Broadband in Missouri
A closer look at coverage data

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AGENDA

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

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 (Geosensus) is through Q3 of 2017. Some Census Blocks had no financial data. Business locations includes Small Offices or Home Offices.

<table>
<thead>
<tr>
<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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</thead>
<tbody>
<tr>
<td>Served</td>
<td>R</td>
<td>48885</td>
<td>0</td>
<td>996,187</td>
<td>571,153</td>
<td>58,049</td>
<td>106,459</td>
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<td>Served</td>
<td>S</td>
<td>72322</td>
<td>0</td>
<td>3,005,523</td>
<td>1,755,131</td>
<td>126,645</td>
<td>370,527</td>
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<td>0</td>
<td>194,750</td>
<td>121,145</td>
<td>7,778</td>
<td>17,124</td>
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<tr>
<td>Underserved</td>
<td>R</td>
<td>69926</td>
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<td>12,926</td>
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<td>Underserved</td>
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<td>2043</td>
<td>32,856,042</td>
<td>23,166</td>
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<td>10,442</td>
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<td>13,492</td>
<td>8</td>
<td>4</td>
<td>0</td>
<td>16</td>
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<tr>
<td>Unserved</td>
<td>R</td>
<td>63732</td>
<td>1,417,000,422</td>
<td>595,754</td>
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<td>10034</td>
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<tr>
<td>Unserved</td>
<td>U</td>
<td>5</td>
<td>64,283</td>
<td>64</td>
<td>27</td>
<td>3</td>
<td>126</td>
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<tr>
<td>Total</td>
<td></td>
<td>206230</td>
<td>1,740,830,315</td>
<td>5,547,189</td>
<td>3,034,264</td>
<td>273,239</td>
<td>597,157</td>
</tr>
</tbody>
</table>

**Percentage Served by Census Block**

- **343565** Total CBS
- **135441** CBS with No HUs

**Residential Population by County**

**Business Locations by County**

**Total Investment for Unserved by County**
Sizing the issue - CAF 2 Auction Results

![Graph showing speeds provided and awarded carriers]

**States:**
- MN
- MO
- MS
- MT
- NC
- ND
- NE
- NJ
- NM
- NV
- OH
- OK
- OR

**Row Labels:**
- Above Baseline: 73.53%
- Baseline: 4.27%
- Gigabit: 22.20%
- Grand Total: 100.00%

**Awarded Carriers:**
- 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: 68,289/17,631,941
- 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
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?

CQA
Model • Measure • Manage
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
The Fabric - How it works
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
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
The Fabric – Output

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