Oklahoma Broadband Locations and Mapping
An Overview of Data and Services CQA will Provide the State of Oklahoma

October 2019
Agenda

• Who is CQA?
• Overview of Contract
• Overview of the Broadband Serviceable Location Fabric
• Other Potential Efforts
  • Unserved/Costs in Oklahoma
  • Potential Efforts to Identify and Target
CostQuest Associates

• 20 Years in Telecommunications
• Based in Cincinnati and Seattle
• Governmental Work
  • FCC
    • National Broadband Plan
    • Connect America Fund
  • States
    • Broadband Mapping
    • Cost Modeling
• Industry
  • Valuation and Appraisal
  • Data and Solutions
Overview of Contract
Contract

- Provide location detail of Broadband Serviceable locations across Oklahoma
- 1-Year license for Broadband Serviceable Location Fabric Data
- Potential for additional data and services
  - Service availability by location
  - Cost Model: Cost to serve and maintain networks to unserved areas
Overview of The Broadband Serviceable Location Fabric
**Overview:** The BSLF aggregates hundreds of millions of data points, applies statistical scoring, and managed crowdsourcing to pinpoint the exact rooftop locations of virtually every structure that is a candidate for broadband. The BSLF provides a foundation for precise location and service availability.
**Pilot (MO and VA):** The Pilot project, managed by CQA, is a collaboration between USTelecom, ITTA, WISPA, AT&T, CenturyLink, Chariton Valley, Consolidated, Frontier, Riverstreet, TDS, Verizon, and Windstream.
Pilot (MO and VA): The Pilot shows as many as 38% of additional rural locations are unserved in census blocks that would have been reported as “served” in today’s FCC Form 477 reporting approach. These locations are homes and businesses hidden from service providers and policymakers.
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

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?

Visual inspection suggests Fabric count is more realistic.
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*
Where the Fabric Makes a Difference: Accurate Geocoding

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*

Geocoded vs. Fabric Locations
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
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.
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
Key Pilot Findings - Rural Missouri & Virginia

**RURAL LOCATION COUNTS**

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

- **445,000+**

**RURAL DISTANCE DIFFERENCES**

- **61%** of Rural Pilot provided geocoded locations NOT at the correct structure location
  - The FABRIC corrects these coordinates

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

**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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1. Not every broadband provider chose to participate in this Pilot, so the actual number of unserved may be lower.
Missouri Location Distance Differential: Geocoded\(^1\) vs. Fabric

**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.
The Oklahoma Broadband Location Fabric

Version 1 of the Oklahoma Broadband Location Fabric is Done:

**Third Party Data Counts**
- **2,202,551** Parcels
- **3,028,180** Footprints

**Fabric Counts**
- Active and Non Active Fabric Counts
  - Active 693,370
  - Non Active 1,687,097

**Overall Score Factors**
- **97.7%** Attribute Linkage
- **79.1%** Active Fabric with Address

**Overall Quality Score by County**
- **73.4%** Overall Score
- **92.5%** New Score Total
- **77** Counties

Version 2:
- Visual Verification of more than 150,000 parcels
- Focus on improving Rural and Tribal Areas
- Updated OK BSLF by end of Oct.

Locations with 1,000m+ differential excluded as outliers
The Oklahoma Broadband Location Fabric

Version 1 of the Oklahoma Broadband Location Fabric is Done:

**Counties w/ Challenges:**
- 40007 Beaver
- 40129 Roger Mills
- 40053 Grant
- 40001 Adair
- 40023 Choctaw
- 40127 Pushmataha
- 40035 Craig
- 40029 Coal
- 40059 Harper
- 40069 Johnston
- 40005 Atoka

*Locations with 1,000m+ differential excluded as outliers*
Other Potential Efforts/Considerations
State of Broadband in Oklahoma: The Low-Resolution View

OK Demographics and Investment Cost

<table>
<thead>
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<th>SpeedSource</th>
<th>Type</th>
<th>CBs w/ HU</th>
<th>Total Investment</th>
<th>Residential Population</th>
<th>Residential Housing Units</th>
<th>Residential MDU</th>
<th>Business Locations*</th>
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</table>

Total: 269,118 CBs, 1,483,095,078 Total Investment, 3,923,561 Residential Population, 1,721,045 Residential Housing Units, 50,420 Residential MDU, 184,230 Business Locations*

Coverage % of Residential HUs

Demographics

% of Unserved Residential HUs by County
Other States and Best Practices

CQA is currently working with...

- Arkansas
  - BSLF
  - Service Availability Data
  - Cost Model
  - Broadband Map

- California
  - Cost Model
  - RDOF Data
  - BSLF
  - Fund Design

- South Carolina
  - BSLF
  - Service Availability Data
  - Cost Model
  - Broadband Map

- New York
  - Cost Model
  - Auction Design
  - Build-out Validation