNDERGROUND
$6.9M - $9.2M	COST TO PASS	$9M - $15M
$859K - $3.4M	ISP INVESTMENT	$859K - $3.4M
$3.4M - $8.3M	FUNDING GAP	$5.6M - $14.3M
$134 - $324	annual cost per location over 30 years	$216 - $553

77 fiber miles

859 locations | **11.1** locations per mile

2

AERIAL		UNDERGROUND
$2.6M - $3.4M	COST TO PASS	$3.4M - $5.6M
$123K - $492K	ISP INVESTMENT	$123K - $492K
$2.1M - $3.3M	FUNDING GAP	$2.9M - $5.5M
$561 - $895	annual cost per location over 30 years	$775 - $1,493

29 fiber miles

123 locations | **4.3** locations per mile

3

AERIAL		UNDERGROUND
$4.8M - $6.5M	COST TO PASS	$6.3M - $10.6M
$591K - $2.4M	ISP INVESTMENT	$591K - $2.4M
$2.5M - $5.9M	FUNDING GAP	$4M - $10.1M
$140 - $332	annual cost per location over 30 years	$224 - $567

54 fiber miles

591 locations | **10.9** locations per mile

4

AERIAL		UNDERGROUND
$4.7M - $6.2M	COST TO PASS	$6.1M - $10.2M
$463K - $1.9M	ISP INVESTMENT	$463K - $1.9M
$2.8M - $5.8M	FUNDING GAP	$4.2M - $9.8M
$201 - $414	annual cost per location over 30 years	$304 - $702

52 fiber miles

463 locations | **8.9** locations per mile

5

AERIAL		UNDERGROUND
$3.2M - $4.3M	COST TO PASS	$4.2M - $7.1M
$1M - $4M	ISP INVESTMENT	$1M - $4M
$0 - $3.3M	FUNDING GAP	$190K - $6.1MM
$0 - $109	annual cost per location over 30 years	$6 - $201

36 fiber miles

1,003 locations | **27.8** locations per mile

**In this area, density is high enough that an ISP may be willing to deploy with no subsidy.*

6

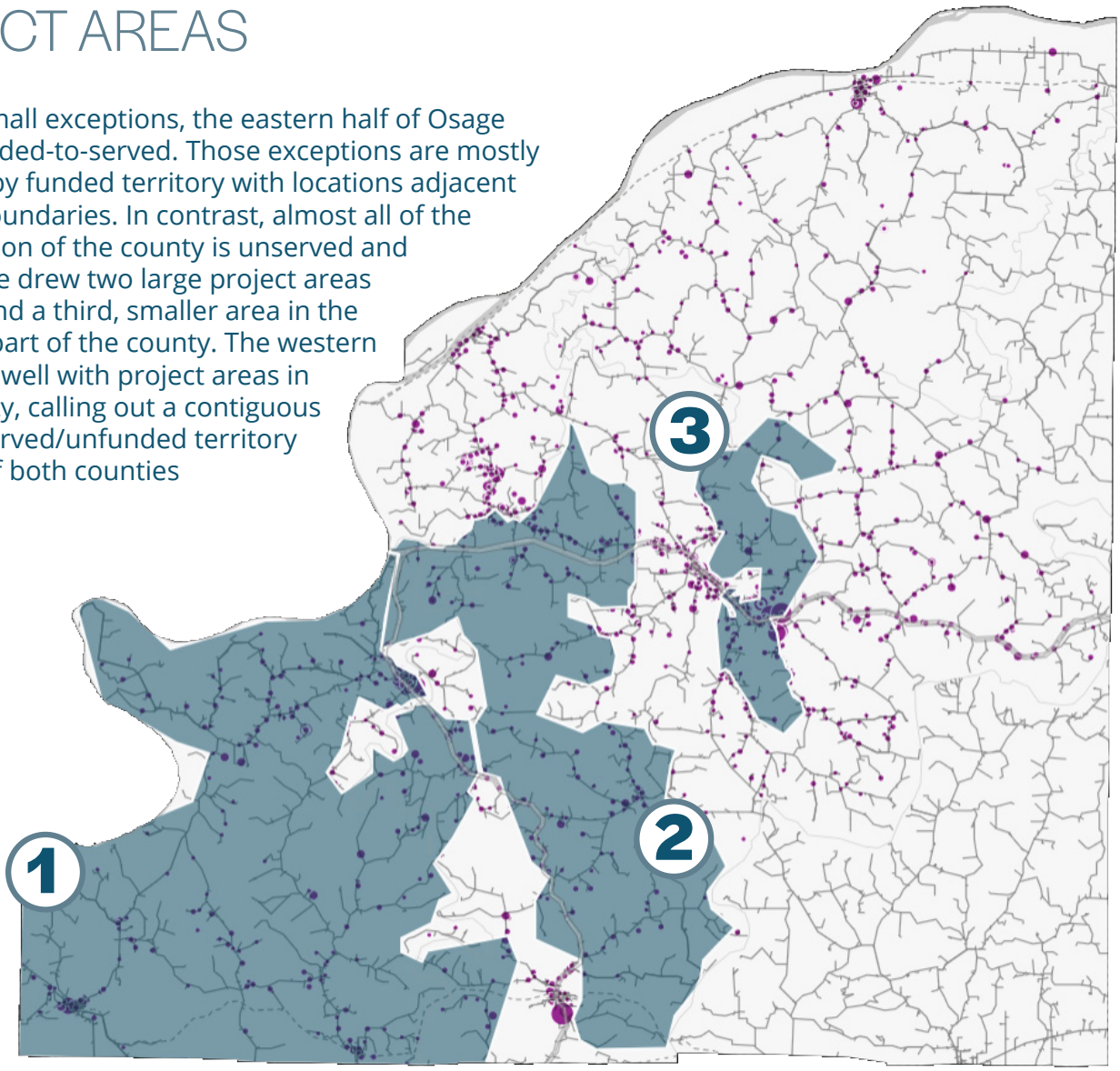
AERIAL		UNDERGROUND
$2.4M - $3.2M	COST TO PASS	$3.2M - $5.3M
$340K - $1.4M	ISP INVESTMENT	$340K - $1.4M
$1.1M - $2.9M	FUNDING GAP	$1.8M - $5M
$104 - $284	annual cost per location over 30 years	$177 - $488

27 fiber miles

340 locations | **12.5** locations per mile

OSAGE COUNTY
PROJECT AREAS

With a few small exceptions, the eastern half of Osage County is funded-to-served. Those exceptions are mostly surrounded by funded territory with locations adjacent to funding boundaries. In contrast, almost all of the western portion of the county is unserved and unfunded. We drew two large project areas in the west and a third, smaller area in the east-central part of the county. The western areas line up well with project areas in Maries County, calling out a contiguous block of unserved/unfunded territory in the west of both counties



Proposed Project Area Funded or served excluded from calculation

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

354	2,675	881	7.6
fiber miles	locations	business locations	locations per mile

INVESTMENT = $31.5 - $69.2 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.*

OSAGE COUNTY
PROJECT DETAILS

1

AERIAL		UNDERGROUND
$17.9M - $23.9M	COST TO PASS	$23.4M - $39.3M
$1.4M - $5.7M	ISP INVESTMENT	$1.4M - $5.7M
$12.2M - $22.5M	FUNDING GAP	$17.7M - $37.9M
$284 - $525	annual cost per location over 30 years	$412 - $884

201 fiber miles

1,429 locations

7.1 locations per mile

2

AERIAL		UNDERGROUND
$10.9M - $14.5M	COST TO PASS	$14.2M - $23.8M
$771K - $3.1M	ISP INVESTMENT	$771K - $3.1M
$7.8M - $13.7M	FUNDING GAP	$11M - $23.1M
$336 - $594	annual cost per location over 30 years	$480 - $998

122 fiber miles

771 locations

6.3 locations per mile

3

AERIAL		UNDERGROUND
$2.8M - $3.7M	COST TO PASS	$3.6M - $6.1M
$475K - $1.9M	ISP INVESTMENT	$475K - $1.9M
$868K - $3.2M	FUNDING GAP	$1.7M - $5.6M
$61 - $226	annual cost per location over 30 years	$121 - $394

31 fiber miles

475 locations

15.3 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:

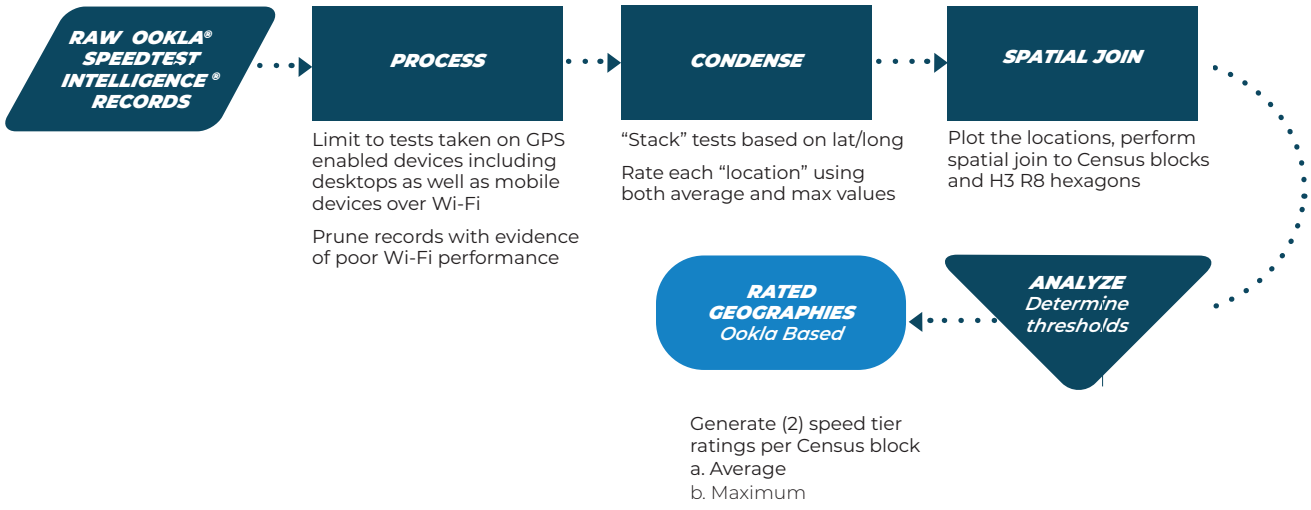
Filter
Include desktop, iOS, and Android app results*
Exclude results with GPS precision of greater than 200 meters**
Include only results from fixed broadband providers

**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.*

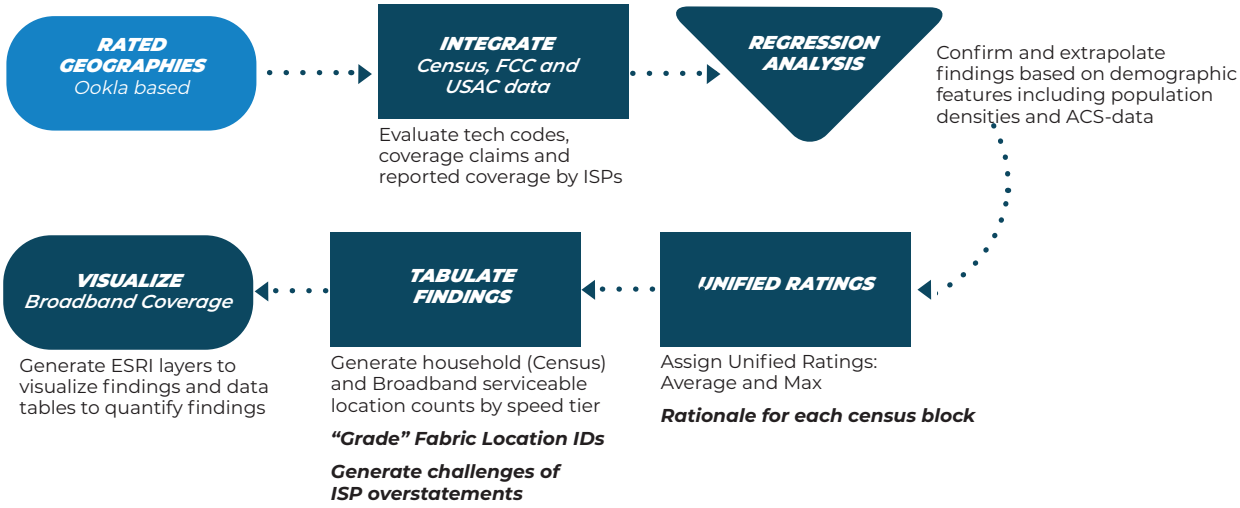
ANALYZING THE DATA

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.

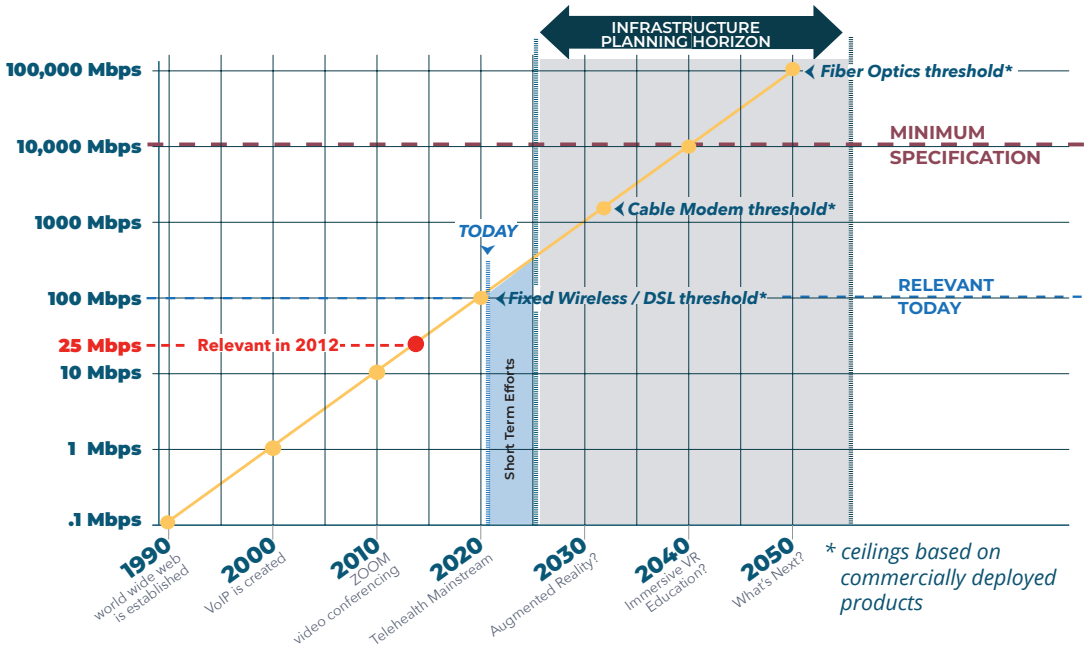
APPENDIX 3
Planning for the Future

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

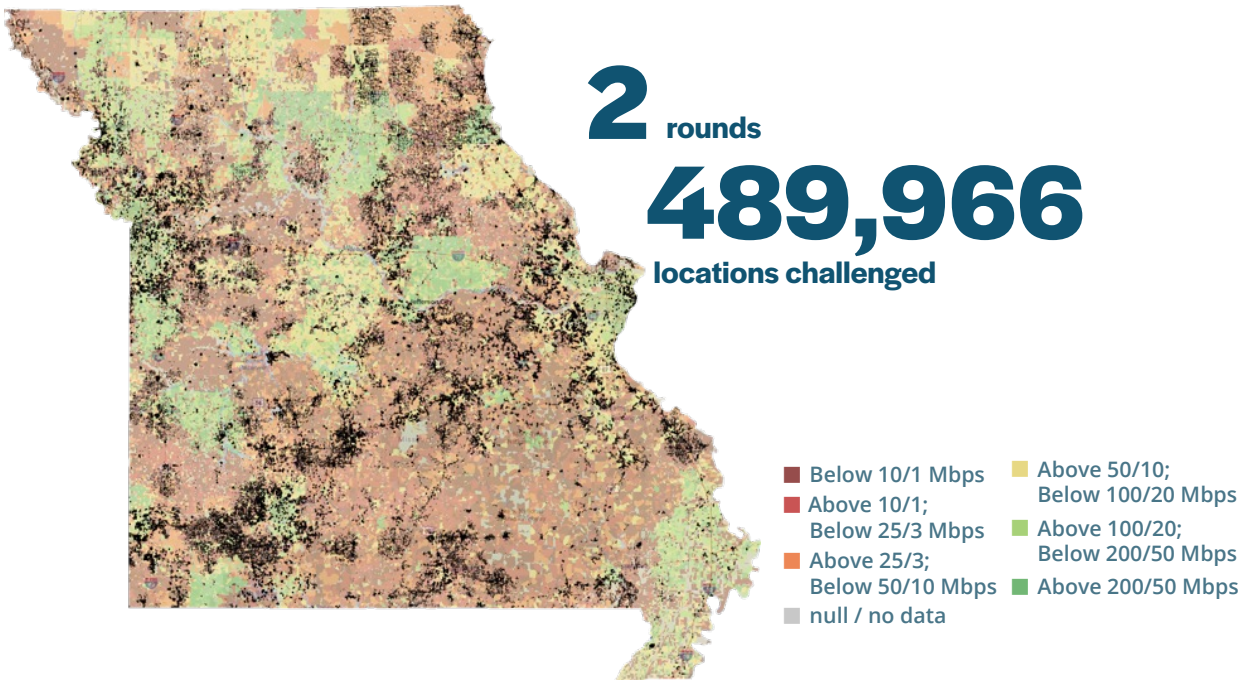
For all technologies, we only challenged locations where our maps showed speeds were below 25/3 Mbps and carrier claims were at least two speed tiers higher. For example, in our first round of fixed wireless challenges, we challenged nearly 48,000 locations that were claimed to be between 100/20 and 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	Below 10/1	Above 10/1; Below 25/3	Below 10/1	Above 10/1; Below 25/3	Above 25/3; Below 50/10	Below 10/1	Above 10/1; Below 25/3	Above 25/3; Below 50/10	Grand Total
Crawford County	**473**	**38**	**89**	**127**	**139**	**220**	**351**	**7**	**37**	**101**	**1582**
Cable					**30**	**47**	**329**				**406**
Charter Communications Inc					30	46	315				391
Fidelity						1	14				15
DSL	**402**		**3**	**3**							**408**
Brightspeed	172		3	3							178
Fidelity Telephone LLC	40										40
Steelville Telephone Exchange, Inc.	190										190
Fiber					**2**	**4**	**22**	**7**	**37**	**101**	**173**
Charter Communications Inc					2	4	21			1	28
Sho-Me Technologies, LLC								1			1
Steelville Telephone Exchange, Inc.							1	6	37	100	144
Fixed Wireless	**71**	**38**	**86**	**124**	**107**	**169**					**595**
BlueBit Networks	44	5	70	112	21	13					265
T-Mobile US	20				2						22
Wisper ISP, LLC	7	33	16	12	84	156					308
Dent County	**200**	**8**	**5**	**1**	**198**	**176**	**851**				**1439**
Cable					**58**	**72**	**851**				**981**
Fidelity					58	72	851				981
DSL	**144**		**5**	**1**							**150**
Brightspeed	125		5	1							131
Steelville Telephone Exchange, Inc.	19										19
Fixed Wireless	**56**	**8**			**140**	**104**					**308**
UNITED STATES CELLULAR CORPORATION	44				12						56
Wisper ISP, LLC	12	8			128	104					252
Gasconade County	**401**		**1**	**2**	**16**	**15**		**35**	**183**	**330**	**983**
Cable								**5**	**11**	**40**	**56**
MCC Missouri LLC								5	11	40	56
DSL	**359**		**1**	**2**							**362**
Brightspeed	230		1	2							233
Fidelity Telephone LLC	129										129
Fiber					**1**			**30**	**172**	**290**	**493**
Brightspeed					1						1
Callabyte								18	35	40	93
Fidelity									3	7	10
Fidelity Telephone LLC								12	134	243	389
Fixed Wireless	**42**				**15**	**15**					**72**
T-Mobile US	33				15	15					63
UNITED STATES CELLULAR CORPORATION	2										2
VERIZON	7										7
Maries County	**262**	**23**	**18**	**43**	**682**	**780**		**6**	**37**		**1851**
DSL	**224**		**18**	**43**	**6**	**38**		**4**	**37**		**370**
Brightspeed	218		13	3							234
Windstream Missouri, Inc.	6		5	40	6	38		4	37		136
Fiber								**2**			**2**
GTECH Fiber LLC								1			1
Sho-Me Technologies, LLC								1			1
Fixed Wireless	**38**	**23**			**676**	**742**					**1479**
UNITED STATES CELLULAR CORPORATION	21				5						26
Windstream Missouri, Inc.	5				7						12
Wisper ISP, LLC	12	23			664	742					1441
Osage County	**236**	**33**	**11**	**8**	**603**	**682**		**131**	**256**	**553**	**2513**
Cable					**1**			**129**	**254**	**548**	**932**
Cable America								129	254	548	931
Optimum					1						1
DSL	**123**		**11**	**8**	**1**						**143**
AT&T Inc					1						1
Brightspeed	123		11	8							142
Fiber						**1**		**2**	**2**	**5**	**10**
Mid MO Micro Computers						1					1
Sho-Me Technologies, LLC								2	2	5	9
Fixed Wireless	**113**	**33**			**601**	**681**					**1428**
UNITED STATES CELLULAR CORPORATION	47				14						61
VERIZON	48				4						52
Wisper ISP, LLC	18	33			583	681					1315
Phelps County	**839**	**124**	**59**	**33**	**937**	**1137**	**1675**	**251**	**360**	**294**	**5709**
Cable					**330**	**586**	**1674**	**165**	**225**	**206**	**3186**
Cable America					208	421	484	165	225	206	1709
Charter Communications Inc					31	39	133				203
Fidelity					91	126	1057				1274
DSL	**414**		**1**	**3**	**2**	**4**		**1**	**2**		**427**
Brightspeed	414		1	2							417
Windstream Missouri, Inc.				1	2	4		1	2		10
Fiber						**1**	**1**	**85**	**133**	**88**	**308**
Brightspeed									1	1	2
Charter Communications Inc						1	1				2
Fidelity										1	1
GTECH Fiber LLC								79	129	47	255
Socket Telecom, LLC								5	2	39	46
Steelville Telephone Exchange, Inc.								1	1		2
Fixed Wireless	**425**	**124**	**58**	**30**	**605**	**546**					**1788**
BlueBit Networks	15		49	21	19	9					113
T-Mobile US	137	59			27	97					320
UNITED STATES CELLULAR CORPORATION	177				35						212
VERIZON	53										53
Wisper ISP, LLC	43	65	9	9	524	440					1090

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	Below 10/1	Above 10/1; Below 25/3	Below 10/1	Above 10/1; Below 25/3	Above 25/3; Below 50/10	Below 10/1	Above 10/1; Below 25/3	Above 25/3; Below 50/10	Grand Total
Pulaski County	**325**	**91**	**13**	**87**	**537**	**1084**	**8**	**374**	**1225**	**4197**	**7941**
Cable								**336**	**1091**	**4089**	**5516**
Cable America								336	1091	4089	5516
DSL	**124**		**12**	**86**	**16**	**117**		**35**	**79**		**469**
Brightspeed	119										119
Windstream Missouri, Inc.	5		12	86	16	117		35	79		350
Fiber						**2**	**8**	**3**	**55**	**108**	**176**
Brightspeed						2	8			1	11
GTECH Fiber LLC								2	29	81	112
Windstream Missouri, Inc.								1	26	26	53
Fixed Wireless	**201**	**91**	**1**	**1**	**521**	**965**					**1780**
T-Mobile US	49				16	7					72
UNITED STATES CELLULAR CORPORATION	105				20						125
VERIZON	6										6
Windstream Missouri, Inc.	12			1	4						17
Wisper ISP, LLC	29	91	1		481	958					1560
Washington County	**580**	**86**	**11**	**61**	**373**	**576**	**2**	**656**	**907**	**100**	**3352**
Cable					**4**	**22**	**2**				**28**
Charter Communications Inc					4	22	2				28
DSL	**565**		**10**	**15**							**590**
Brightspeed	491		10	15							516
Fidelity Telephone LLC	54										54
Steelville Telephone Exchange, Inc.	20										20
Fiber								**656**	**907**	**100**	**1663**
yondoo Broadband, LLC								656	907	100	1663
Fixed Wireless	**15**	**86**	**1**	**46**	**369**	**554**					**1071**
BlueBit Networks	1	6	1	20	1	25					54
T-Mobile US	9	3		4	15	21					52
Wisper ISP, LLC	5	77		22	353	508					965
Grand Total	**3316**	**403**	**207**	**362**	**3485**	**4670**	**2887**	**1460**	**3005**	**5575**	**25370**

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