Broadband in Missouri

A closer look at coverage data

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June 2019

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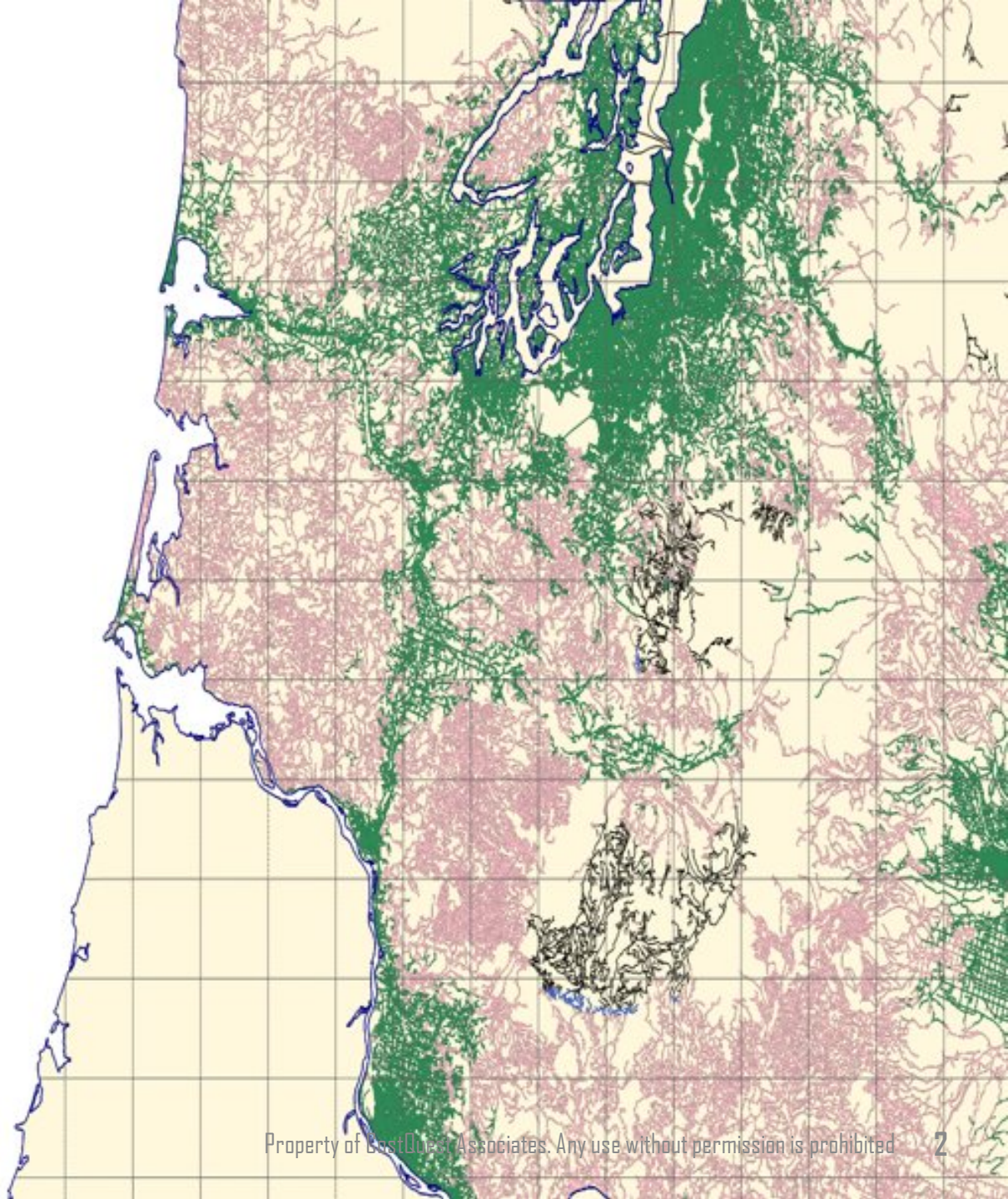
AGENDA

- Introduction
- Reported coverage in Missouri
- Sizing the issue
- The big assumption
- Proposed solution
- How it works



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Cincinnati ~ Seattle ~ Washington D.C.

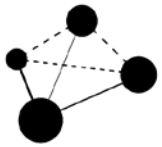
Founded in 1999, CostQuest Associates is internationally recognized as the leading telecommunication network modeling, costing and profitability expert. We deliver comprehensive solutions to complicated business challenges. These robust solutions reflect the highly specific needs of your business, including the impact of financial, economic, and regulatory environments.

Data & Metrics

We develop useful and unique data sets and provide business intelligence to enable you to make informed decisions.

GIS & Mapping

We utilize Geographic Information Systems (GIS) and tools to develop geographic data, and perform spatial programming.



Economic Network Modeling

Our Economic Network Modeling solutions are activity-based and are economically rational ways to measure and manage profitability.

Policy Support

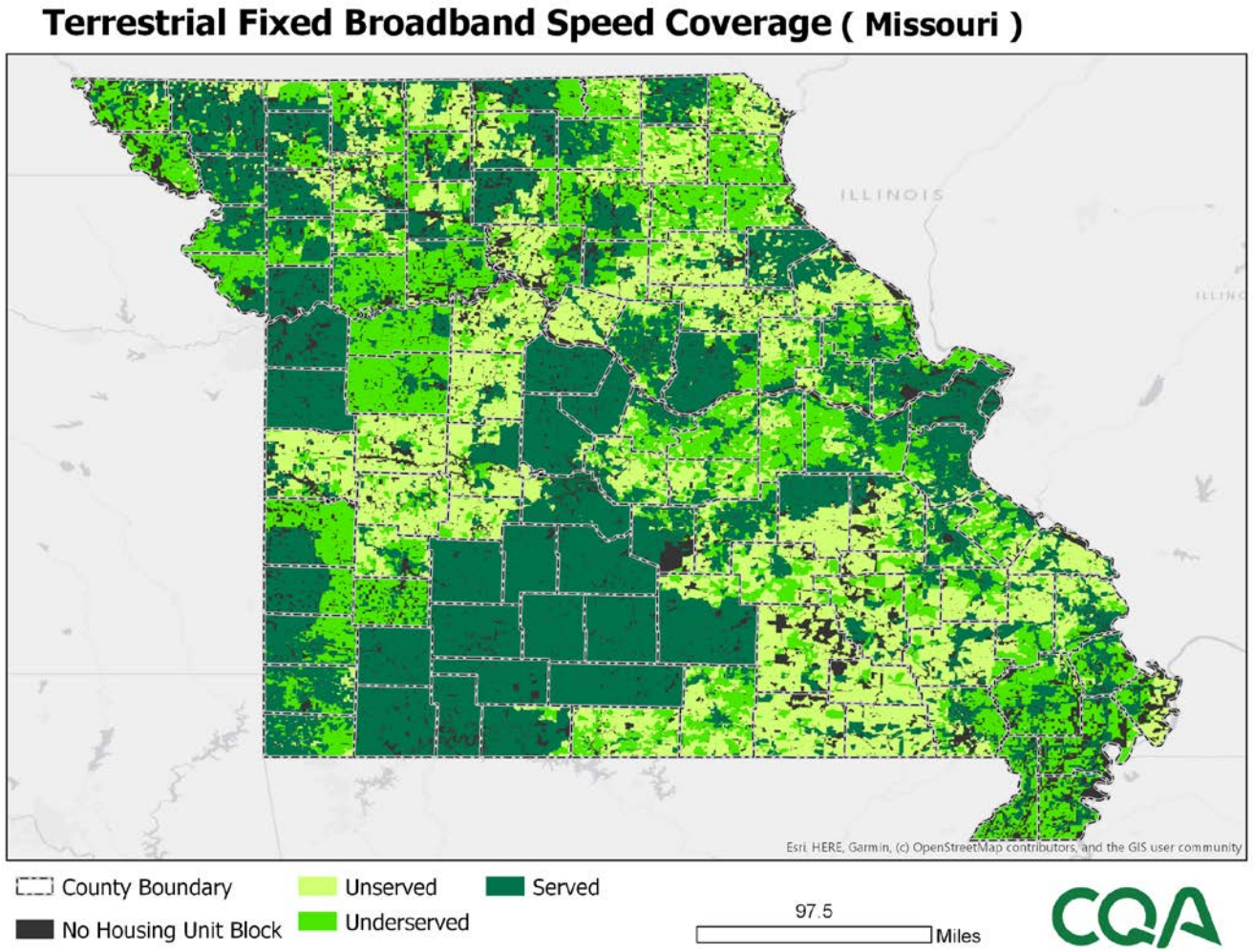
Our Universal Service Models are in use around the world and our policy support cover nearly all regulatory issues facing the this industry.

Valuation & Appraisal

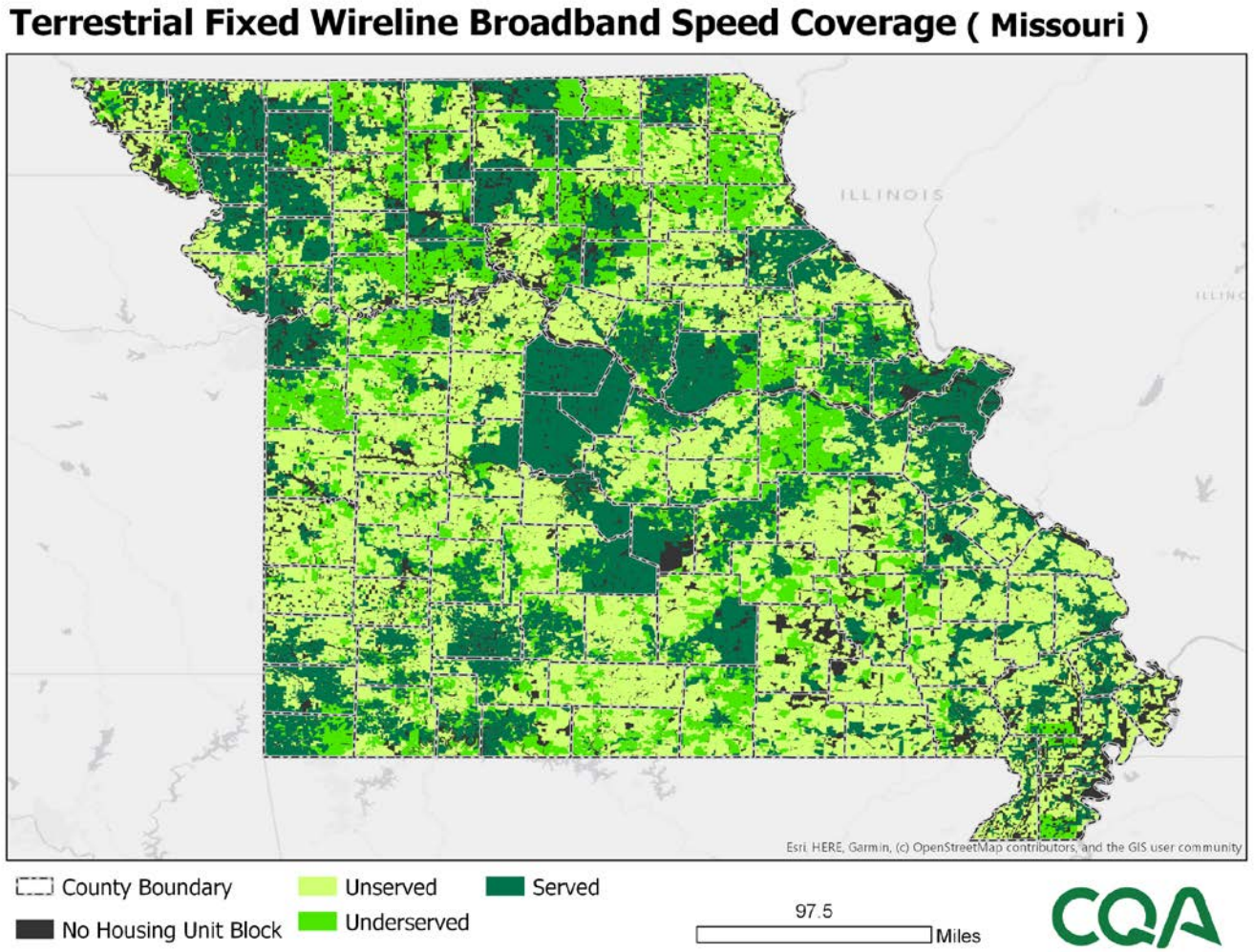
Our valuation, appraisal, and tax support services are developed and applied in the real world and have been accepted in nearly every state.

REPORTED COVERAGE IN MISSOURI

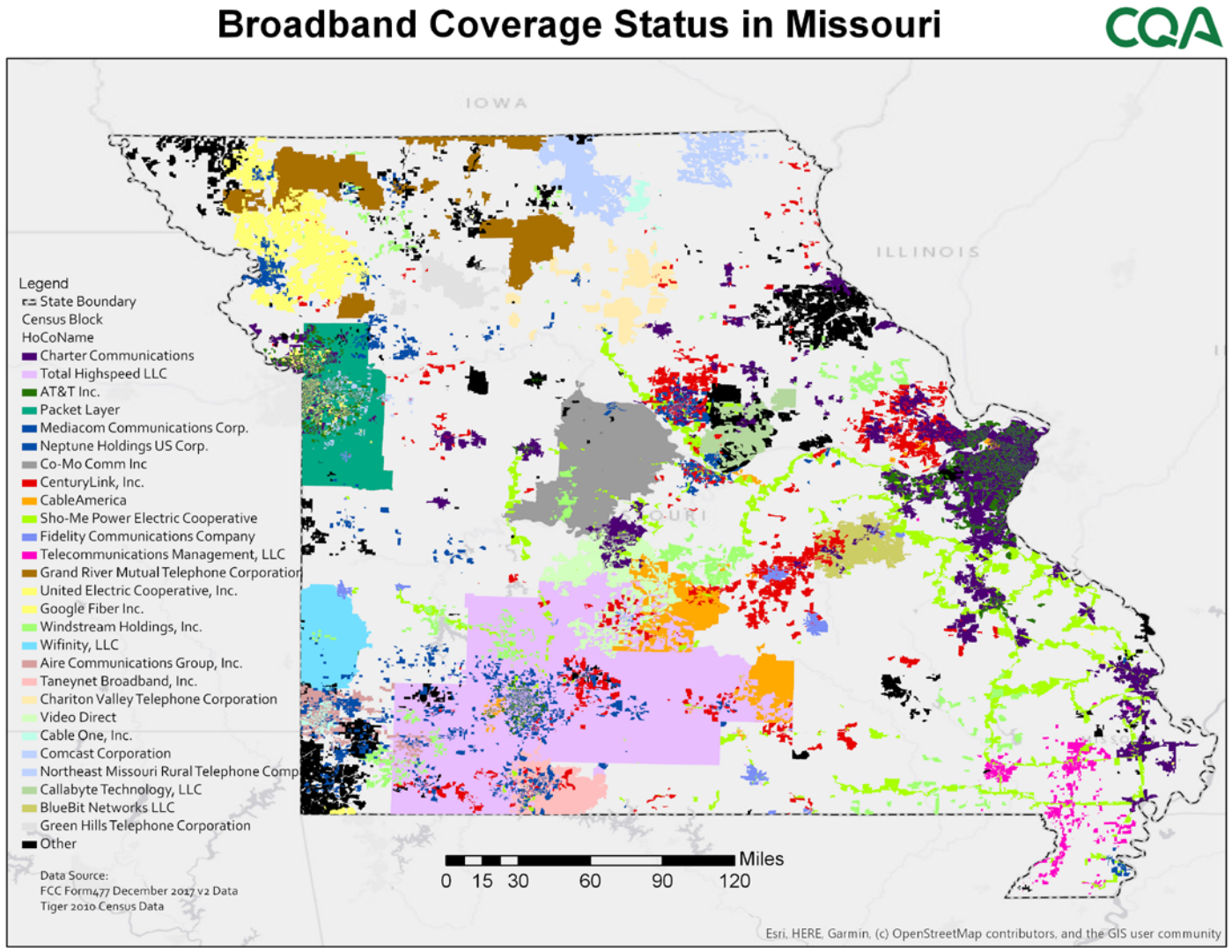
Reported coverage in MO – FCC 477



Reported coverage in MO – FCC 477 – Wireline ONLY



Reported coverage in MO – FCC 477 – Served ONLY by carrier



SIZING THE ISSUE

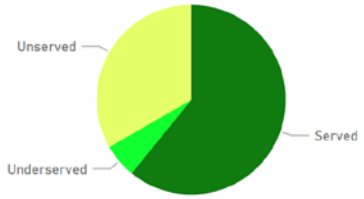
Sizing the issue – Based on 477 coverage

MO Demographics and Investment Cost

* Demographic data (Georesults) is through Q3 of 2017. Some Census Blocks had no Financial data. Business locations includes Small Offices or Home Offices.

SpeedSource	Type	CBs w/ HU	Total Investment	Residential Population	Residential Housing Units	Residential MDU	Business Locations*
Served	R	48885	0	996,187	571,553	58,049	106459
Served	S	73232	0	3,505,523	1,755,131	128,645	370527
Served	U	3450	0	194,750	121,145	7,778	17124
Underserved	R	9950	221,057,590	164,278	114,853	12,926	22436
Underserved	S	2043	32,856,042	21,306	32,052	9,091	10442
Underserved	U	2	13,492	8	4	0	16
Unserved	R	63732	1,417,000,422	595,734	394,476	51,379	59993
Unserved	S	4931	69,838,486	69,739	45,023	5,368	10034
Unserved	U	5	64,283	64	27	3	126
Total		**206230**	**1,740,830,315**	**5,547,589**	**3,034,264**	**273,239**	**597157**

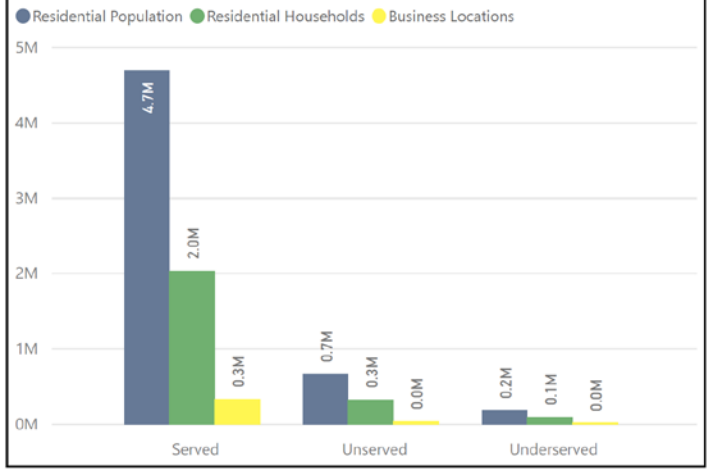
Percentage Served by Census Block



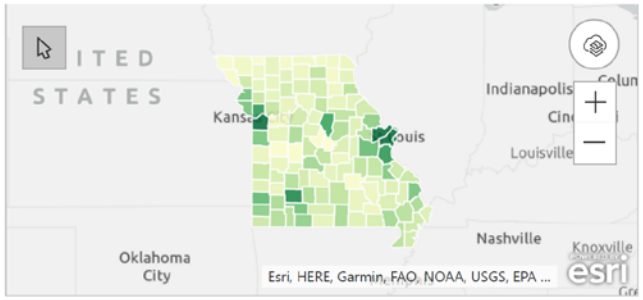
343565
Total CBs

135441
CBs with No HUs

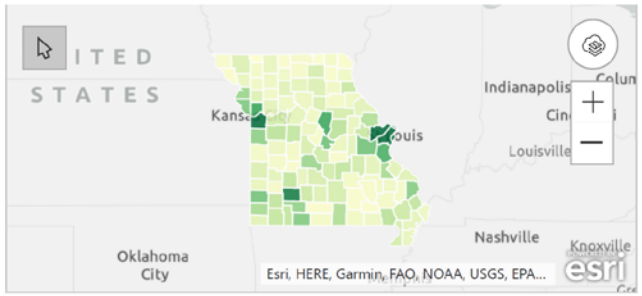
Demographics



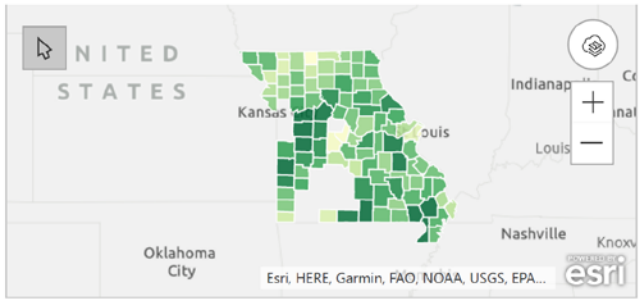
Residential Population by County



Business Locations by County



Total Investment for Unserved by County*



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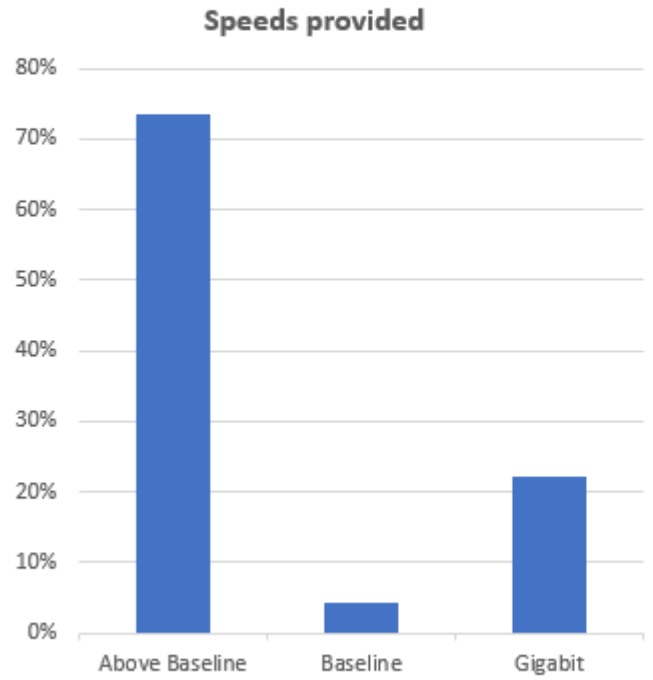
Sizing the issue - CAF 2 Auction Results

CAF II Auction

State

MN
MO
MS
MT
NC
ND
NE
NJ
NM
NV
OH
OK
OR



Row Labels	Speed per Location
Above Baseline	73.53%
Baseline	4.27%
Gigabit	22.20%
Grand Total	**100.00%**

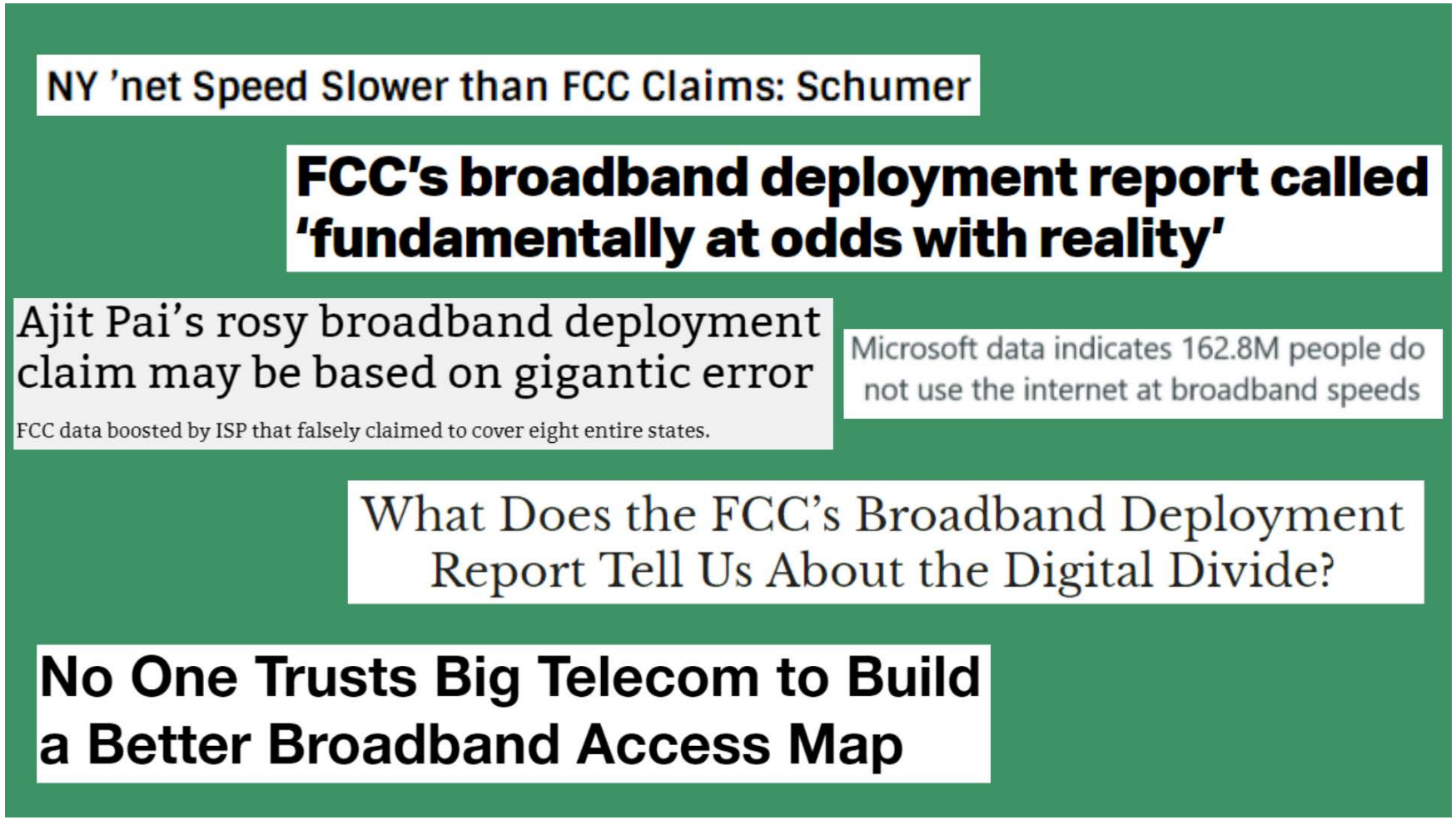
Awarded Carriers	Sum of Locations supported	Sum of Annual Assigned Support
Air Link Rural Broadband, LLC	2,321	1,137,144
ArisWave Consortium	788	300,154
Barry Electric Cooperative	2,308	610,345
Chariton Valley Communications Corporation	847	417,967
Fidelity Communications Company	9	2,437
Mark Twain Communications Company	676	305,337
Mercury Wireless	1,954	164,185
Mid-States Services, LLC	358	186,806
Rural Electric Cooperative Consortium	17,214	4,656,941
Total Highspeed LLC	386	64,056
Wisper ISP, Inc	68,269	17,631,941
Grand Total	**95,130**	**25,477,312**

THE BIG ASSUMPTION

The big assumption

- Form 477 data is self-reported by carriers semi-annually
  - Onerous to audit locations served and speeds provided
  - Accuracy of data unclear
- Census blocks are considered served if one location has service
  - Could overstate service coverage
- National Broadband Map populated by Form 477 data
- HUBB filings require geocoded locations
  - No source of truth to verify locations filed
- Geocoders are often inaccurate/error prone in rural areas

The big assumption



- What is the truth?
- Reported coverage is not granular & is difficult to audit
- Reported covered areas aren't served locations
- Unserved locations still unknown
- Rural information hardest to ascertain
- Where are federal funds needed most?

PROPOSED SOLUTION

Proposed solution – Rumblings

- The FCC is considering moving the FCC reporting to a unit below Census Block
  - USTelecom, ITTA, WISPA and their members
    - Pushing the creation of a location **Fabric** that provides a high degree of certainty on where every home/business (location) is in America
      - Ideally the latitude and longitude of the structure could require broadband service
    - Pushing for an FCC filing at carrier's choice: either the address or polygon level
    - The data is then connected to the **Fabric** to provide a normalized view of coverage
      - Provides information on locations served BUT also on unserved locations
  - NCTA and their members
    - Pushing an interim effort for carriers to file polygons

Proposed solution - Rumblings

- Sub Census Block – Addresses and/or Polygons
  - Addresses
    - Carrier data often incomplete
    - Potential customer addresses not always maintained
    - Addresses have quality issues (e.g., some do not exist)
    - Geocoding output is non-standard
  - Polygons
    - Carriers do not always maintain polygons
    - Standards do not exist for the creation and interpretation
    - Polygon creation dependent on quality network and/or address data
    - Polygons delink from a unit of known demand – the Census Block

…Addresses and polygons both require an underlying dataset of precise Latitude and Longitude of all locations

Proposed solution – The Fabric

Broadband Service Location Fabric "the Fabric"

- Precise, geo-coded, serviceable locations
- Creates visibility in rural America to drive targeted subsidy fund allocation
- Improves efficiency for filers submitting location data
- Enables the FCC to audit Form 477 data accuracy at granular level

…USTelecom has retained CQA to implement a proof of concept using the states of MO and VA

Proposed solution – The Fabric

Let's remove the **guesswork** and map every American household and business that needs to be online

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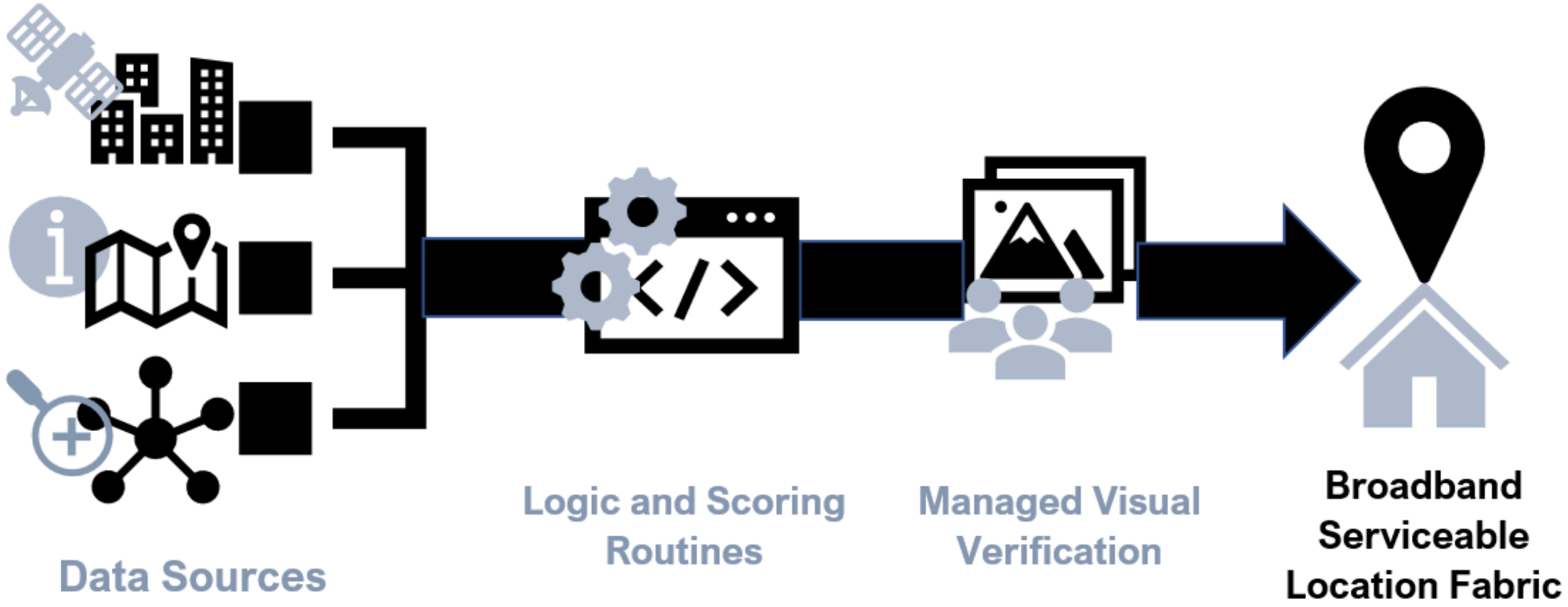
HOW IT WORKS

The Fabric - How it works



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The Fabric – How it works

- Goal: Identify the structure(s) needing service
- Challenges:
  - Secondary structures (chicken coops, barns, garages, etc.)
  - Addresses aren't automatically geocoded

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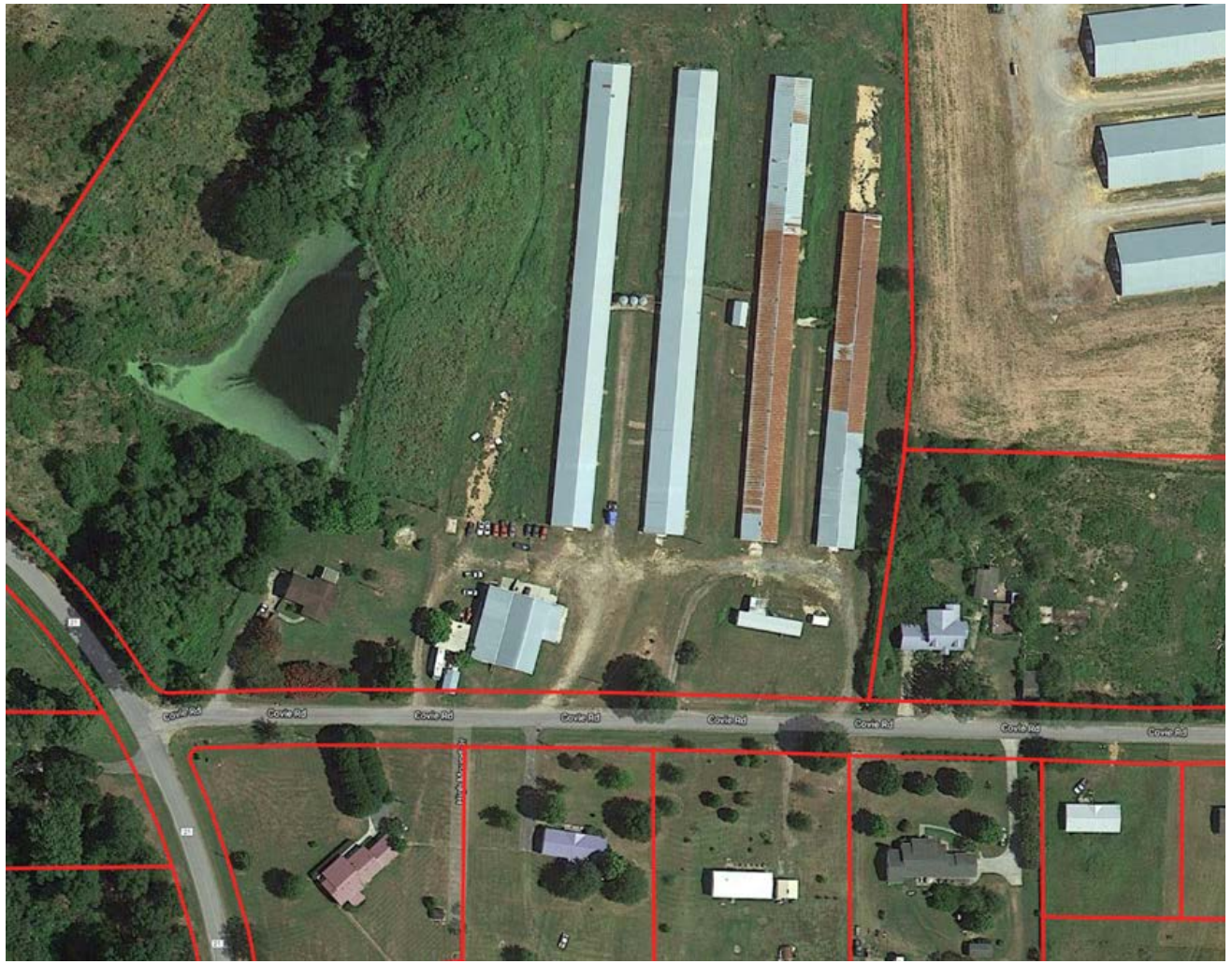
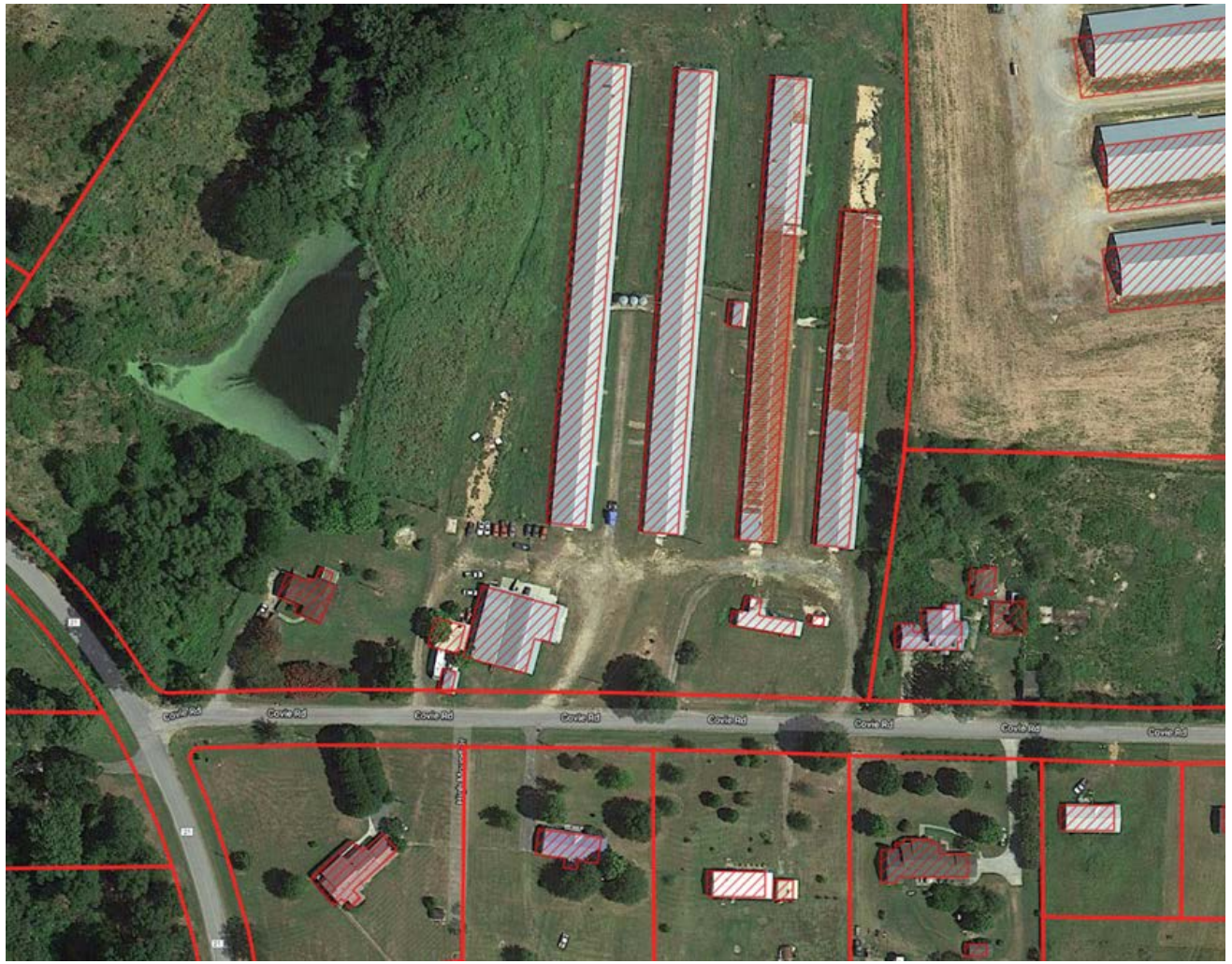
The Fabric – How it works

- Step 1:
  - Overlay parcel data
  - Use Tax Assessor and parcel attribute data to categorize parcels
    - Are there multiple locations?
    - Does the land use indicate there may be a serviceable structure?
    - Consider improvement value, information on secondary structures, etc.



The Fabric – How it works

- Step 2:
- Incorporate building footprint data
  - Footprints identify candidate locations for the Fabric
  - Footprints replace an interpolation of textual address data with real-world accuracy of where serviceable structures are



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The Fabric – Output

- Logic is applied to aggregate data
- The Fabric identifies serviceable structure(s), circled, on each parcel

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The Fabric – Comparison to 3rd party geocoders

- Eight total mistakes made by 3rd party geocoders
- Geocoder A (pink dots) missed two locations and added two extra
- Geocoder B (orange dots) missed four locations

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DEFINITIONS

- **Address:** Textual reference for a location (name on a map)
- **CAF**: Connect America Fund, one of the Universal Service Administrative Company (USAC) initiatives
- **Geocoder:** A tool that (usually) converts an address into a set of latitude + longitude
- **HUBB:** High Cost Universal Broadband, the portal where CAF awardees must file their progress (geocoded locations served, etc.)
- **Location:** A residential or business structure
- **Parcel:** A plot of land, with boundaries, legally owned by an individual or entity
- **Parcel Attributes:** Qualities of a parcel such as land use, property value, etc.
- **Parcel Centroid:** The geometric middle of a parcel