Cost Quest Associates:

- leading telecommunication network modeling, costing and profitability experts

- FCC hired to develop the Connect America Cost Model, basis for CAF II, RDOF

- Built the broadband serviceable location fabric with address-level information

The CommLaw Group:

- DC-area boutique law firm specializing in telecommunications

- Deep bench in information services, taxation, wireless/auctions, compliance

- Innovative approach to legal service delivery, including Commpliance Group

Is the Rural Digital Opportunity Fund a Big Deal?

— *Connect America Fund, Phase II ("CAF II")*

- $1.48 billion over 10 years
- 33,000 census block groups
- 713,176 locations
- Minimum support threshold, $52.50/location
- Maximum support threshold, $146.10/location

— *Rural Digital Opportunity Fund ("RDOF"), Phase I*

- $16 billion over 10 years
- 66,000 census block groups
- 5,907,896 locations
- Minimum support threshold, $40.00/location ($30.00/tribal)
- Maximum support threshold, $212.50/location

CAF II: What's Similar, What's Different

- Similar
  - *Award ongoing high-cost universal service support through competitive bidding in a multiple-round reverse auction.*
  - *Using ("flawed") Form 477 data for census block coverage.*
- Different
  - *Speed Tiers in CAF II*
    - 10 Mbps / 1 Mbps – weight 65
    - **25 Mbps / 3 Mbps – weight 45**
    - **100 Mbps / 20 Mbps – weight 15**
    - 1000 Mbps / 500 Mbps – weight 0
  - *Speed Tiers in RDOF, Phase I*
    - **25 Mbps / 3 Mbps – weight 50**
    - 50 Mbps / 5 Mbps – weigh 35
    - **100 Mbps / 20 Mbps – weight 20**
    - 1000 Mbps /500 Mbps – weight 0

Reverse Auctions

Basics

In a reverse auction, multiple sellers bid for the prices at which they are willing to sell their goods & services

1. *The lowest bid meeting specifications wins the business*

2. *Example - Landowner seeking builders to develop empty real estate – best deal*

3. *The FCC is seeking both the highest quality & lowest price to deliver that quality*

   A. The FCC's formula uses weighted bids to compare prices for different levels of quality

   B. Bidding starts with high levels of support & declines each round

   C. Activity requirements force bidders to bid each round or drop out

   D. The sum of all final bids must not exceed the FCC's total budget, i.e., the auction will not end until the total bids do not exceed the total budget for the auction

   E. To encourage aggressive bidding, the FCC will award support at the level of the second lowest bid

4. *Every bidder must understand the detailed rules or have real-time assistance*

Reverse Auctions
Information available to bidders

1. The clock percentage for the upcoming round

2. The aggregate cost at the previous round's clock percentage up until the budget clears

3. The bidder's activity, based on all bids in the previous round, the implied support of the bidder's bids at the clock percentage, & the implied support of the bidder's carried-forward bids

4. Summary statistics of the bidder's bidding in the previous round

5. For all eligible areas in all states, whether the number of bidders that placed bids at the previous round's clock percentage was 0, 1, or 2 or more

What Do I Need?

1. A detailed network plan & associated operational metrics
2. A bottom-line budget to deliver the network & services proposed
3. A good understanding of the bidding rules & mechanics
   A. *"Attend" the FCC's seminar/webinar*
   B. *Participate in the mock auction*
   C. *Obtain any needed 3rd-party expertise of reverse auctions*
4. Have a plan when to exit the auction if the support is likely to go below your bottom-line budget
5. Stick to your plan; don't let emotions push you

Short-Form Requirements

Application Contents

1. Identity of the applicant, including parties that have an interest in the applicant;
2. Names of three authorized bidders;
3. The identities of all real parties in interest;
4. Certification that the application discloses all real parties in interest;
5. Certification that the applicant & all applicable parties have complied with & will continue to comply with §1.21002;
6. Certification that the applicant follows all requirements for receiving the universal service support being sought;
7. Certification that the applicant will make any payment required by §1.21004; &
8. Certification that the individual submitting the application is authorized

Short-Form Requirements

Financial Requirements for Participation

1. An applicant may be required to post a bond or place funds on deposit with the FCC in an amount based on the default payment that may be required by §1.21004

2. The details of & deadline for posting such a bond or making a deposit will be announced by public notice

3. No interest will be paid on any funds placed on deposit

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Short-Form Requirements

Operational Questions

Operational History - Has the applicant previously deployed consumer broadband networks? If so:

1. *Provide the dates when broadband service was offered & in which state(s)*

2. *Provide an estimate of the number of subscribers by state*

3. *What services (e.g., voice, video, broadband Internet access) were or are provided in each state?*

4. *List any data-usage limit (data cap) for existing broadband access services*

5. *Specific technologies & network architecture used for last-mile; middle-mile/backhaul; & internet interconnections*

6. *What are the deployed voice technologies & how are these voice services implemented?*

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Short-Form Requirements

Network Infrastructure

1. *Provide a description of which network architectures & technologies will be used. Note any variations*

2. *What are the relevant topologies, technologies & protocols & the corresponding industry standards for:*

    1. Last-mile;

    2. Middle-Mile/Backhaul; &

    3. Internet Access?

3. *Additional disclosures if the applicant is proposing to use non-standard technologies & protocols*

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Short-Form Requirements

Describe the anticipated system(s) that will be used to provide voice services, such as:

1. *internally designed & operated;*

2. *provided by a Managed Voice Service Provider; or*

3. *an OTT (Over-The-Top) solution available to subscribers via the applicant*

4. *If the applicant is considering multiple solutions, provide information on each one & identify possible vendors or service providers*

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Short-Form Requirements

1. Demonstrate that the technology & engineering design supports the proposed performance tier, latency & voice service requirements for the requisite number of locations during peak periods

2. Describe the capabilities of the network technologies that will deliver speed & usage allowance, latency & voice service mean opinion score (MOS)

3. State the target/design peak period over-subscription ratio(s) for the last-mile, middle-mile/backhaul & Internet interconnection with basic assumptions & calculations

4. How will the applicant determine if any portion of the network infrastructure needs to be improved, upgraded or expanded to meet requirements?

5. Network Buildout: Demonstrate that all network buildout requirements to achieve all service milestones can be met

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Short-Form Requirements

Network Management

A. Methods to monitor, operate, problem resolution, provision & optimize the network & associated services; source(s) of such functions (Must specifically address voice operations)

B. If the applicant will expand existing network management systems, describe how the current system provides successful operations

C. If the applicant will use a third-party network management provider, identify any providers the applicant is currently considering

D. If the applicant will operate its own system, demonstrate that it can provide internally developed operations systems for provisioning & maintaining the proposed network and provide customer services within budget & service milestones

   A. *If not, demonstrate that potential vendors, integrators & other partners are able to meet requirements*

   B. *Describe concisely the information & sources of such information supporting these responses*

E. Special disclosures for satellite operators

RDOF is a <u>RACE</u>

We're here to help you win.

TODAY'S FOCUS:

PREPARATION
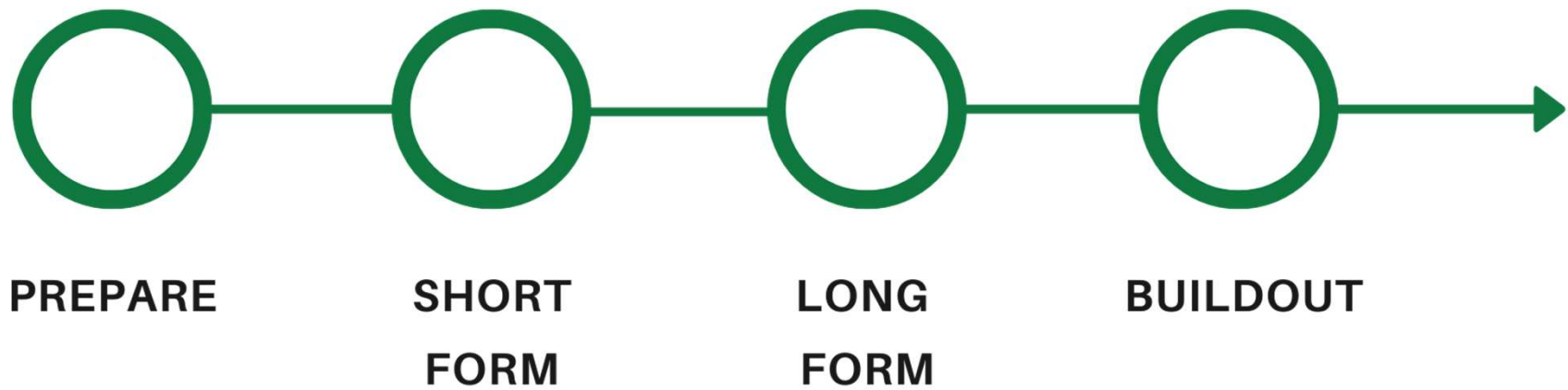
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Phases of the Race

PREPARE   SHORT FORM   LONG FORM   BUILDOUT

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RDOF Preparation Checklist

❑ Learn the Rules

❑ Size Up the Competition

❑ Know Your Numbers

❑ Put it All Together

PREPARE   SHORT FORM   LONG FORM   BUILDOUT

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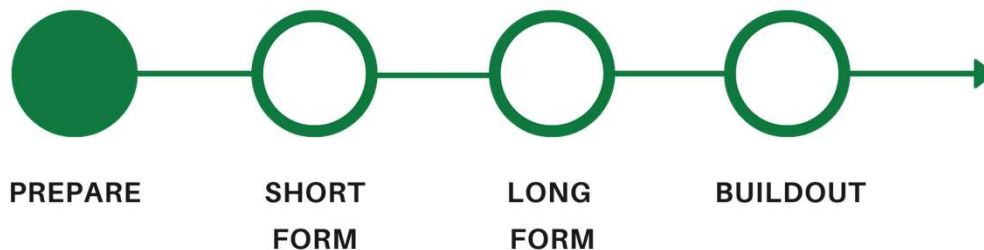
Step 1:
Learn the Rules

- Review RDOF Order/Rules
- Identify eligible geographic areas of interest (we like CBG)
- Determine how you will handle reporting obligations

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Step 2:
Size Up the Competition

- Identify competitors in target bid areas

- Estimate likely competitor bids

- Weight competitor bids by performance tiers

Key Inputs: Service availability, proximity, O&M burden by technology

Step 3:
Know Your Numbers

- Measure proximity of your infrastructure to eligible locations

- Estimate your costs to deploy & maintain

- Determine where you'd fall in Weight and Performance Tiers

Key Inputs: Eligible Locations, proximity, O&M burden

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Step 4:
Put it All Together

- Compare your cost vs. Competition

- Compare likely performance weighting

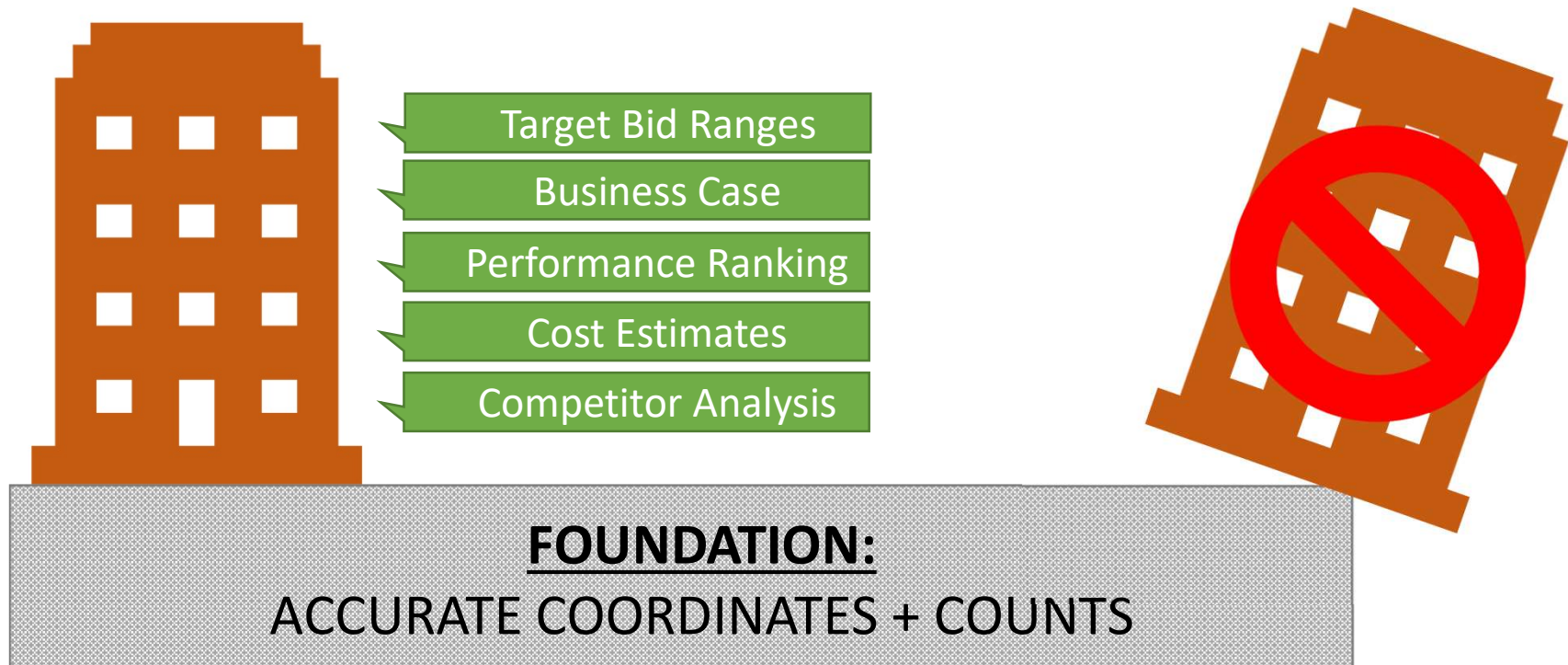- Score and prioritize (ex. by cost advantage, reserve amount, performance advantage)
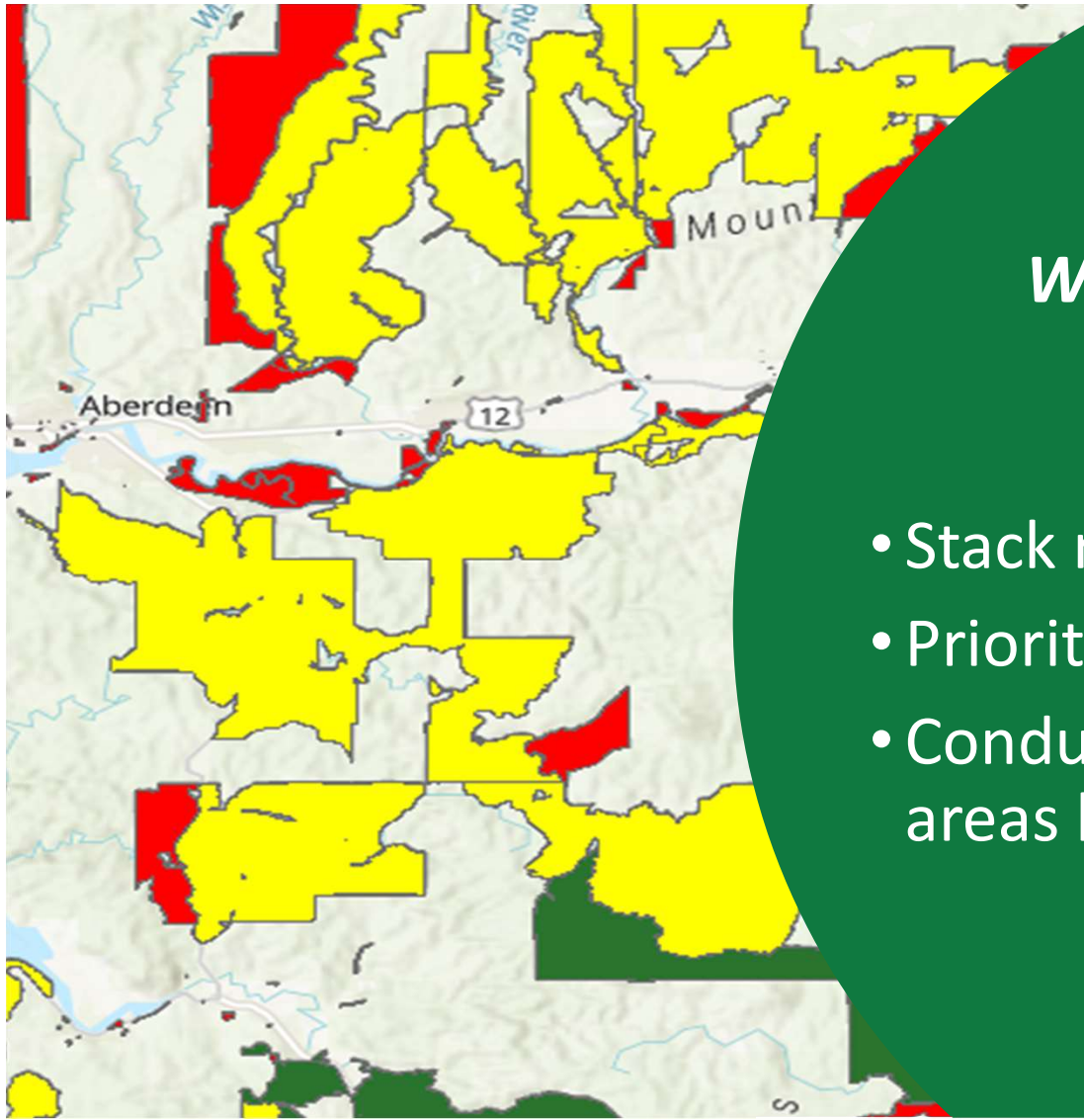
What it Could Look Like

- Stack rank Census Block Groups
- Prioritize areas based on data
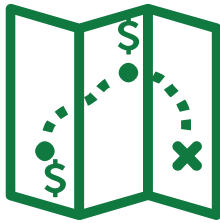- Conduct further analysis only in areas best for your business

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Where You Start: Precise Location Data

Where You Start – Precise Location Data

Target Bid Ranges

Business Case

Performance Ranking

Cost Estimates

Competitor Analysis

FOUNDATION:
ACCURATE COORDINATES + COUNTS

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CQABroadbandFabric
Built for Broadband. Built for Rural.

How We Can Help

- **Vetted Locations** in all RDOF-eligible areas, with rooftop coordinates

- **Cost & Investment Data** for all areas of interest, including estimated reserve amounts

- **Competitor Analysis** including estimated performance tier rankings and relative cost

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Sample: RDOF Census Block Group

Where are the 395 locations?

Auction 904 Initial Eligible Areas - WA

state	WA
geoid	530270004005
FCC_Locations	395
Reserve_Prices	396958

RDOF Eligible CBG

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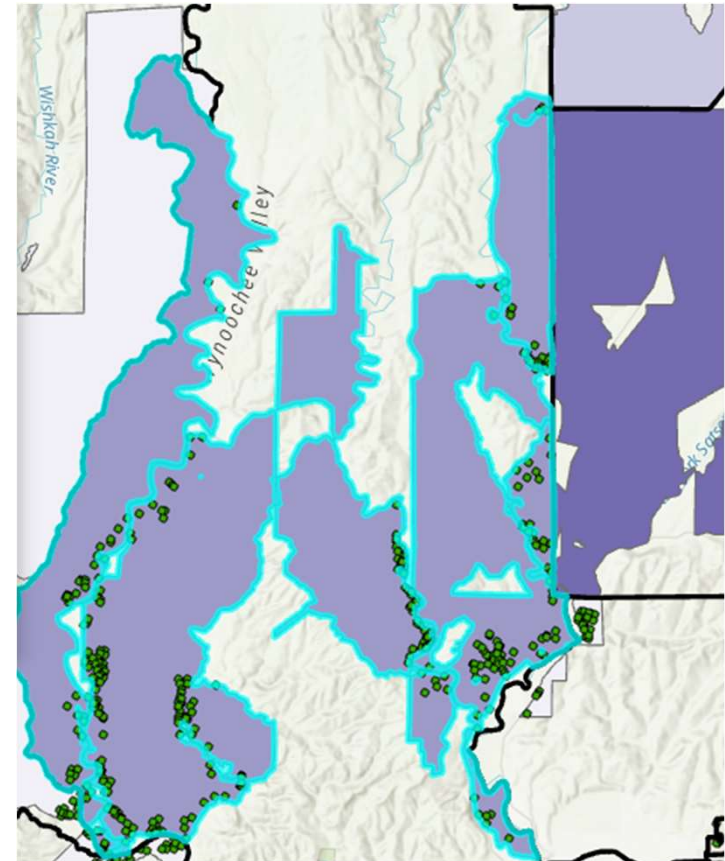
Sample: RDOF Census Block Group

We found rooftop coordinates for 378.

| Auction 904 Initial Eligible Areas - WA	
state	WA
geoid	530270004005
FCC_Locations	395
Reserve_Prices	396958
Fabric_Locations	378
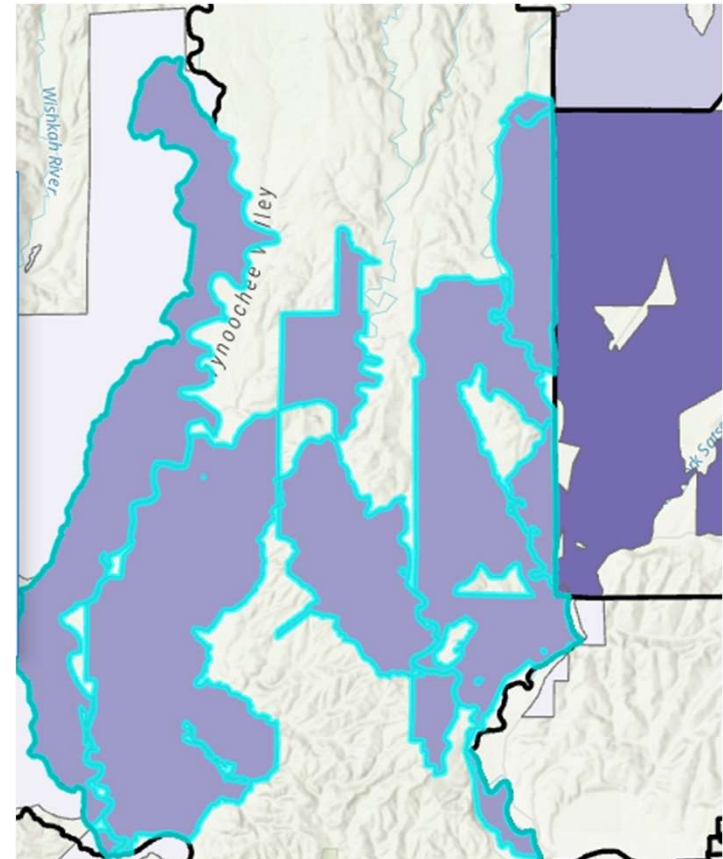
RDOF Eligible CBG

Sample: RDOF Census Block Group

Accurate locations enables accurate estimates for:

Proximity of your infrastructure

Cost to deploy + maintain

Potential Revenue in area
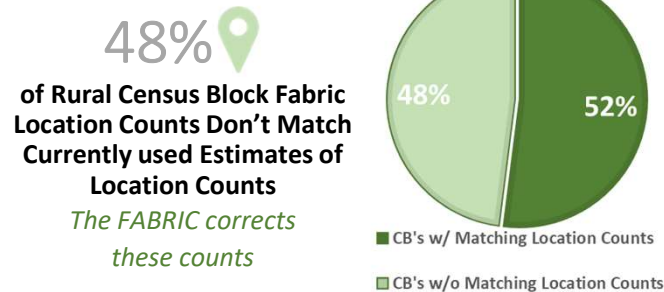
Optimal Network Designs by technology type

RDOF Eligible CBG

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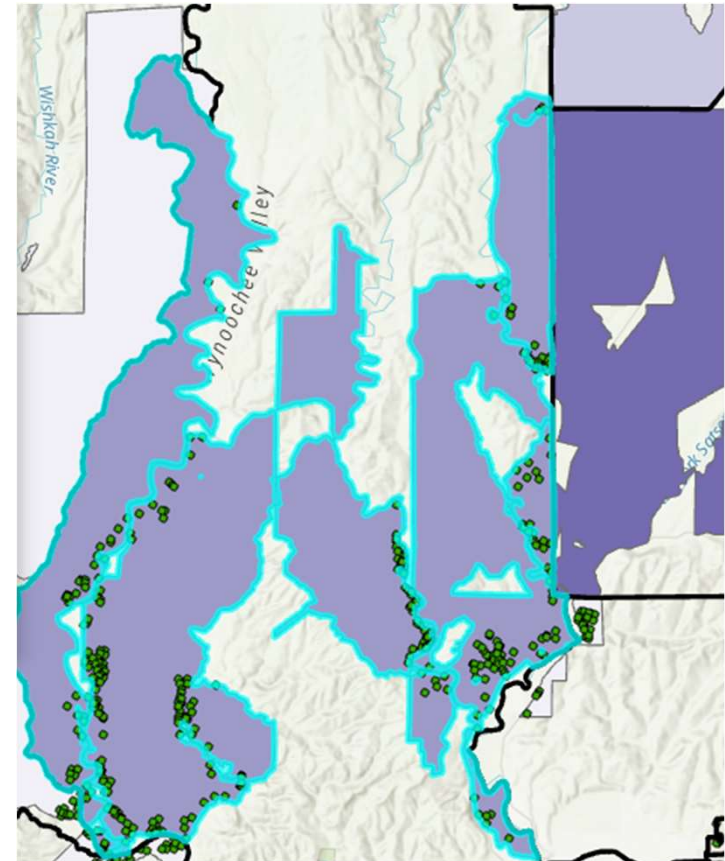
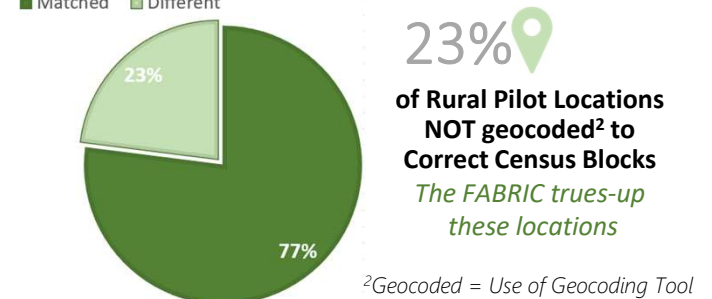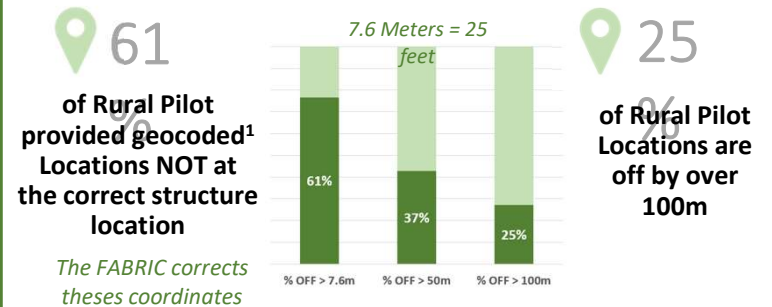# Key Pilot Findings - <u>Rural</u> Missouri & Virginia

Key Findings

[1] Not every broadband provider chose to participate in this Pilot, so the actual number of unserved may be lower.

RURAL LOCATION COUNTS

38%
of total Rural Locations in Census Blocks reported to be served are UNSERVED[1]
The FABRIC identifies unseen locations

445,000+

48%
of Rural Census Block Fabric Location Counts Don't Match Currently used Estimates of Location Counts
The FABRIC corrects these counts

48% / 52%
■ CB's w/ Matching Location Counts
■ CB's w/o Matching Location Counts

RURAL DISTANCE DIFFERENCES

61%
of Rural Pilot provided geocoded[1] Locations NOT at the correct structure location
The FABRIC corrects theses coordinates

7.6 Meters = 25 feet

61% — % OFF > 7.6m
37% — % OFF > 50m
25% — % OFF > 100m

■ Matched ■ Different

25%
of Rural Pilot Locations are off by over 100m

23%
of Rural Pilot Locations NOT geocoded[2] to Correct Census Blocks
The FABRIC trues-up these locations

23% / 77%

[2] Geocoded = Use of Geocoding Tool

Bottom Line

The FABRIC greatly improves the accuracy of Census Block location counts

The FABRIC provides much improved accuracy for location coordinates

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Have Questions?

Get in touch:

broadbandfabric@costquest.com

Timeline for RDOF Phase I? Look at CAF II

CAF II ("Auction 903")

- Ran from July 24, 2018 to August 21, 2018
- 103 bidders, for 700,000 locations in 45 states

RDOF Phase I ("Auction 904")

- August 1, 2019 – Notice of Proposed Rulemaking
- February 7, 2020 – Order
- March 2, 2020 – Proposed Bidding Procedures
- March 17, 2020 – Map of Preliminary Eligible Areas
- 4 p.m. TODAY - FCC Webinar, with TBDs filled in:
- *Challenge Period, then Publication of Final Map*
- *Short Form Deadline*
- *Mock Auction*
- *Auction Date(s)*
- *Long-Form Deadline*

The CommLaw Group Can Help

Auction experience

- FCC licensing, and spectrum access strategies
- Auction and bidding strategies and procedures
- Secondary market practice and procedure
- Spectrum leasing
- FCC authorizations and disputes; regulatory classifications

Law and policy around broadband deployment and mapping

- Form 477; Emerging Digital Opportunity Data Collection
- Using broadband maps to enable strategic decision-making
- State CLEC / ETC / CPCN certifications
- Work with mapping partners to navigate RDOF opportunities

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Service Tiers and Latency (T+L) Weights

- Think of speed tiers and latency as weights (or "drag") on bid
- Speed Tiers in RDOF, Phase I
    - **25 Mbps / 3 Mbps = weight 50.** *Usage >+ 250 GB*
    - *50 Mbps / 5 Mbps = weigh 35. Usage >+ 250 GB*
    - **100 Mbps / 20 Mbps = weight 20.** *Usage >= 2 TB*
    - *1000 Mbps /500 Mbps = weight 0. Usage >= 2 TB*
- Latency in RDOF, Phase I
    - *High latency = weight 40. Still must be <= 750 ms & MOS of >= 4*
    - *Low latency = weight 0. Must be <=100 ms.*

How T+L Weight Will Affect Your Bid

Weights for Performance Tiers and Latencies							
Minimum		Baseline		Above Baseline		Gigabit	
High Latency	Low Latency	High Latency	Low Latency	High Latency	Low Latency	High Latency	Low Latency
90	50	75	35	60	20	40	0

Implied Annual Support Amount (at the clock percentage) $= \min \left\{ R, \left(\frac{C - (T + L)}{100} \right) R \right\}$

where:

R denotes the area's reserve price
T denotes the tier weight
L denotes the latency weight
C denotes the clock percentage

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No Proposed Modification to Rules Governing Communications

- 47 CFR 1.21002(a) and (b):

- "Applicant" – applicant, party capable of controlling the applicant, and each party that may be controlled by the applicant or by a party capable of controlling the applicant.

- Prohibited Communication – After the deadline for submitting application ("Short Form"), applicant prohibited from:

  – *Cooperating or collaborating with any applicant*

    - Regarding its own

    - One another's, or

    - Any other competing applicant's bid

  – *Communicating with any other applicant in any manner the substance of its own, or one another's, or any other competing applicant's bid or bidding strategies, until after the post-auction deadline for winning bidders to submit applications for support ("Long Form").*

Long Form Versus Short Form

Short Form is for Bidders. Long Form is for Winning Bidders.

Elements of Long Form ("Form 683")

- Additional information about qualifications, funding and technical details about the network.

- A letter from an eligible bank committing to issue a letter of credit.

- Within 180 days of being announced as winning bidders, certify that they are Eligible Telecommunication Carriers in any areas for which they seek support

Timeline of Deployment in RDOF Award

- 10 years support in equal monthly installments
- One voice and one broadband service
- 40 percent of required location in a state by end of third year
- Additional 20 percent (80 percent total) by end of fourth and fifth years
- Revised location totals by end of year six
- 100 percent deployment by end of year eight
- All support location serve newly build location after the revised total but before end of year eight upon reasonable request
- Carriers determine deployment schedules
- File USAC annual reports

Compliance

Universal Service Administrative Corporation:

- Any time that a service provider is designated as an ETC by a state or the Commission, the Universal Service Administrative Company (USAC) will assign that service provider a SAC before the provider begins receiving universal service support.

- Form 477 Compliance

- Compliance with Lifeline requirements

- Other Forms?

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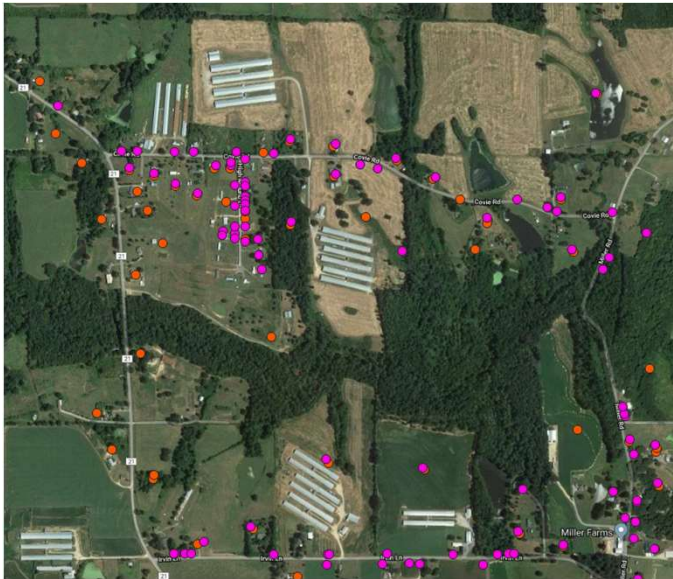www.CommLawGroup.com

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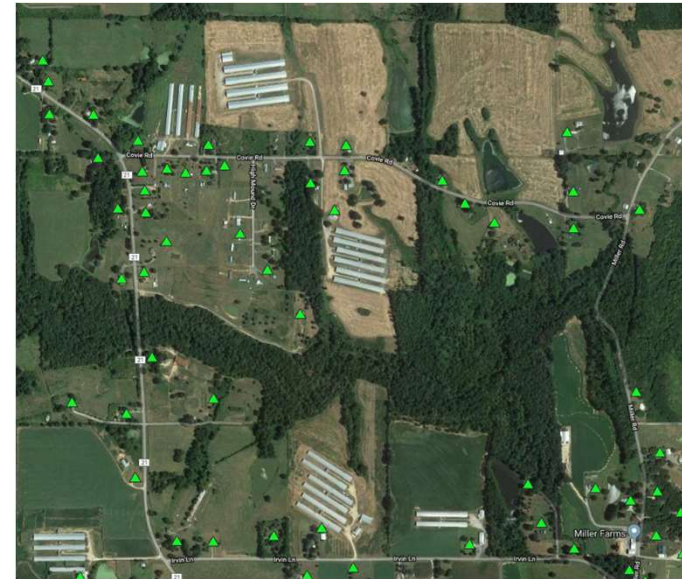**M&D MARASHLIAN & DONAHUE, PLLC**
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Appendix: Additional Information About the Fabric

# Where the Fabric Makes a Difference: Service Locations

Dots shown represent the results of entering the same service addresses into two geocoders. It is unclear how many locations exist in this area or where service would be installed.

The Fabric uses multiple data sources to better identify the locations (green triangles) of homes and businesses that would need service.

Where the Fabric Makes a Difference: Counting Locations
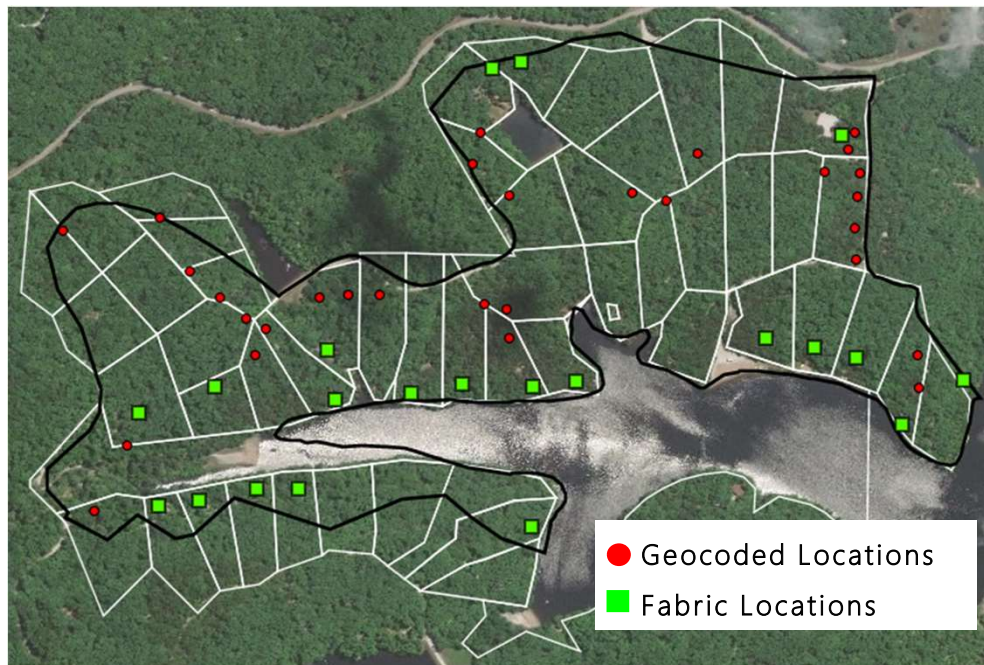
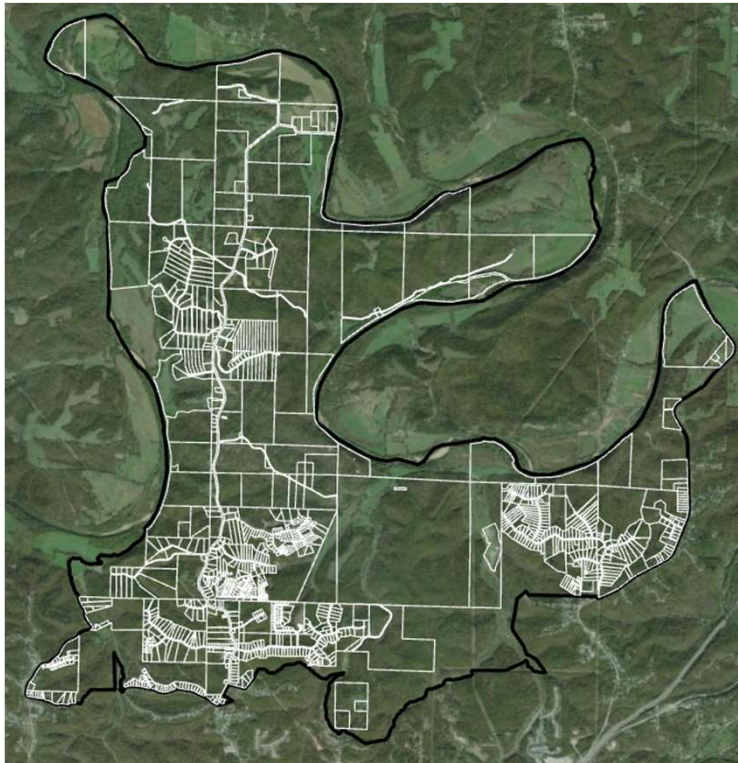Visual inspection suggests Fabric count is more realistic

The number of locations identified for the same census block can vary substantially depending on the data source.

In this example, there is a 55% differential in location counts:

- 2011 Census Housing Units = 47
- Fabric Locations = 21

Are all the locations served?

Legend:
- ● Geocoded Locations
- ■ Fabric Locations

Where the Fabric Makes a Difference: Counting Locations

The number of locations identified for the same census block can vary substantially depending on the data source and data vintage.

In this example, there is a 32% differential in location counts:

- 2011 Census Housing Units = 260

- Fabric Locations = 380

The Fabric identified 120 additional locations beyond build out requirements

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# Where the Fabric Makes a Difference: Accurate Geocoding

Geocoded vs. Fabric Locations

Geocoding in rural areas often identifies a latitude/longitude at or near the roadside. The Fabric generates a latitude/longitude specific to the rooftop of each structure.

In this example, the difference for just eight locations submitted to the HUBB was over 521 meters (1709 feet).

Structure-accurate coordinates can support location reporting and network planning

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Missouri Location Distance Differential: Geocoded[1] vs. Fabric

Distance Differential – Geocoded locations vs. Fabric locations

Locations with 1,000m+ differential excluded as outliers
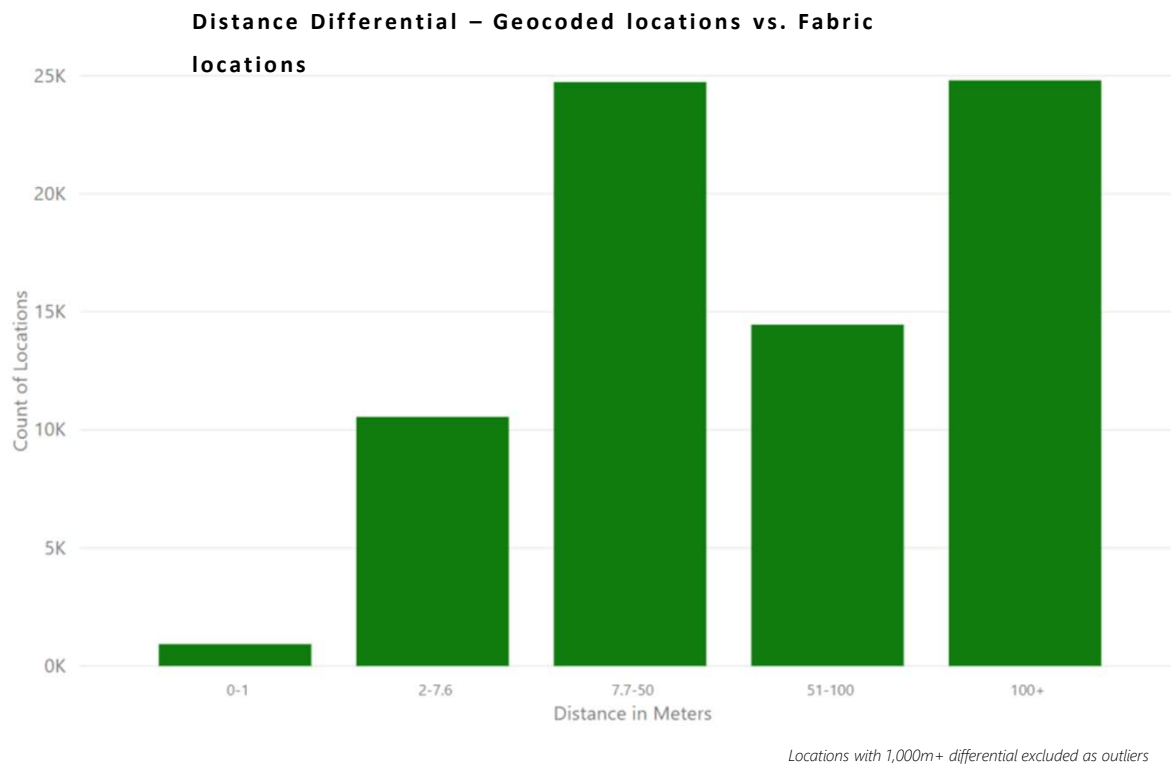
Key Findings

- 84% of geocoded locations > 7.6m from Fabric locations
- 55% of geocoded locations > 50m from Fabric locations

Average distance between geocoded & Fabric is ~130m

Context
7.6 meters is the HUBB accepted margin of error to determine if a filed location is in an eligible area. A difference of more than 50 meters could represent a different location, a different eligible census block, or skew build costs and network designs.

[1] *These locations, many of which were geocoded by a geocoding tool, were sourced from HUBB data as a point of comparison for this study.*
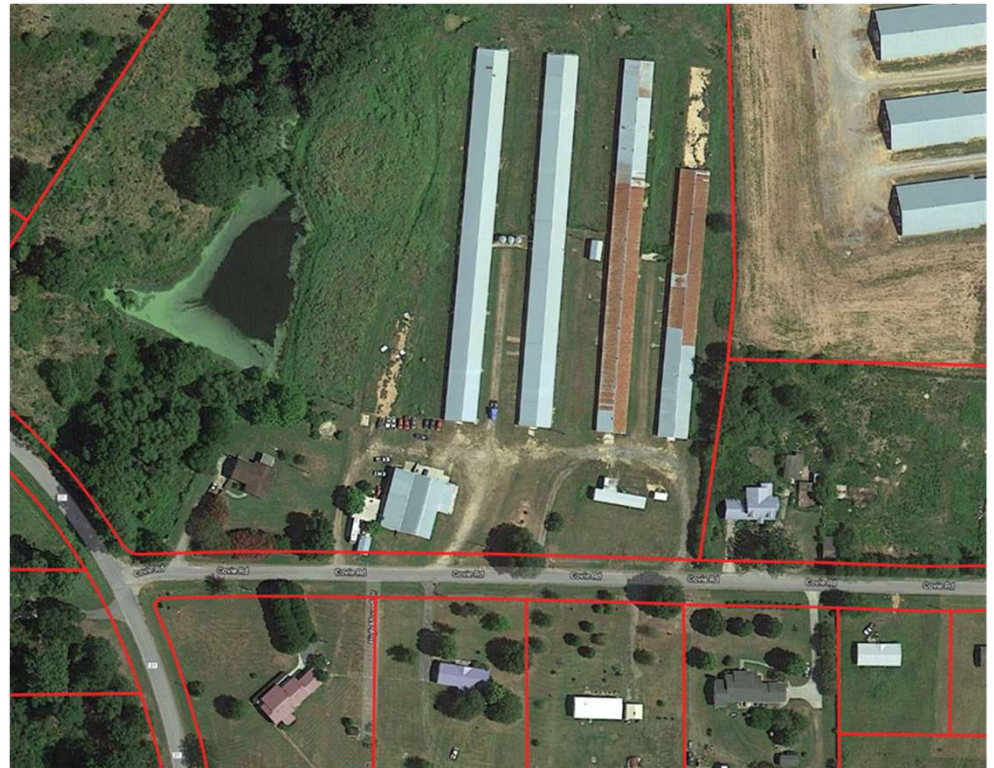
How the Fabric is Created

- Goal: Identify the structure(s) needing service
- Challenges:
  - Secondary structures (barns, garages, etc.)
  - Addresses aren't automatically geo-referenced
  - Defining what structures are "serviceable" or funded needs to be clearly defined by policymakers
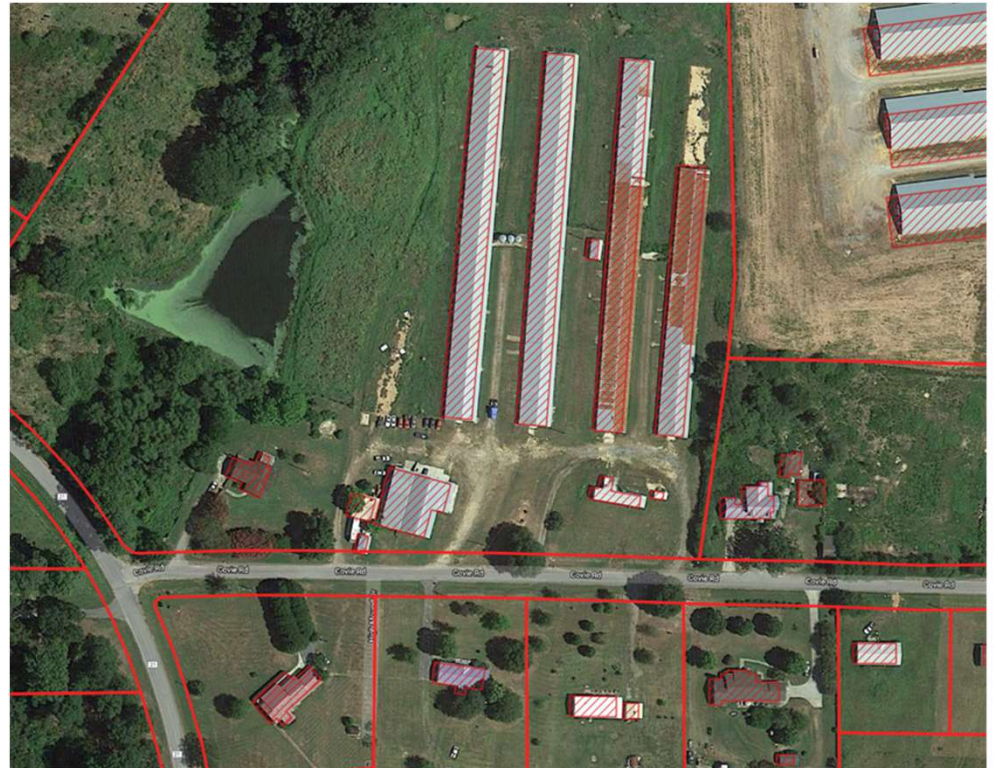
How the Fabric is Created

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.

How the Fabric is Created

Step 2:

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

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How the Fabric is Created

Step 3:

- Using parcel attribute data and building footprints, logic is applied parcel by parcel to interrogate and aggregate data

- The Fabric identifies serviceable structure(s), circled, on each parcel

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The Fabric Compared to Geocoders

Shown: Results of the Fabric compared to two geocoders

- Geocoder A (pink dots) missed two locations and added two extra

- Geocoder B (orange dots) missed four locations

- Poor and inconsistent geocoding hampers deployment, customer service, and compliance reporting