Rural Broadband

Solving the Puzzle

13 May 2021

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Research Partners and Funders

Open to New Members!

Buckeye Hills Regional Council

Ohio Valley Regional Development Commission

OMEGA – Ohio Mid-Eastern Governments Association

Eastgate Regional Council of Governments

Ohio University – Voinovich School of Leadership and Public Affairs

OhioSE Economic Development

Foundation for Appalachian Ohio – Give. Grow. Create.

Noble County – Community · Heritage · Progress

ARC

OARnet – An OH·TECH Consortium Member

OME-RESA

EDA – U.S. Economic Development Administration

Connecting Appalachia

https://www.connectingappalachia.org/

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REID Consulting Group

BUCKEYE HILLS regional council

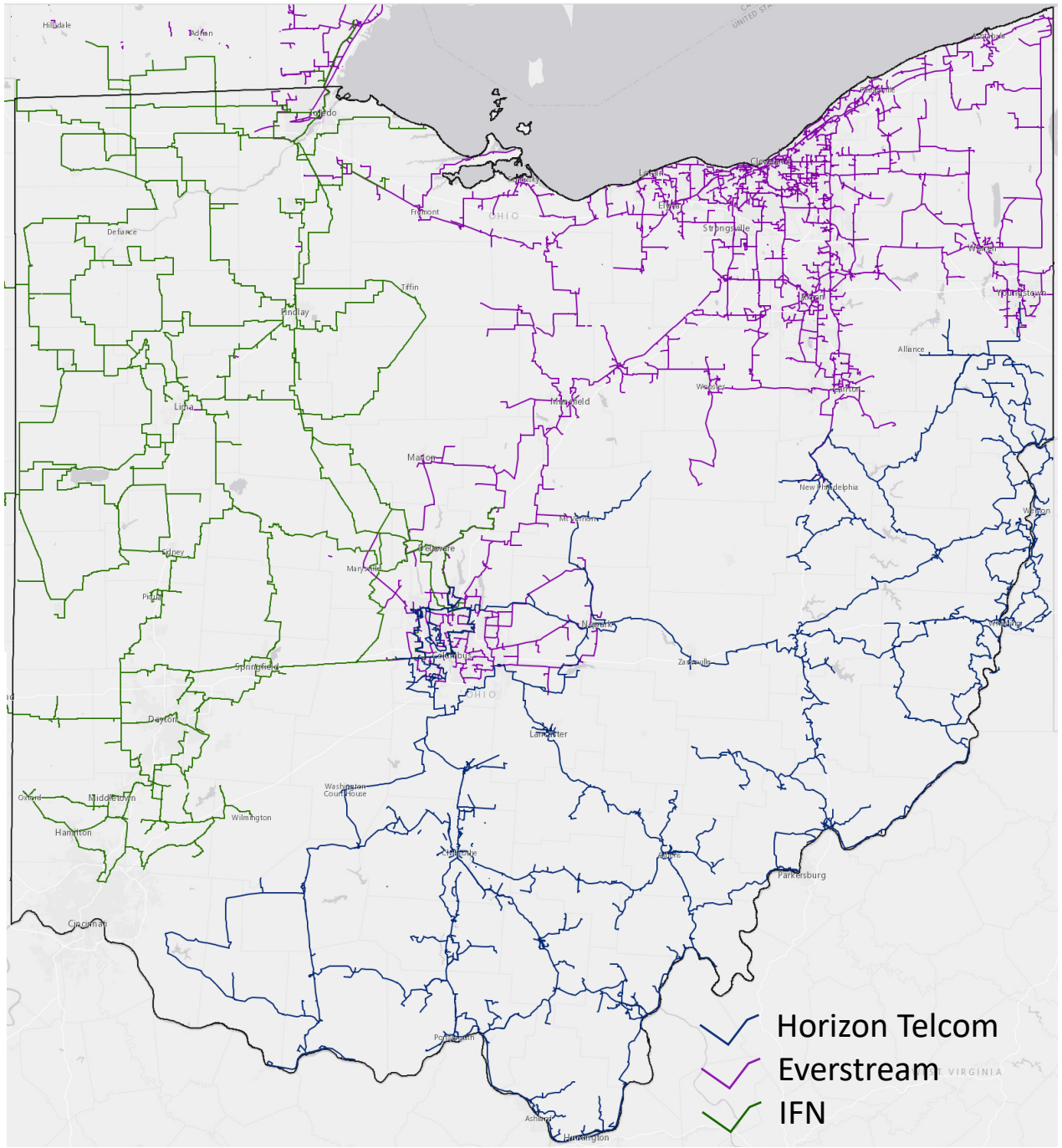
Tremendous Middle Mile Progress by Thinking Big

- 2000+ miles of fiber
- $260 million in total construction
- $160 million in Federal funding
- 6000+ anchor institutions
- Hundreds of cell towers

Ohio Middle Mile Consortium and Southern Ohio Health Care Network

Federal Communications Commission

NTIA U.S. Department of Commerce National Telecommunications & Information Administration



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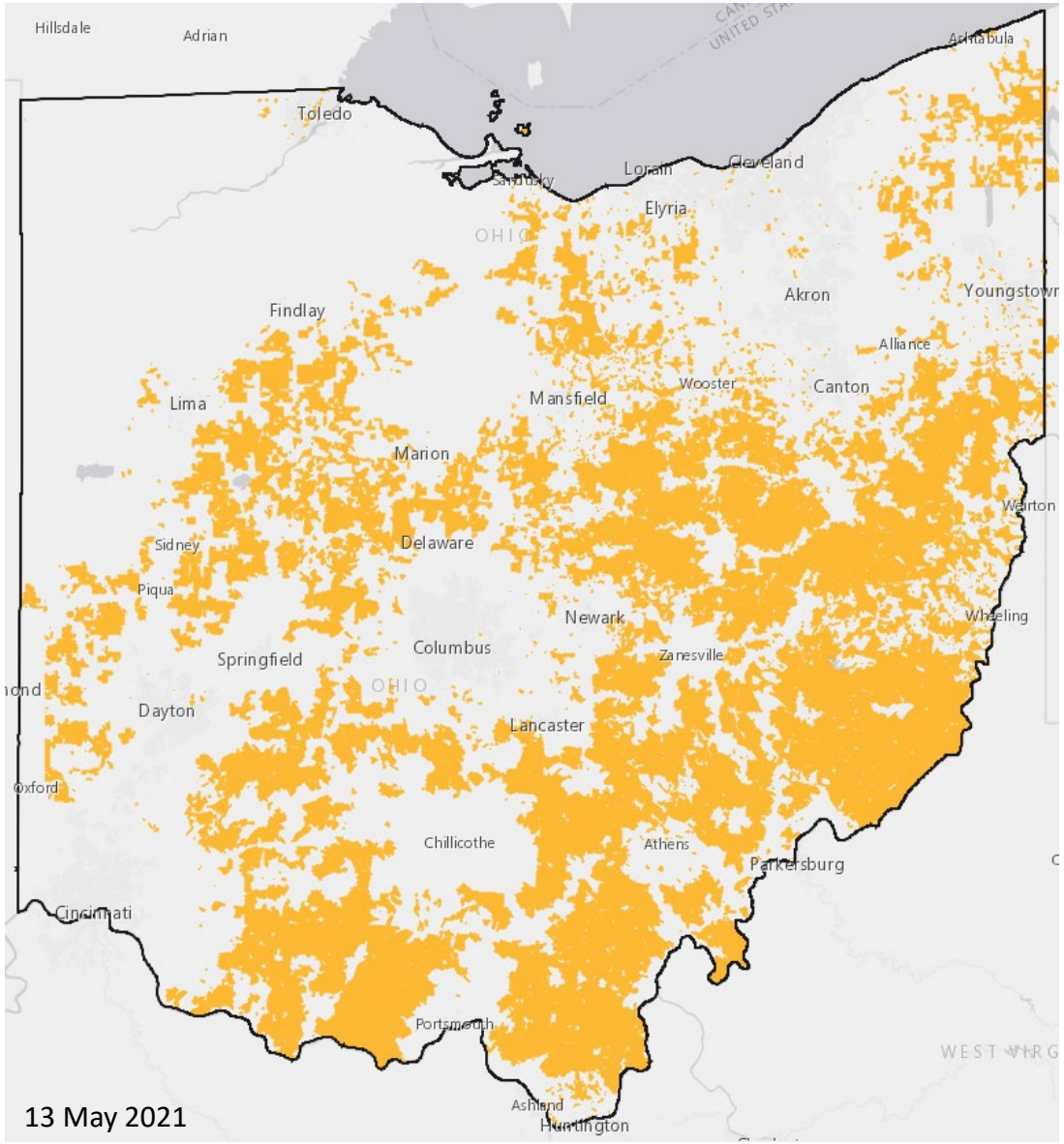
Did Not Extend to the Last Mile



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- FCC identified **190,000 unserved Ohio households** in mid-2020
- Buckeye Hills research finds **at least 150,000 additional unserved rural Ohio households**
- Many more underserved rural households
- Economically distressed urban areas also unserved/underserved

Missing Infrastructure: $95 Billion

Highways area a fundamental infrastructure element

- $10 million to $20 million per mile (fully loaded)
- Some waste, fraud and abuse in every project

Yet we can drive the highways!

Carriers received **$95 billion** in Federal funding to improve rural telecom infrastructure since 2000

Yet the rural digital "highway" is missing in action, leaving rural America reliant on decrepit copper

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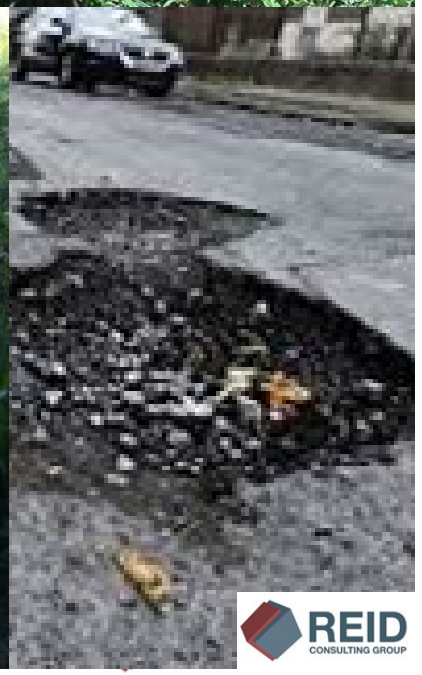
Imperative to wisely invest public funding to revitalize rural America

90% of the funding came from the FCC Universal Service Fund established by Congress to subsidize telecommunications services in rural America, paid for by surcharges on consumer telephone bills

Decrepit Copper

- The copper cables serving rural America are 50+ years old, well past end-of-life
- This decrepit infrastructure fails to deliver reliable telephone service let alone broadband
- Staffing levels so low that restoration takes multiple weeks
- De facto abandonment by large telcos
- Poses life/safety risks, particularly in areas also lacking cell service

Imagine if road maintenance ceased for a few decades



We can not haul bits ….

56 Kbps

1994 PUCO Report

Decrepit copper keeping many rural residents from achieving 56 kbps on modems

Why Does Rural Broadband Require Subsidy?

	City or Area of Ohio	Households per Square Mile	Median Household Income	Density Compared to Columbus
Cities and Towns	Columbus	1,510	$49,478	100%
	Marietta	693	$35,556	46%
	Logan	604	$29,691	40%
	McConnelsville	486	$25,563	32%
Rural Expanse	Entirety of Meigs County	26	$33,407	1.7%
	Carthage Township, Athens County	17	--	1.1%
	Monroe Township, Perry County	12	--	0.8%

No terrestrial provider can serve 100% of the “rural expanse” without subsidy, the point of the largely ineffective FCC Universal Service Fund High Cost Program

Three Common Sense Solutions

A. Build Future Proof Infrastructure

- Utilize robust specifications
- "Technology neutral" but **must meet the long-term speed requirements**
- Require **100% coverage** within a defined service area within four years
- Fund based on overall value rather than just lowest bid

B. Spur Competition and Innovation

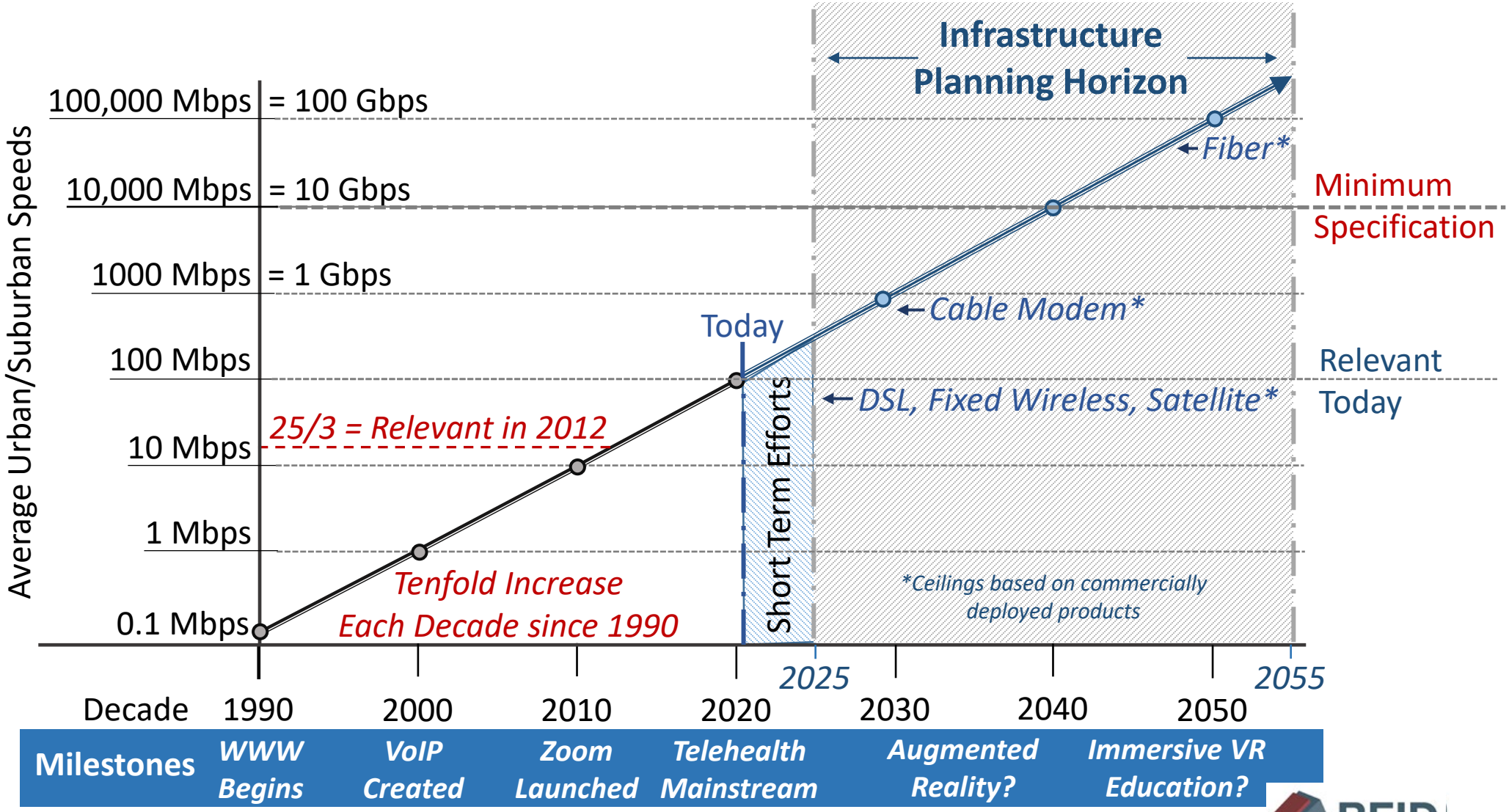
- Avoid creation of de facto monopolies
- Require "open" network designs
- Prioritize public/private partnerships and enable wide participation

C. Mandate Accountability and Transparency

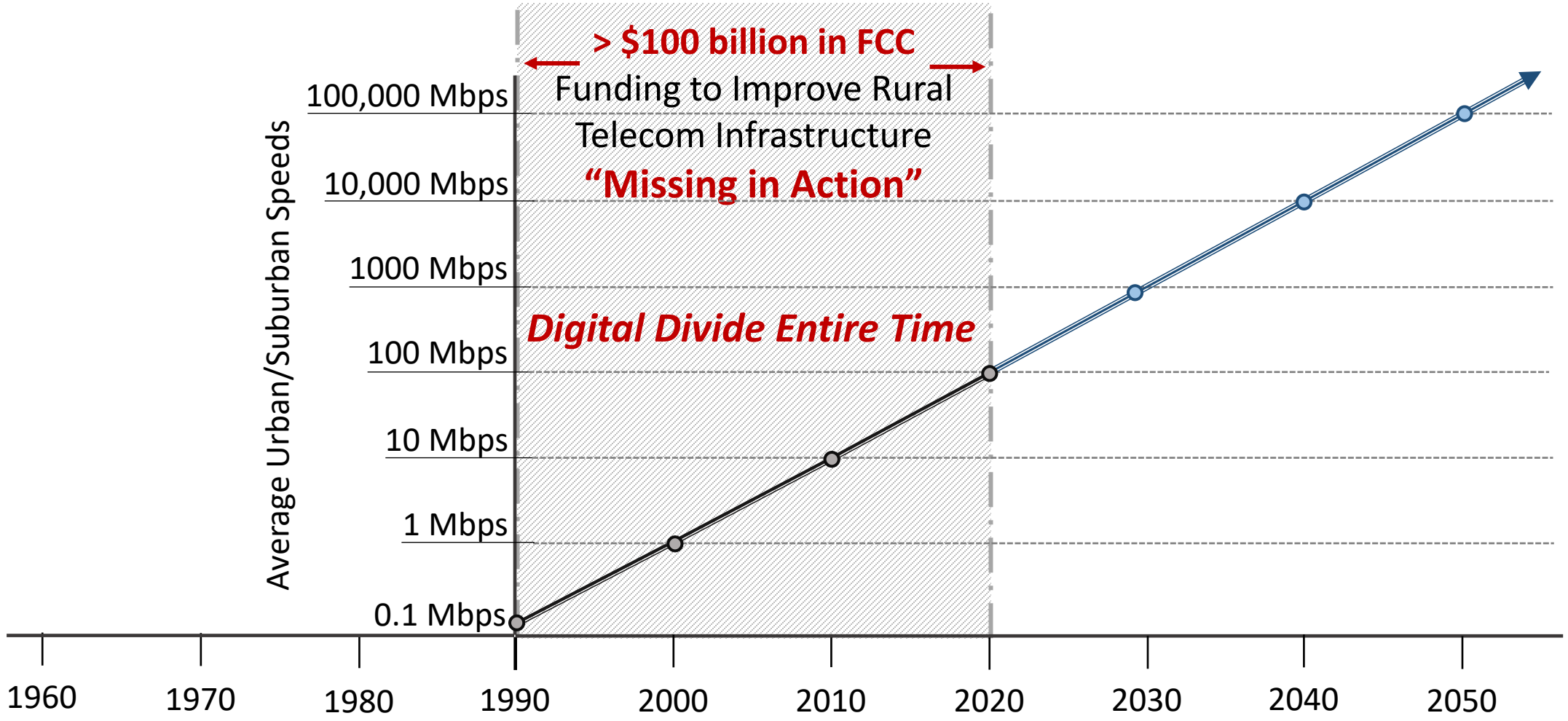
- Reverse the burden of proof in carrier challenges
- Release milestones payments only after verification by public partner/3rd party
- Publish quarterly project updates including coordinates of locations passed/served
- Levy substantial penalties for overstatement of coverage and/or speeds

Long-Term Perspective

"Technology neutral" but must meet the speed requirements



Stranding of Rural America



Overarching Architecture

Key Objectives

- Capacity = Meet the needs of 2055
- Longevity = Minimum of 30 years
- Coverage = 100% of households and businesses

The "Big Picture" plan enables wise investments

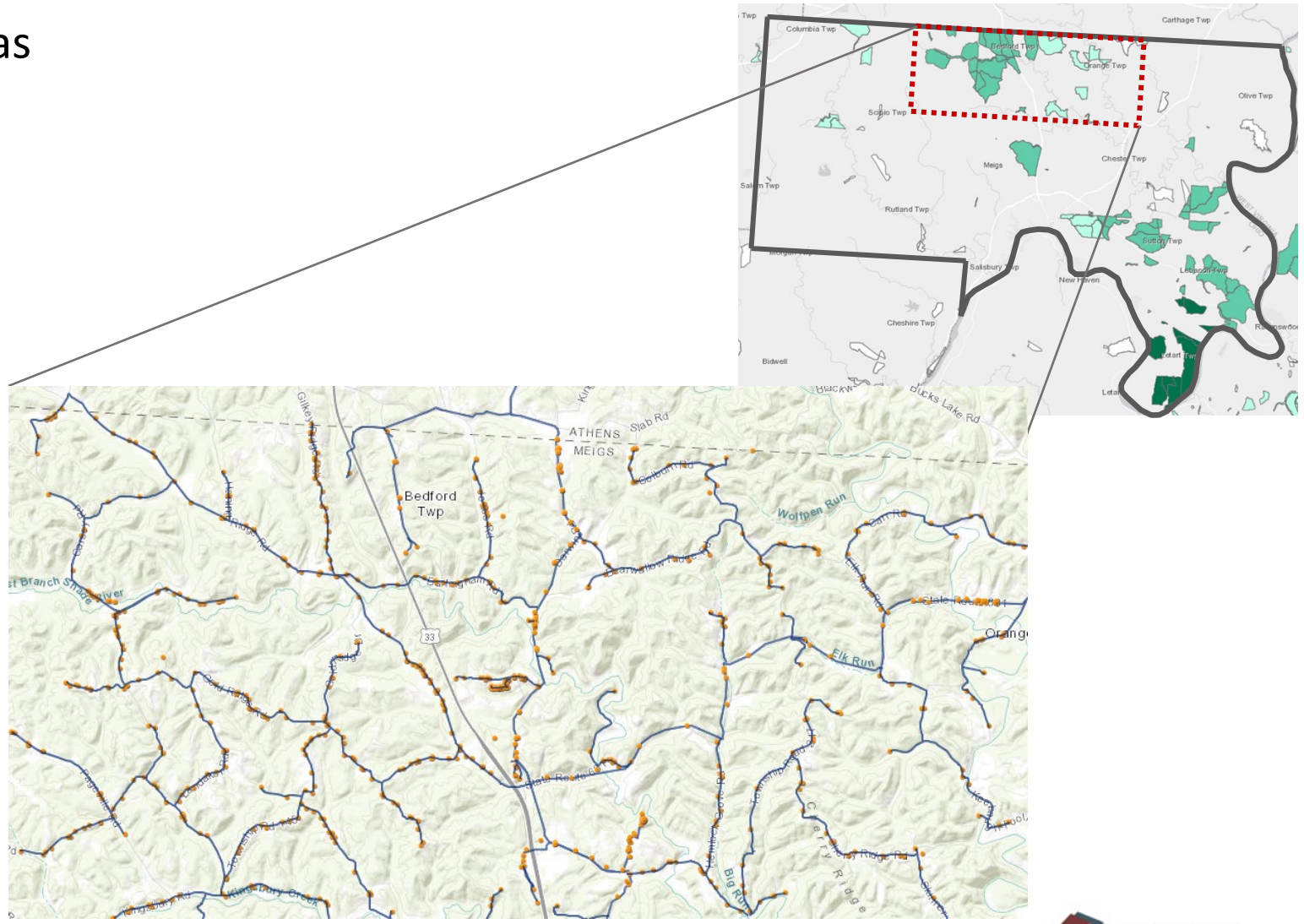
Three Technologies to Evaluate

1. Satellite
2. Hybrid Wireless and Fiber
3. Fiber-to-the-Premise

Engineering Zones

- Select representative sample areas
  - Model various terrains and population densities
  - Engineer solutions within these relatively small areas
- Extrapolate costs across any potential service area
- Financial pro forma to determine required subsidy

Cost effective approach for evaluating options and estimating costs



Satellite

- Low-earth-orbit (LEO) satellites
  - Terrain and heavy foliage obstruct signal
  - Capacity insufficient for mass market
  - Requires fiber nodes for uplink/downlink
- Geosynchronous satellites
  - Suffer round-trip signal delays (“latency”) that hampers two-way live services
  - Data caps and subsequent “throttling” reduce effectiveness for streaming services

Fixed Wireless

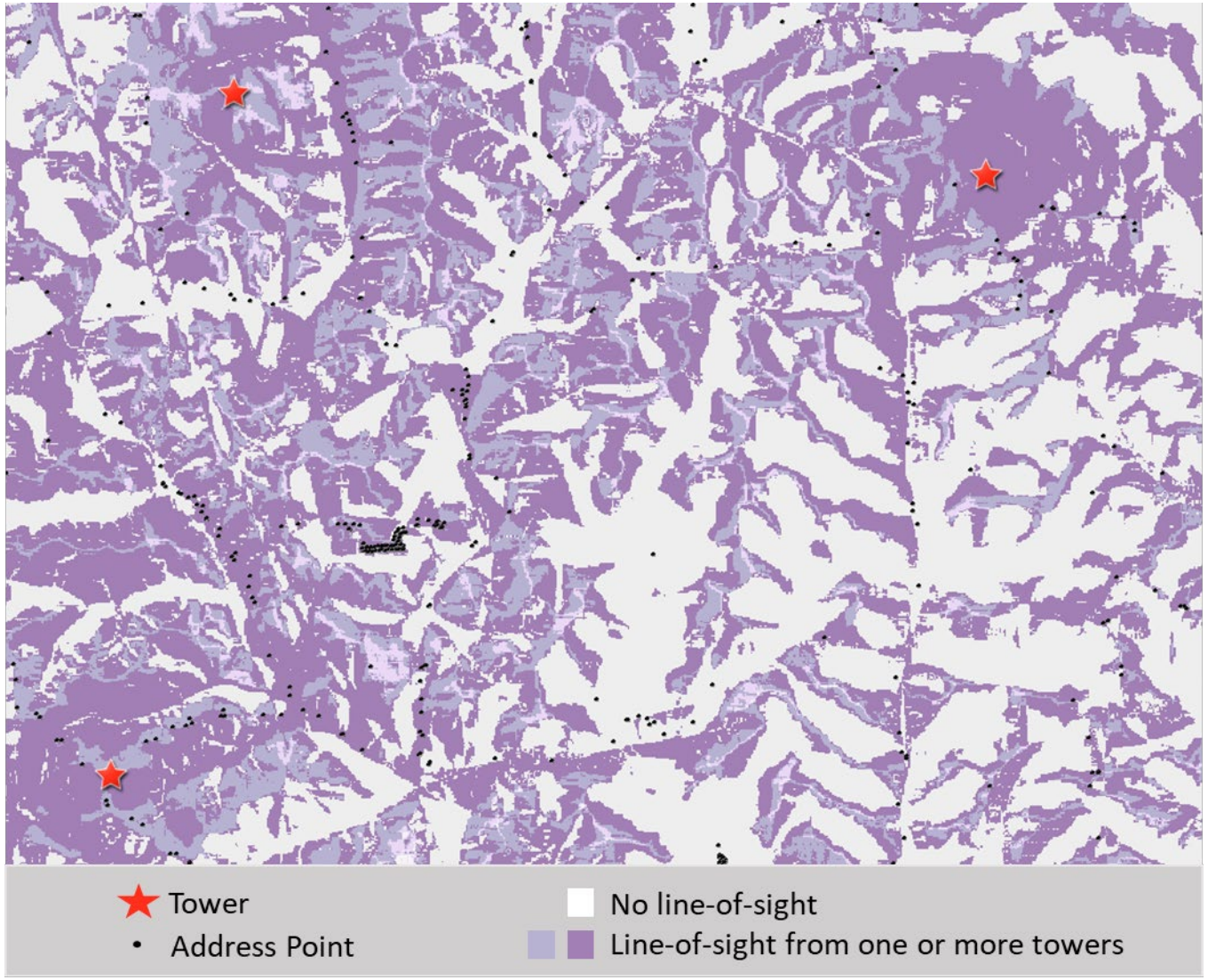
Wireless signals travel unobstructed across flat farmland, a feasible solution in these types of areas

In our region, the combination of rugged terrain and heavy foliage cover severely limit both coverage and capacity

Wireless Propagation Challenges
Engineering Zone A

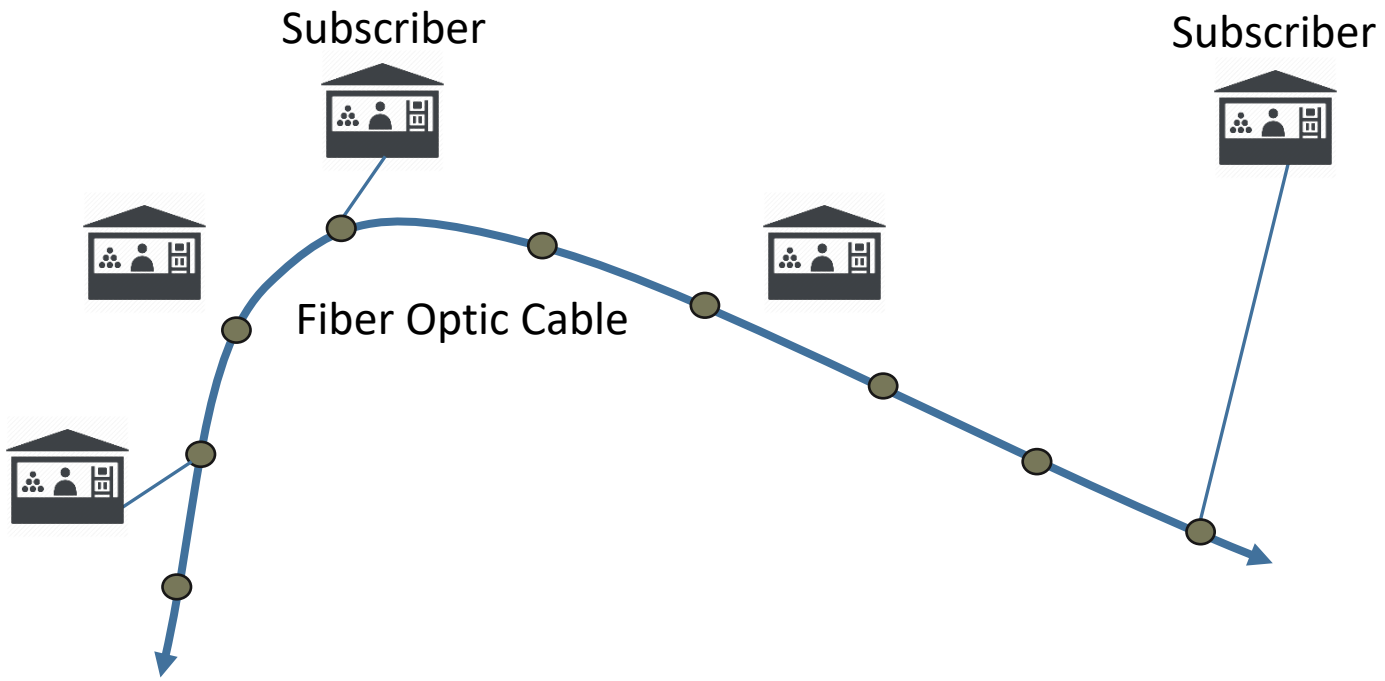
- 4 towers on high points, each 300’ tall (3 shown)
- >$1.5 million in infrastructure for just 60 square miles
- Many locations still unreachable in rugged terrain

Same issues limit mobile phone coverage in region



Fiber-to-the-Premise

- Tremendous capacity
- Stable services
- High capital costs, low operating costs
- 30+ year lifetime
- Foundation required for other services including mobile
- **Would leapfrog our region**
- Efficient use of investment



Once "cost to pass" covered, network is profitable

Grid Resiliency Issue Too

Building the fiber will also result in improved resiliency of the electric gird due to required pole replacements

Unpredictable variation in “make-ready” costs @ $15,000 to $75,000 per mile

Common Misconceptions

Misconception #1: ***Starlink, fixed wireless and 5G will solve the issue***

Reality: Wireless is not an equivalent substitute for wired infrastructure.

- **Low-earth orbit (LEO) satellites fit an important niche but do not offer mass-market capacity and terrain obstructions limit the reach.**
- **Fixed wireless faces speed constraints and terrain limitations.**
- **5G requires last mile fiber networks due to limited reach of small cells.**

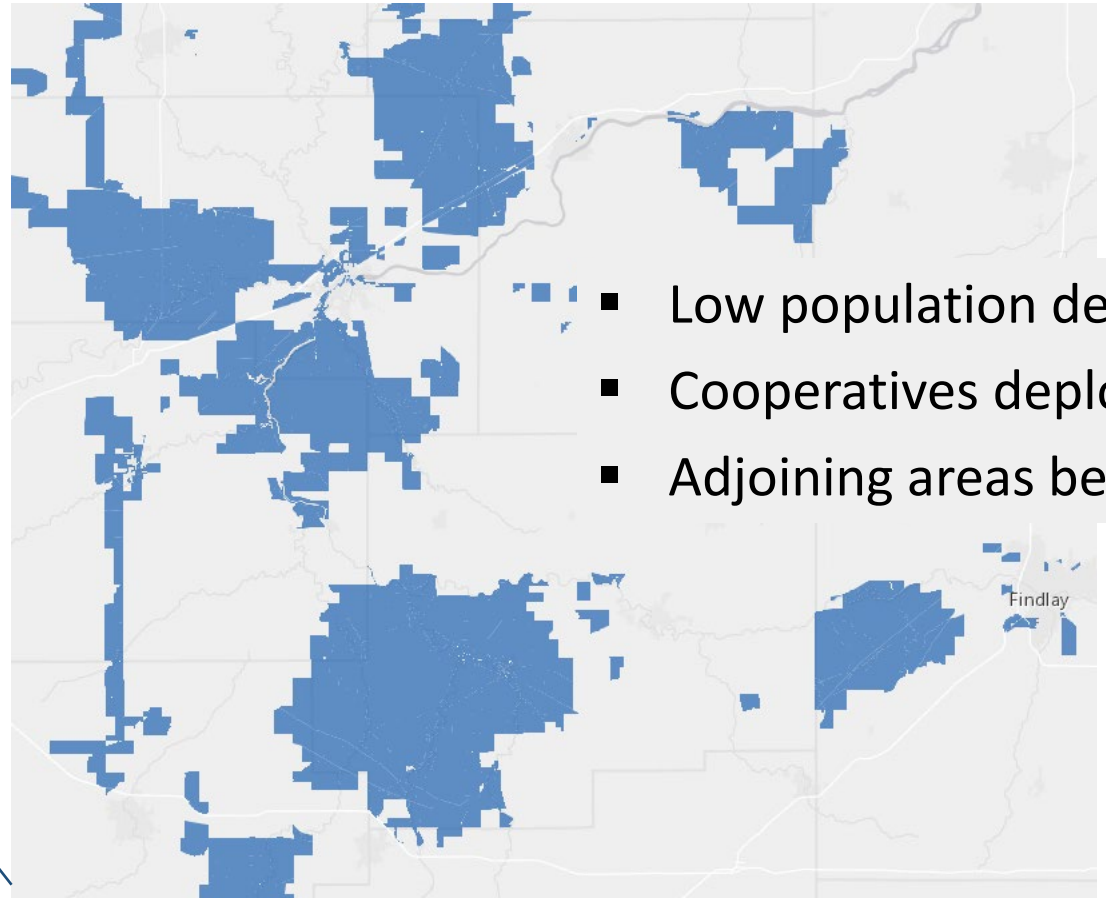
Misconception #2: ***Few rural households will subscribe.***

Reality: Where broadband truly available, subscription rates quickly reach 40% and one third of subscribers opt for the top tier speed offered.

Misconception #3: ***Fiber-to-the-premise in rural areas is too expensive***

Reality: Profitable fiber networks have been implemented by numerous rural telephone and electric cooperatives. Lifecycle costs for fiber are lower than a series of incremental half-measures.

Telephone Cooperatives Fiber-to-the-Home



- Low population density areas
- Cooperatives deployed fiber-to-the-home
- Adjoining areas begging them to expand

Funding Programs

Name of Program	
American Rescue Plan Act	
	State and Local Fiscal Recovery
	Capital Projects Fund
	FCC Emergency Connectivity Fund
	FCC Emergency Broadband Benefit

Name of Program
Ohio House Bill 2
ARC POWER Program
FCC Rural Digital Opportunity Fund
FCC Rural 5G Fund
NTIA Infrastructure Grants
USDA Infrastructure Grants/Loans
Biden Administration Infrastructure Bill

Crucial to Spend Effectively

Buckeye Hills regional council

Connecting Appalachia

Focus on the

FCC Rural Digital Opportunity Fund (RDOF)

- Draws from the **Universal Service Fund (USF)** meant to upgrade rural telecommunications infrastructure
- $20 billion budget
- Two phases
- Buckeye Hills filed research-informed recommendations to FCC on the program (September 2019)
- Phase 1 awarded in December 2020

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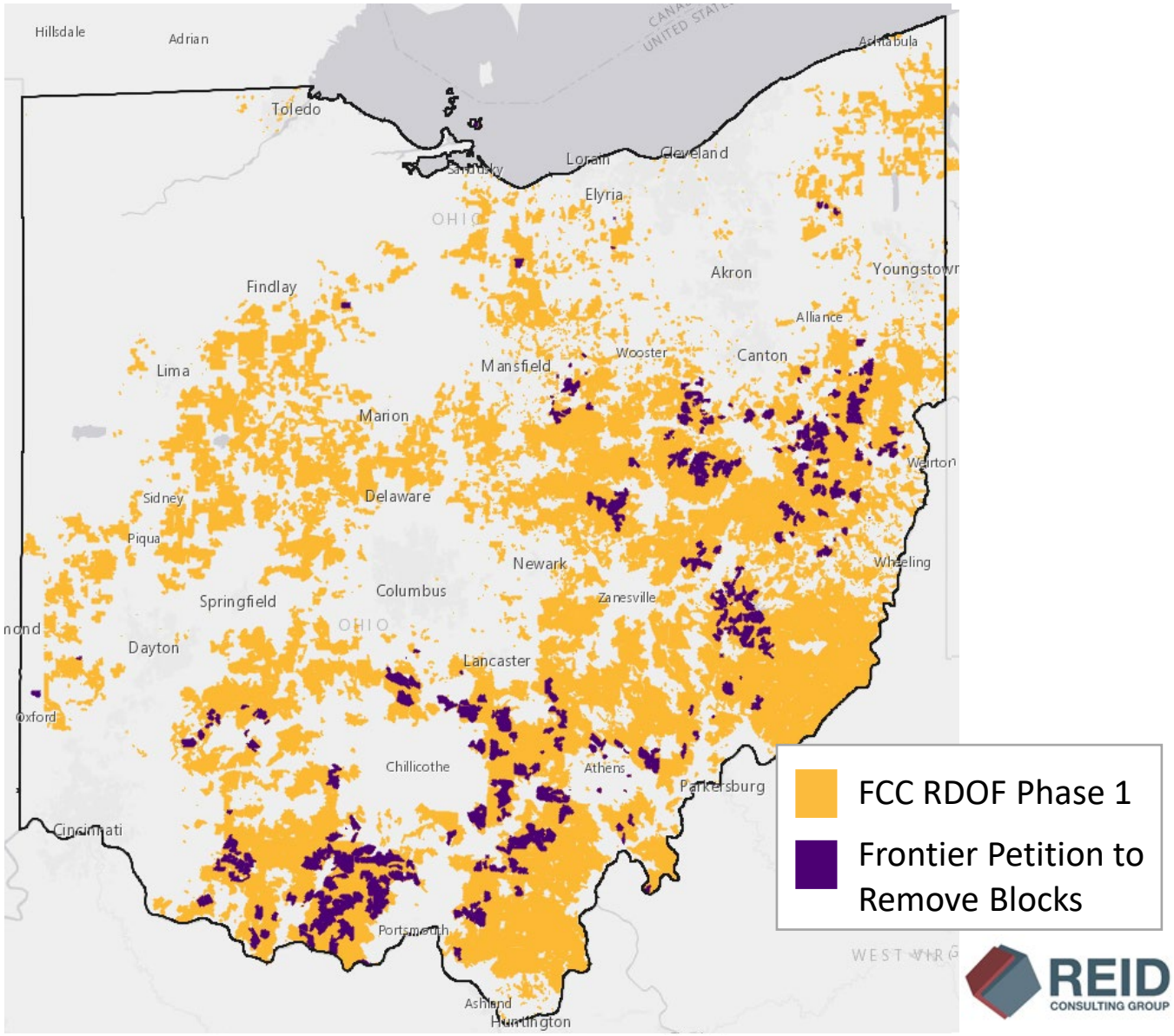
Eligibility Challenges

- Frontier challenged the eligibility of the equivalent of **two entire counties**
- No change on the ground, **just a paper declaration**
- Buckeye Hills filed a rebuttal (May 2020) informed by our research
- The FCC subsequently **rejected Frontier's petition** in Ohio**, citing our rebuttal**
- Across the country, similar tactics by multiple carriers succeeded due to the lack of organized opposition

Reversing the burden of proof would short-circuit such egregious claims



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RDOF Phase 1 Auction

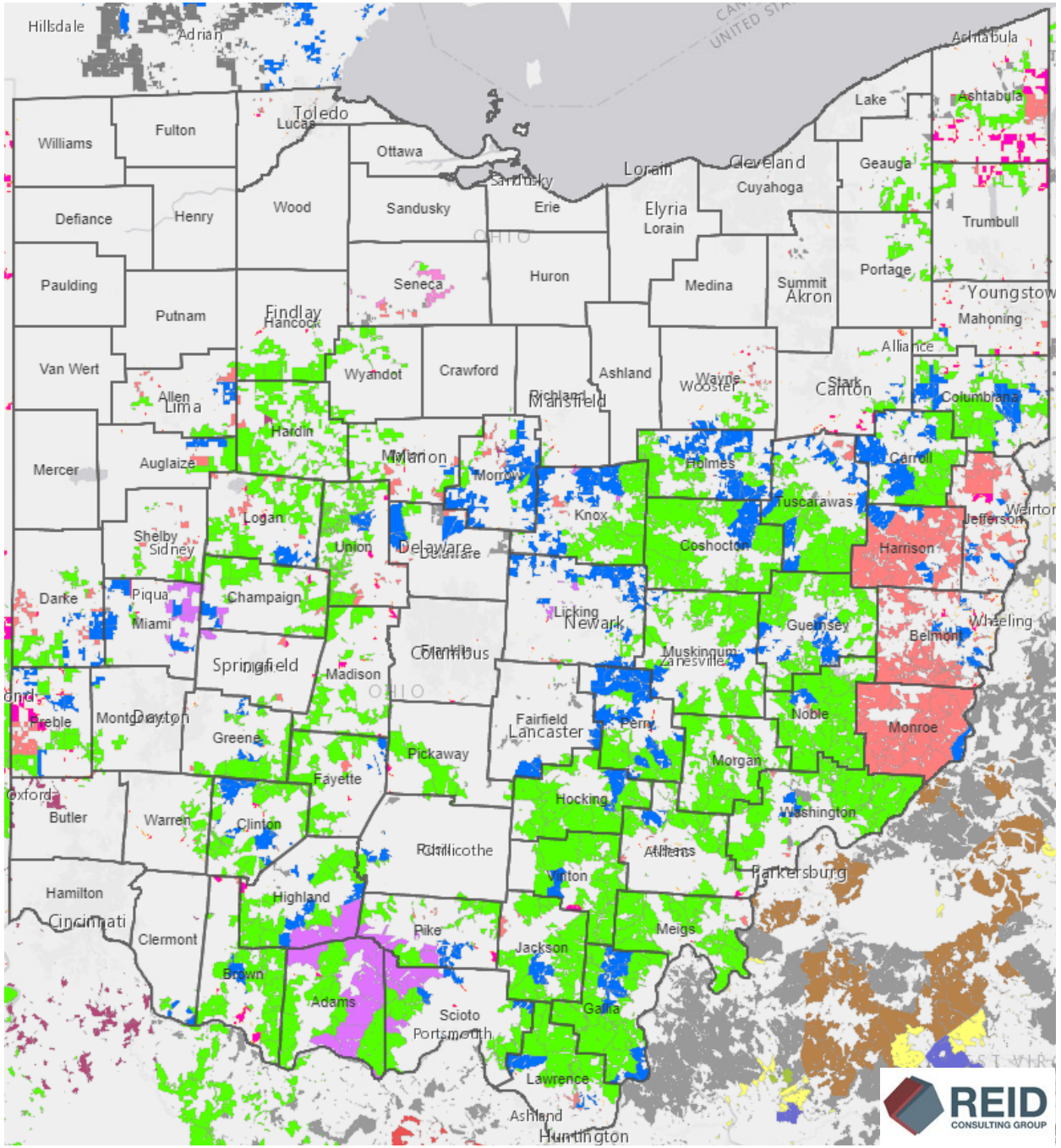
Late 2020

Big Winners in Ohio

- Charter/Spectrum: $107M, Gigabit on fiber
- Mercury Wireless: $11M, Primarily Gigabit on fiber
- Connect Everyone: $38M, Gigabit on fiber
- LTD Broadband: $8M, Gigabit on fiber
- NexTier: $1M, Gigabit on fiber

[Buckeye Hills filed analysis with FCC](#) (Feb 2021) citing research regarding:

- Incentives to abandon up to 30% of the geographic area
- Impracticality of splintered service areas
- Financial viability due to aggressive bidding



Large Capital Gap

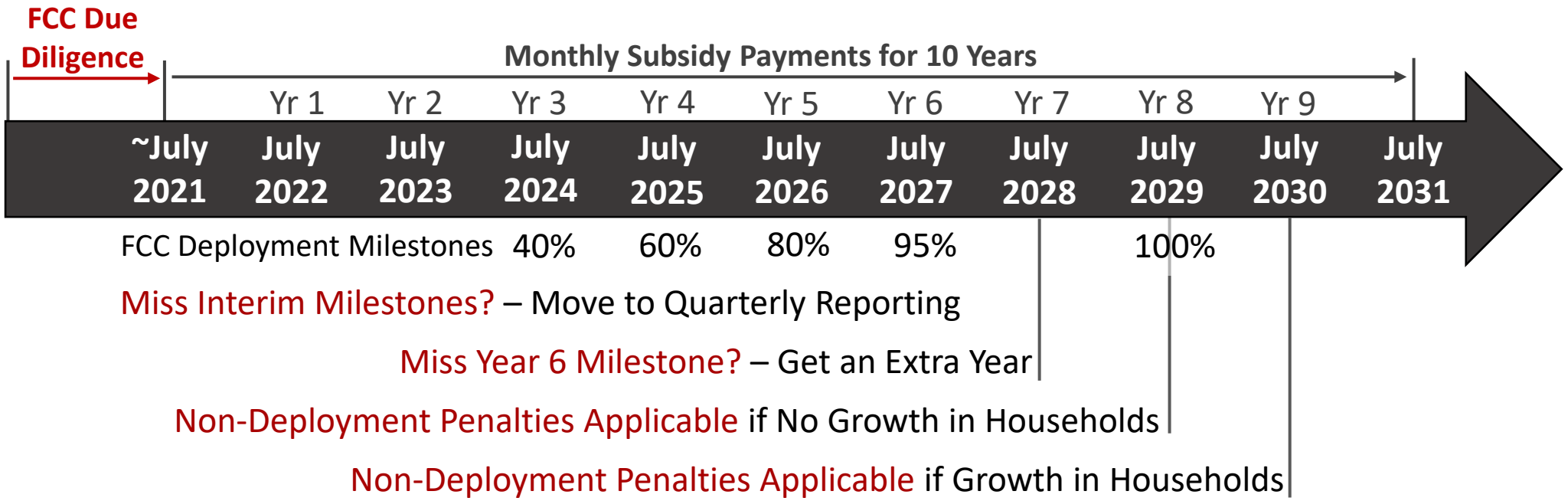
Percentage of FCC "Reserve"	Average Subsidy per Unserved Household - Ohio	Description
100%	$4,389	FCC projection of required subsidy to profitably deploy fiber-to-the-home
60%	$2,639	National "clearing round"
20%	**$889**	**As awarded in Ohio, will incentivize abandonment of the most remote**

$3,500 per Household Gap in Required Capital

Better Approach:

- Use FCC formula to determine needed subsidy (CACM)
- Define logical geographic service areas and terrestrial infrastructure requirements
- Put out to bid at 100% of the reserve and award based on the best overall value

RDOF Overly-Elongated Timeline

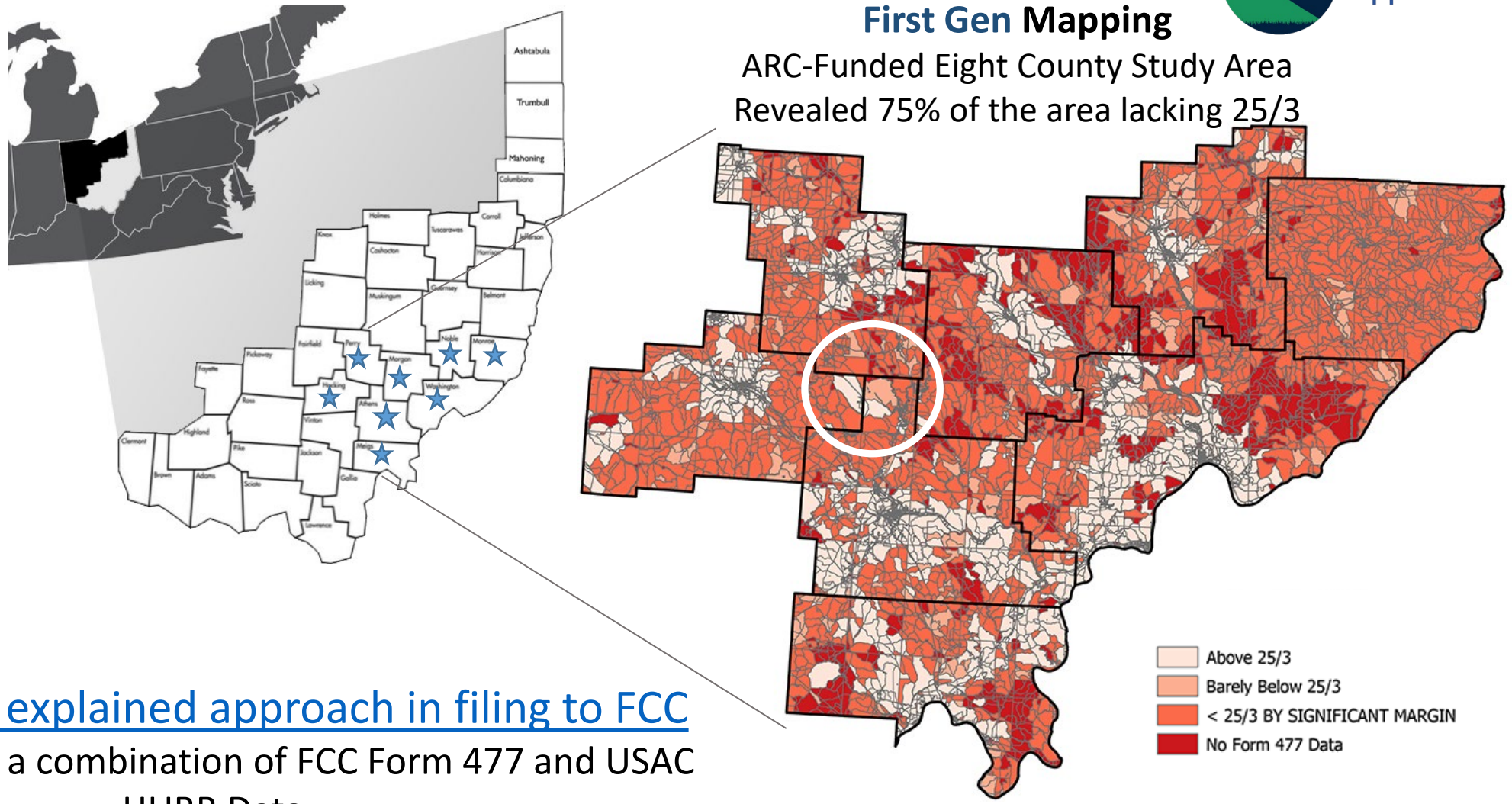


Absence of program transparency will mask status of projects

Prioritizing

First Gen Mapping

ARC-Funded Eight County Study Area
Revealed 75% of the area lacking 25/3



[Buckeye Hills explained approach in filing to FCC](#)
(Jan 2020) using a combination of FCC Form 477 and USAC HUBB Data

Athens-Perry-Hocking

Expressions of Need

- Speeds reported to FCC by carriers
- Dozens of letters of support
- Now confirmed with speed tests

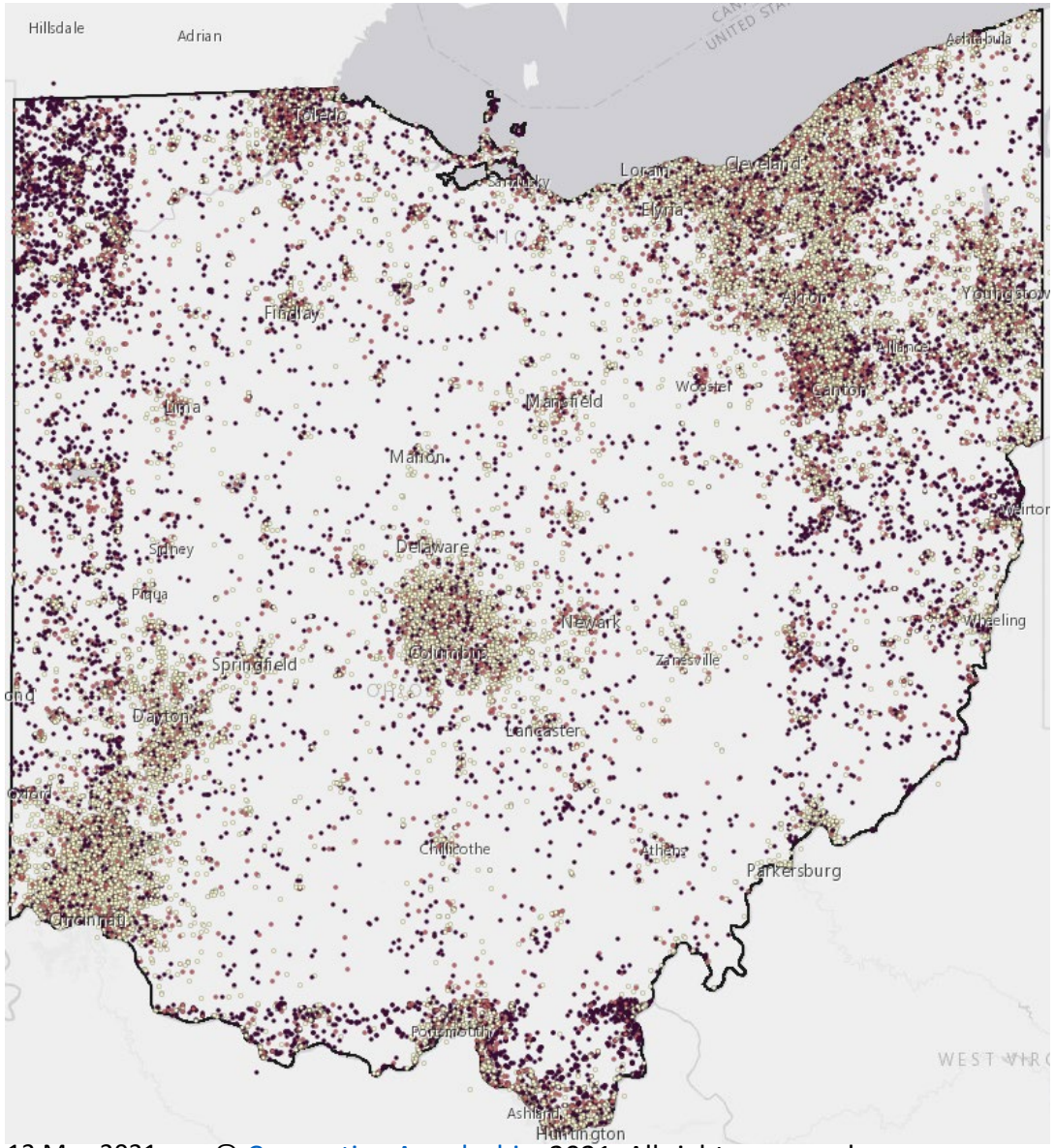
Project: $3.4 to $4.6 million

- Leverage existing fiber in Nelsonville and Glouster
- Build 28 miles of middle mile fiber
- 9 Community POPs and 7 towers

Carrier Objections

- Unsubstantiated claims
- Backed up by other carriers
- A funder averse to controversy

Seeking On-the-Ground Truth



Speedtest® Results

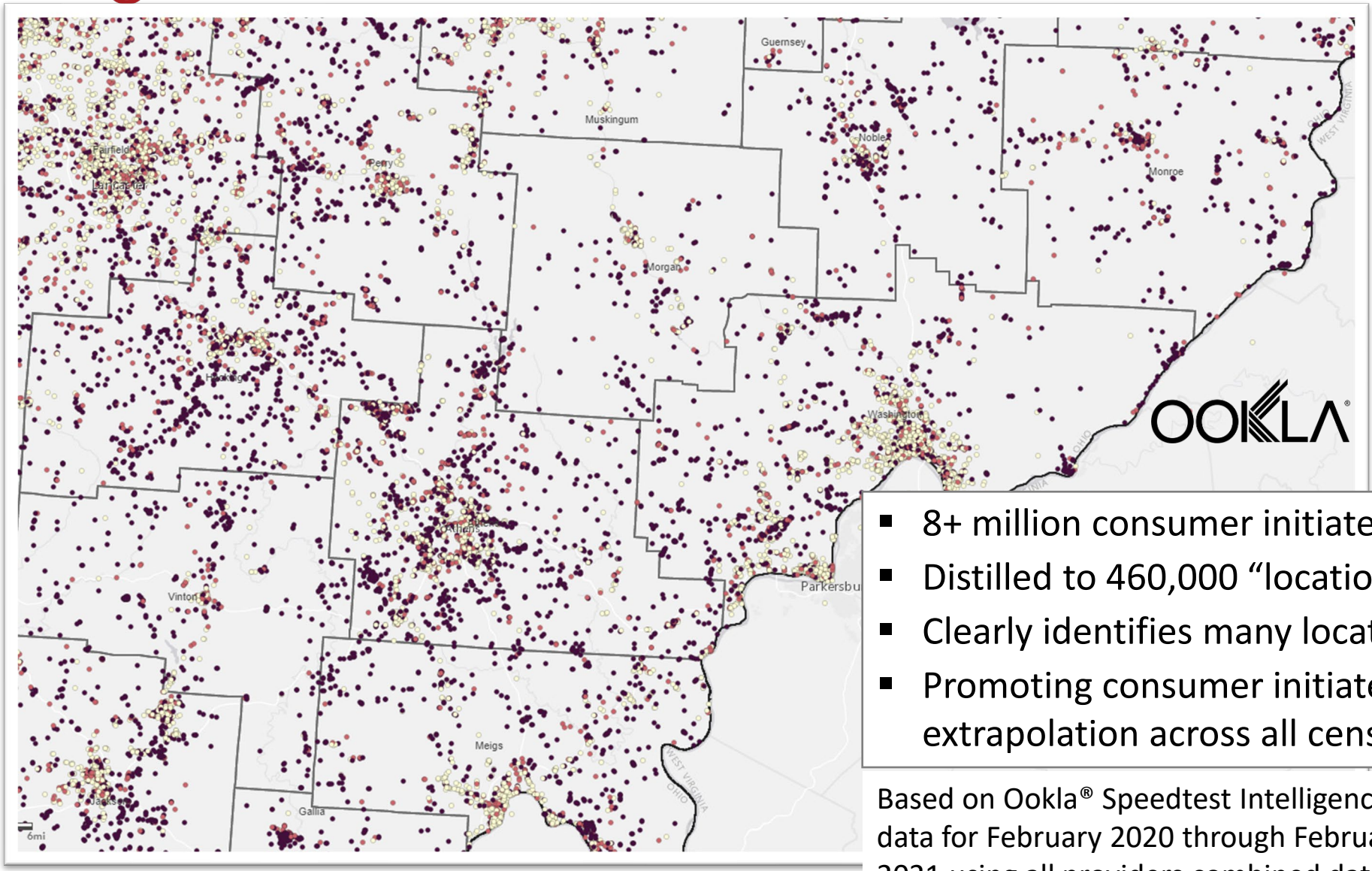
- Below 10/1
- Below 25/3
- Above 25/3

OOKLA®

- 8+ million consumer initiated tests over 13 months
- Distilled to 460,000 “locations” based on lat/long
- Clearly identifies many locations still under 10/1
- Promoting consumer initiated tests to allow for extrapolation across all census blocks

Based on Ookla® Speedtest Intelligence® data for February 2020 through February 2021 using all providers combined data

Seeking On-the-Ground Truth



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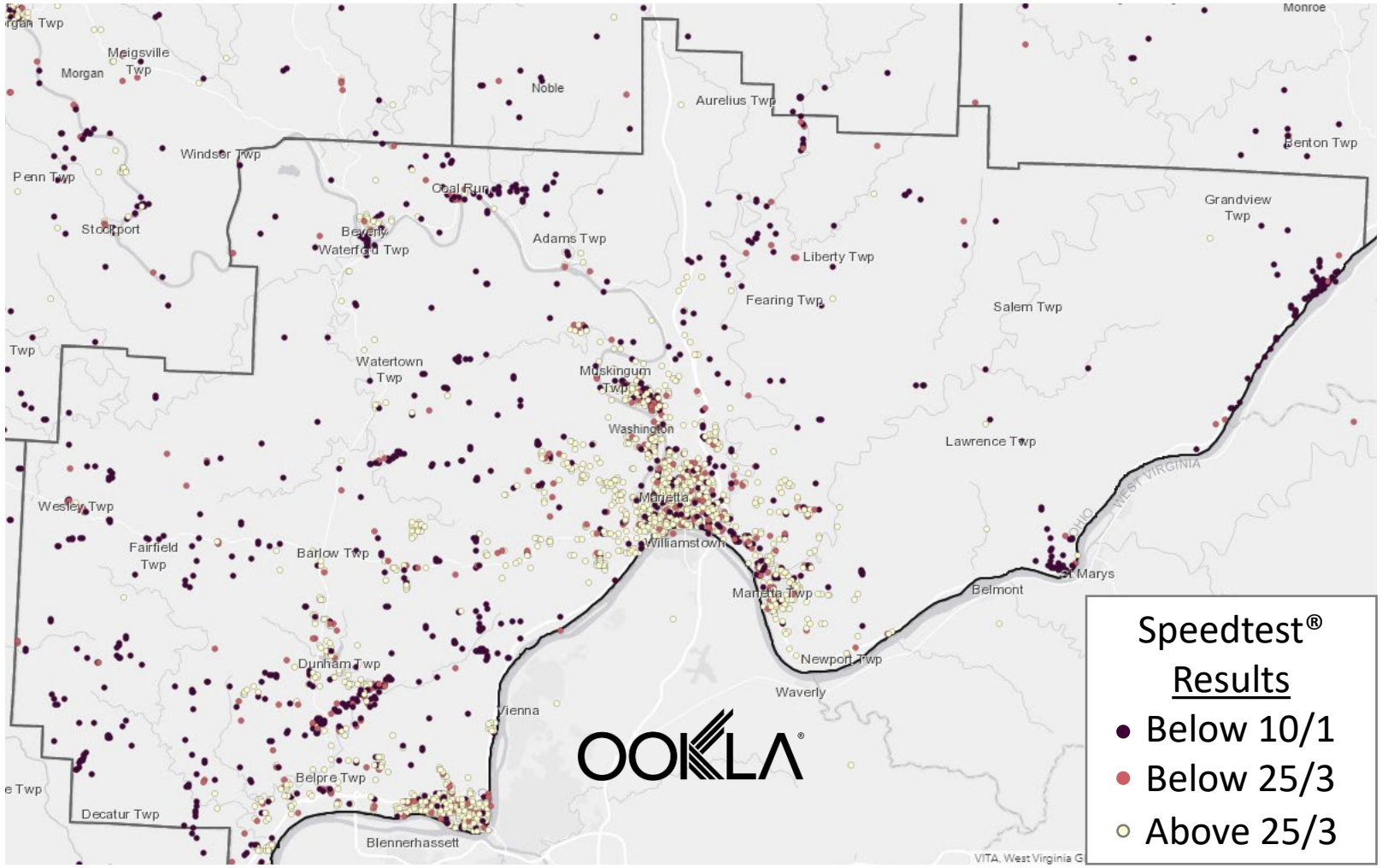
County Report Cards – In Progress



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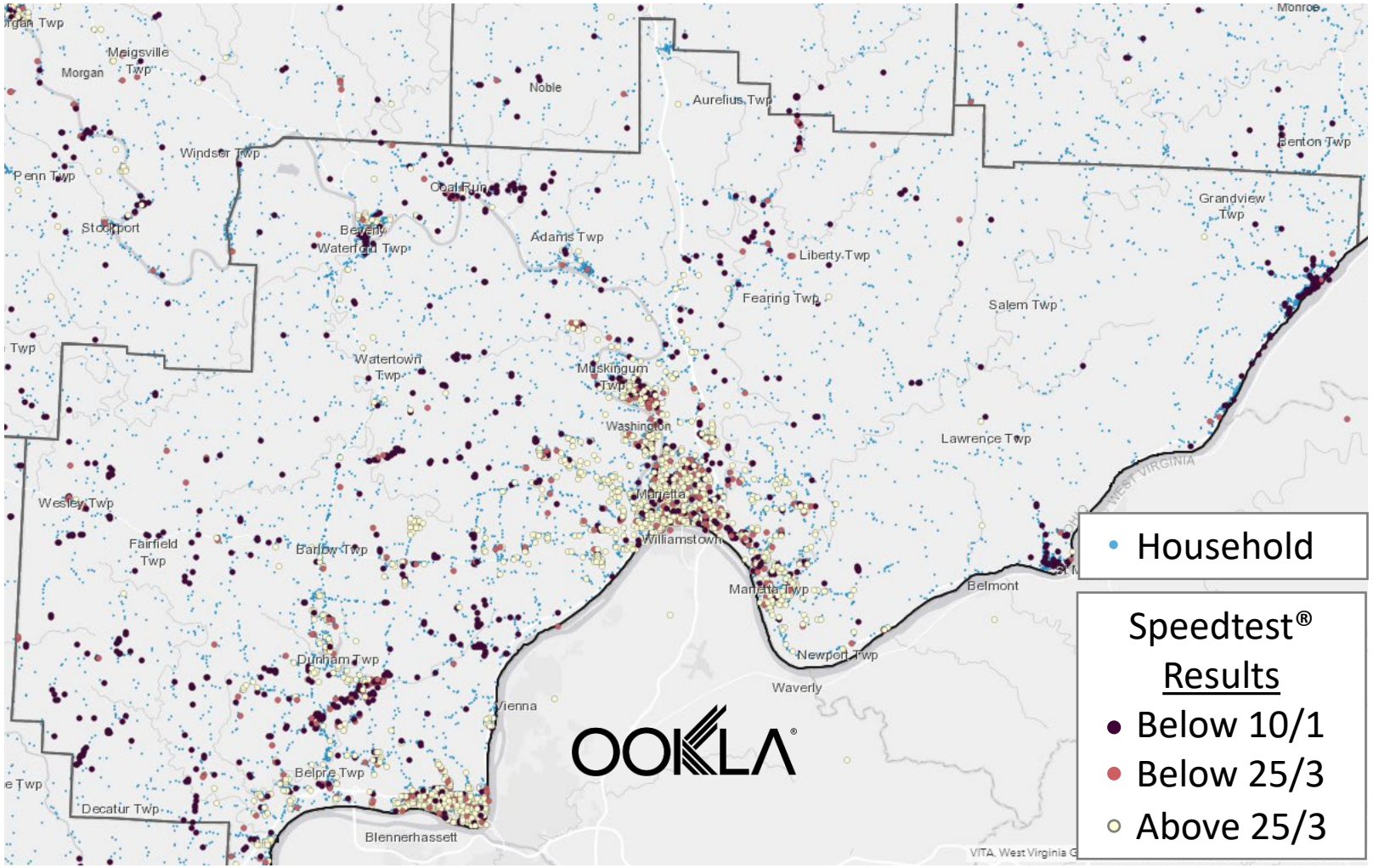


Draft Metrics

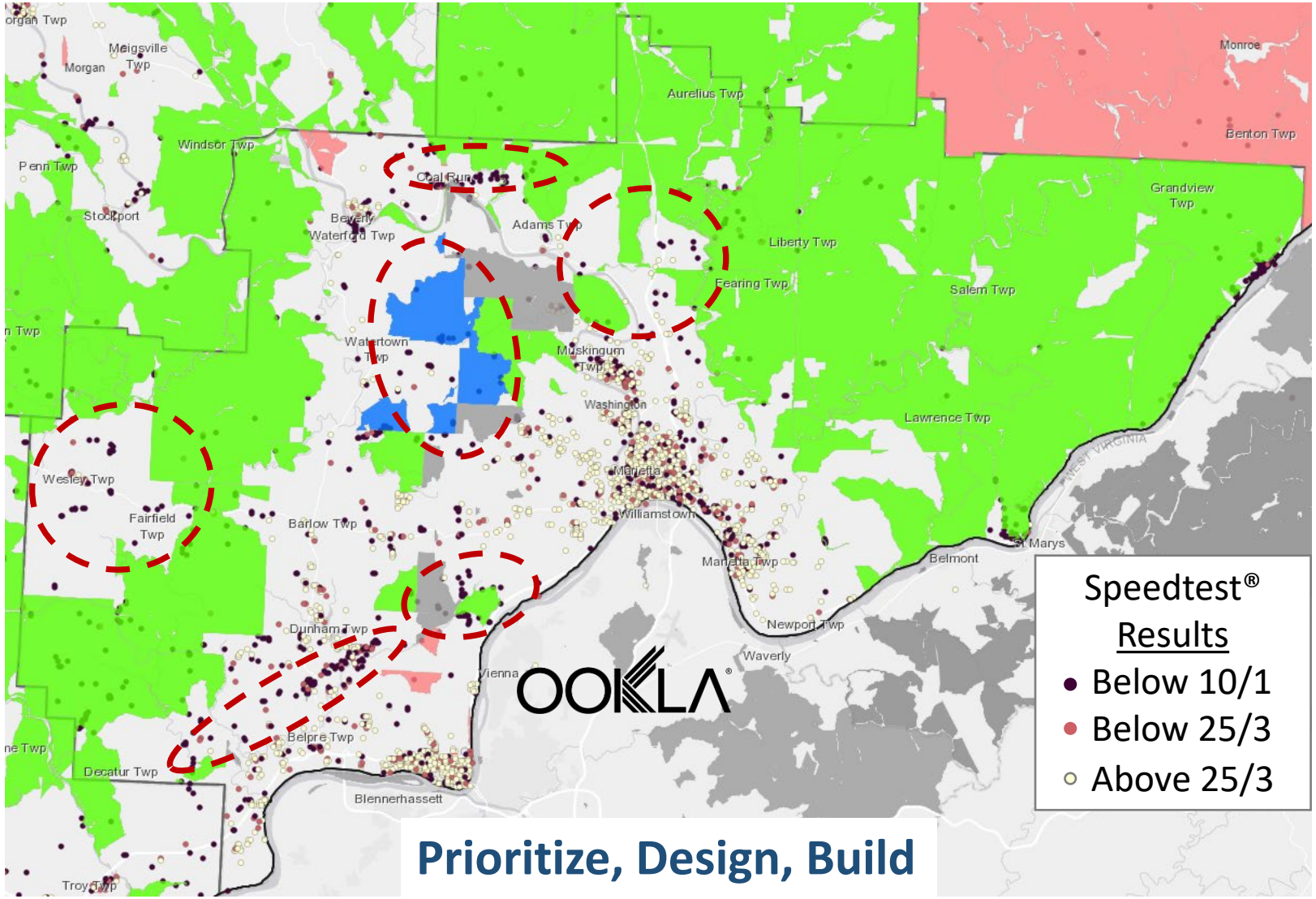
% of households
- No Access
- Below 10/1
- Below 25/3
- Below 100/20

% of square miles
- No Access
- Below 10/1
- Below 25/3
- Below 100/20
- Business fiber access

Based on Ookla® Speedtest Intelligence® data for February 2020 through February 2021 using all providers combined data

Encourage Consumer Initiated Speedtest® and Surveys

County Report Cards – In Progress



RDOF Winners

- Charter/Spectrum
- Mercury Wireless
- Connect Everyone

Low speed clusters

Existing open middle mile

Based on Ookla® Speedtest Intelligence® data for February 2020 through February 2021 using all providers combined data

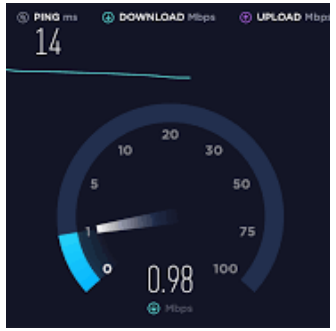
Prioritize, Design, Build

Please Help!

1. **Take the Survey**

   https://ConnectingAppalachia.org/survey

   Include the unserved!



2. **Perform the Speed Test**

   https://ConnectingAppalachia.org/speedtest

   Whether your service is good or bad

3. **Endorse and Promote the Common Sense Solutions**

Big Picture

Erasing the Digital Divide Statewide

Total Price Tag	$3.2 billion
Required Subsidy	$2.0 billion

Subsidy equivalent to building 100 miles of highway

Comparable to Ohio's share of:

- Past $100 billion of poorly spent subsidy
- Existing and proposed Federal subsidies

Crucial to spend based on a comprehensive plan

Common Sense Solutions

A. Build Future Proof Infrastructure

B. Spur Competition and Innovation

C. Mandate Accountability and Transparency

A Fight for Our Future

What do we want rural Ohio to look like in 20 years?

- Untapped and hollowed-out **or**
- Vibrant, engaged and productive

Urgent and bold action required!