BUILT ON DATA

The Role of the National Fabric in Federal BEAD, BDC and Other Programs

September 5, 2024

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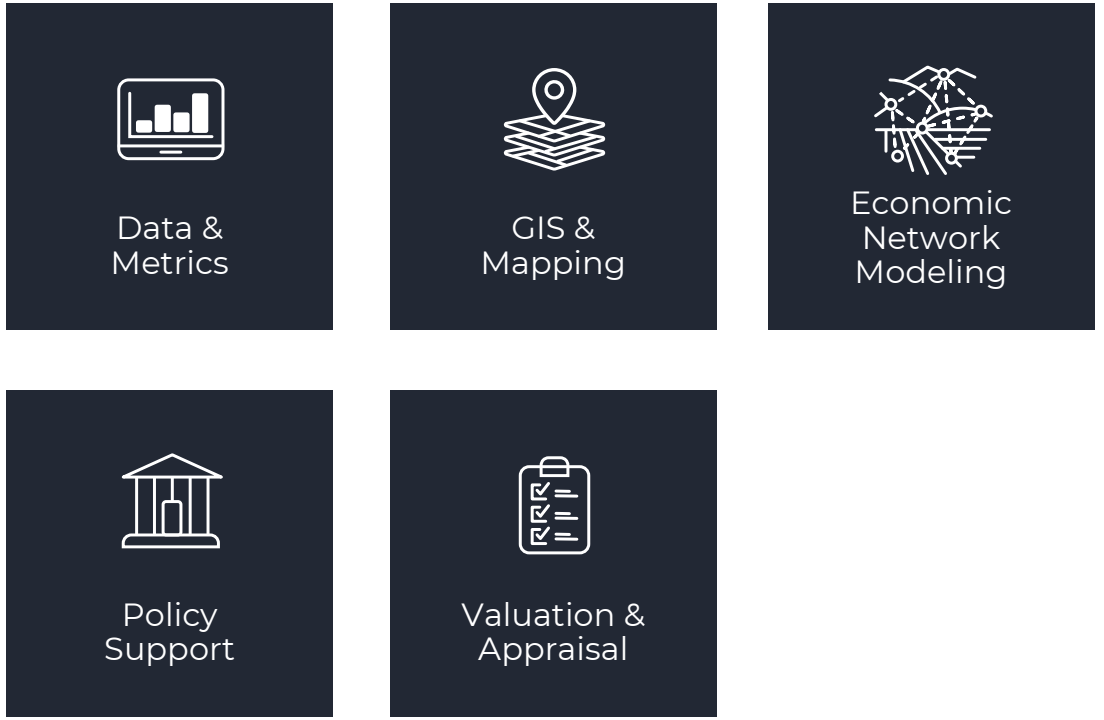
CostQuest Associates

Cincinnati | Seattle | Washington D.C.

CostQuest Associates is a broadband consulting firm made up of economic network modeling, valuation, and data science experts.

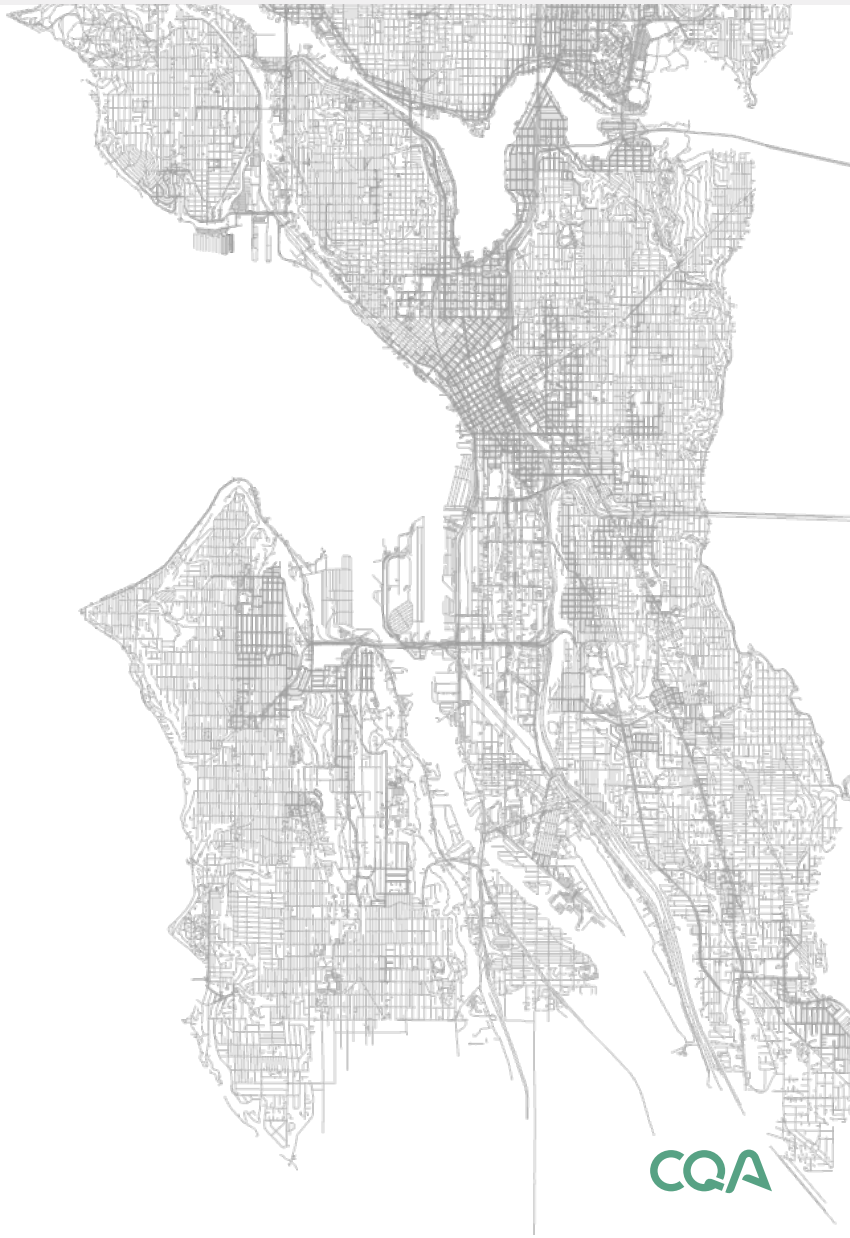
We are the National Fabric Provider for FCC, NTIA, and Federal Granting Programs.

Contracted with federal agencies and several State Governments to support broadband mapping and grant management functions for broadband deployment projects.



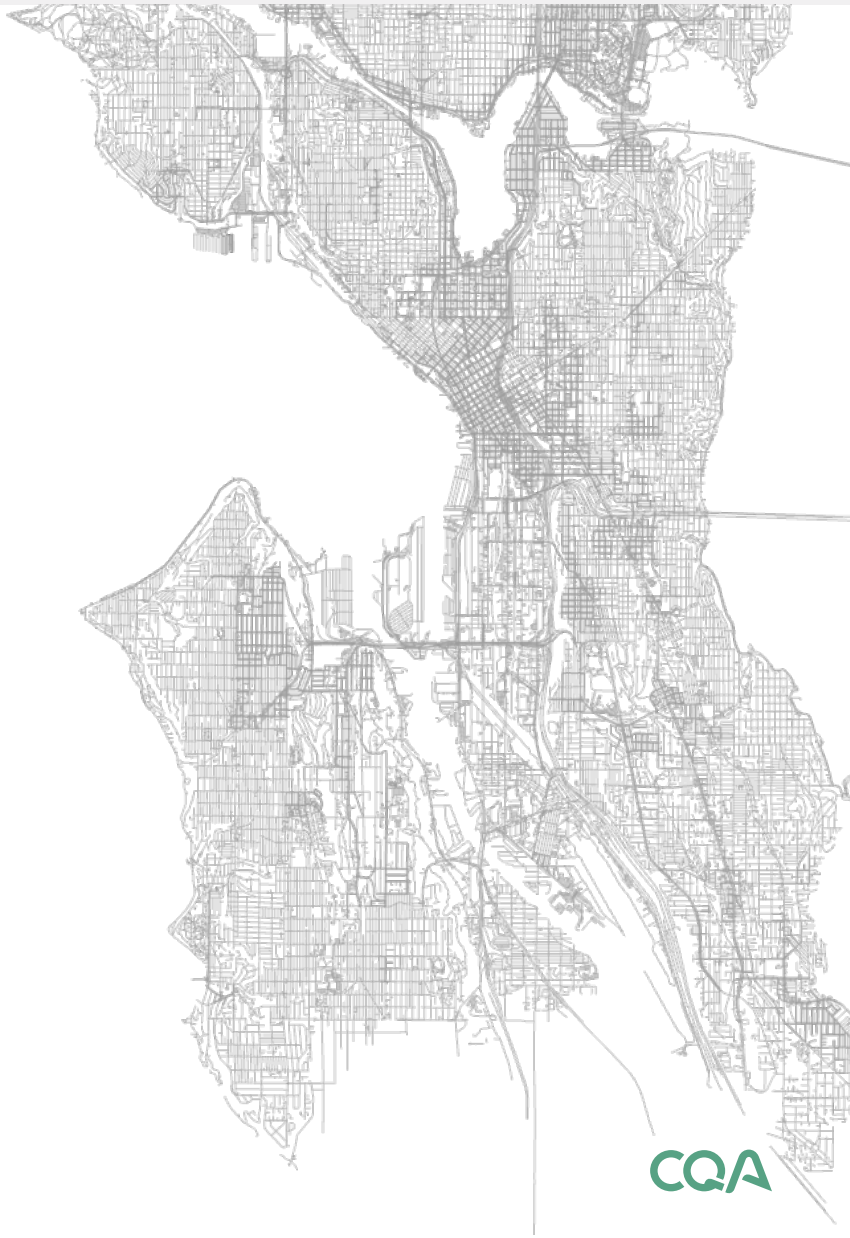
Question 1

How many of you are familiar with the National Broadband Serviceable Location Fabric?



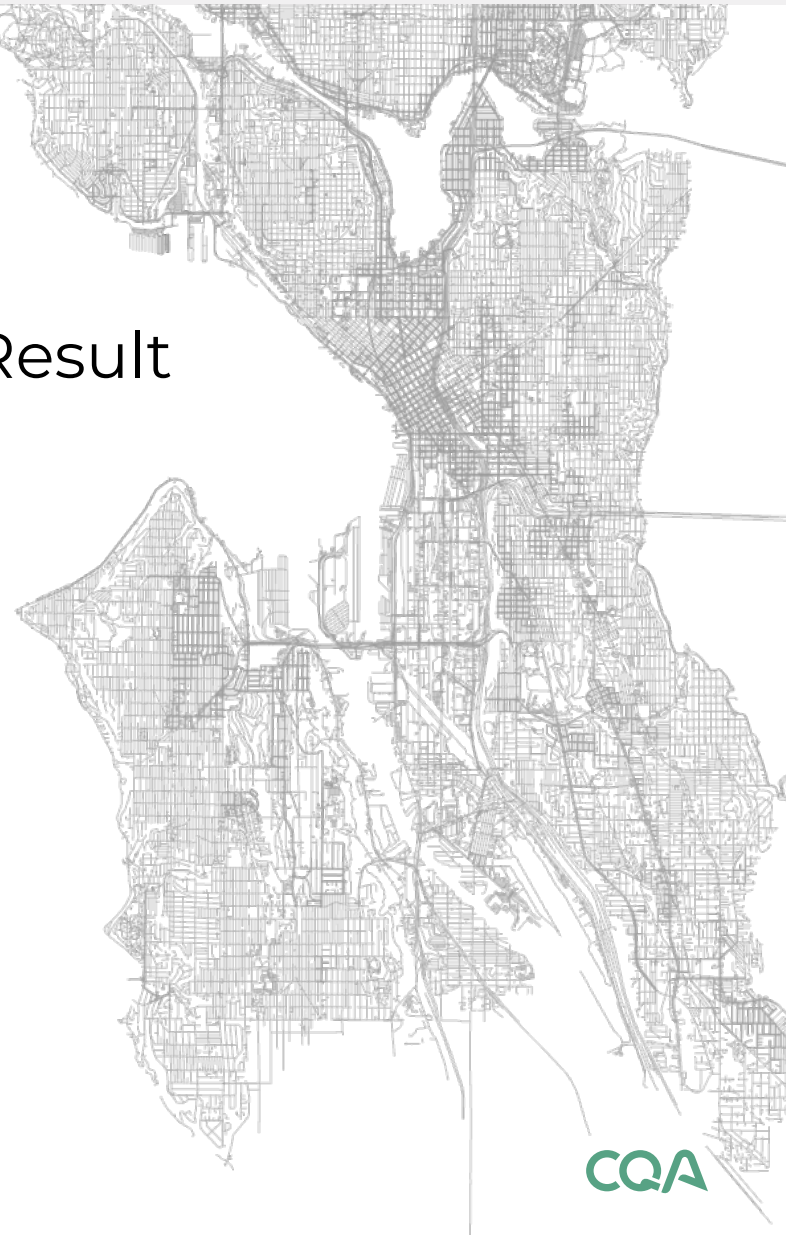
Question 2

How many of you are thinking of applying for BEAD funding?

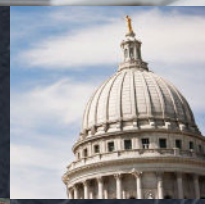


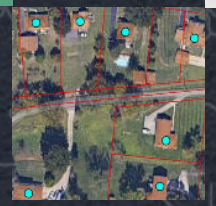
Agenda

- Broadband Mapping – Problem, Solution, and Result
- Fabric Overview
- Fabric Versioning
- Fabric in BDC & FCC Programs
- Fabric in BEAD & Other Programs
  - Fabric BSLs in BEAD



Broadband Mapping:
Problem, Solution, Result





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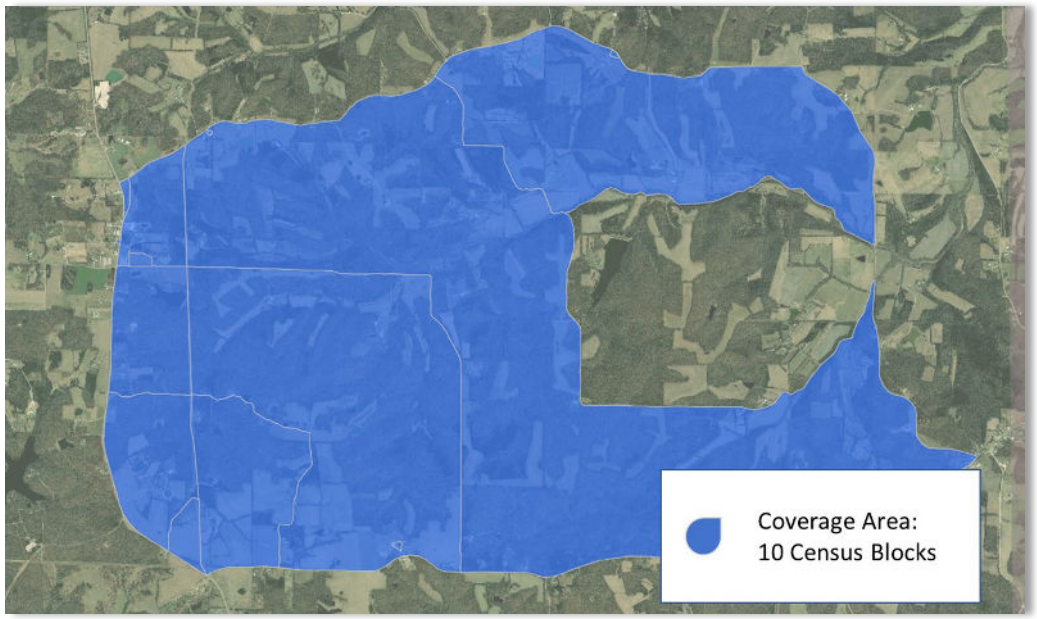
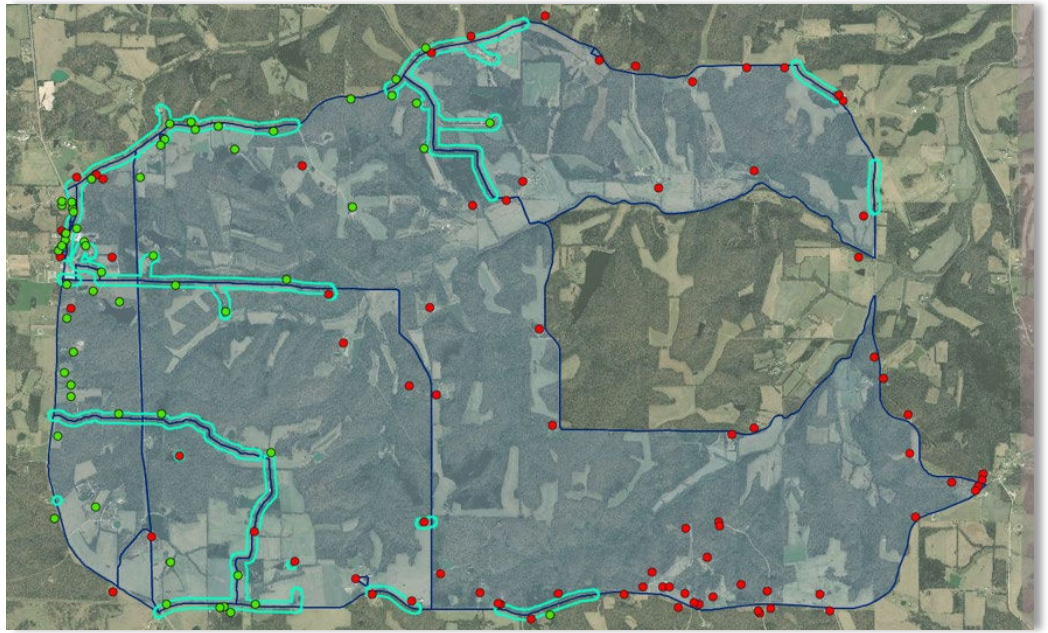
Broadband Mapping Problem – Form 477

- If one location was served in a Census Block – then all the locations in that CB was considered 'Served" – even if there were 'Unserved' locations.
- Mapping at the CB vs location-level was leaving unserved locations behind – creating the "One Served, All Served" problem.
- Initiated the Granular Broadband Mapping Pilot – Proof of Concept for Location-Level Mapping



10 'Served' CBs



Pilot Found 'Unserved' Locations in these CBs

The Path to a National Broadband Map – Solution

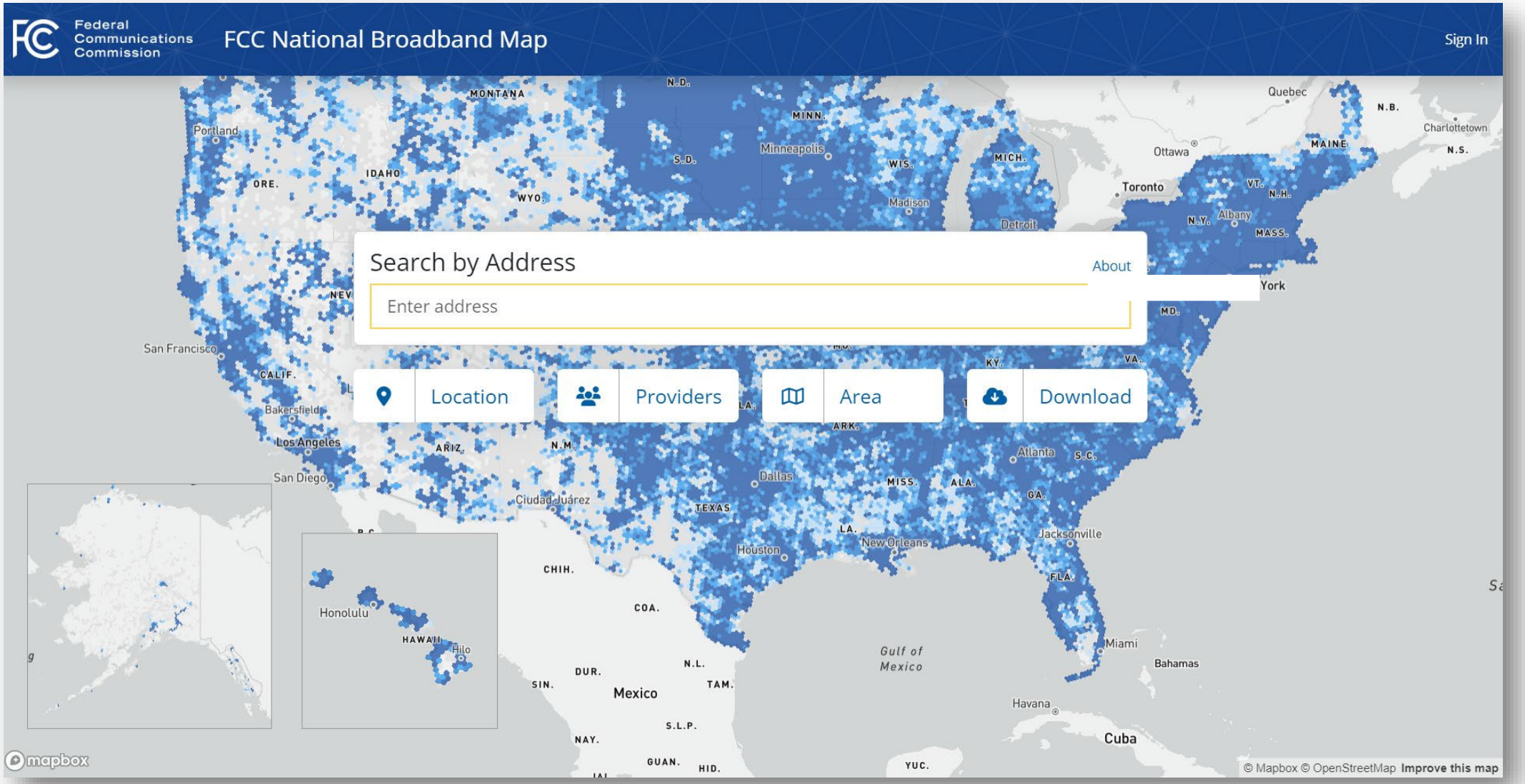
With Bipartisan sponsorship, Congress passed the Broadband Data Act in 2020

- Set out to "create a common dataset of all locations in the US where fixed broadband internet access service can be installed" & a more granular data collection method of broadband coverage

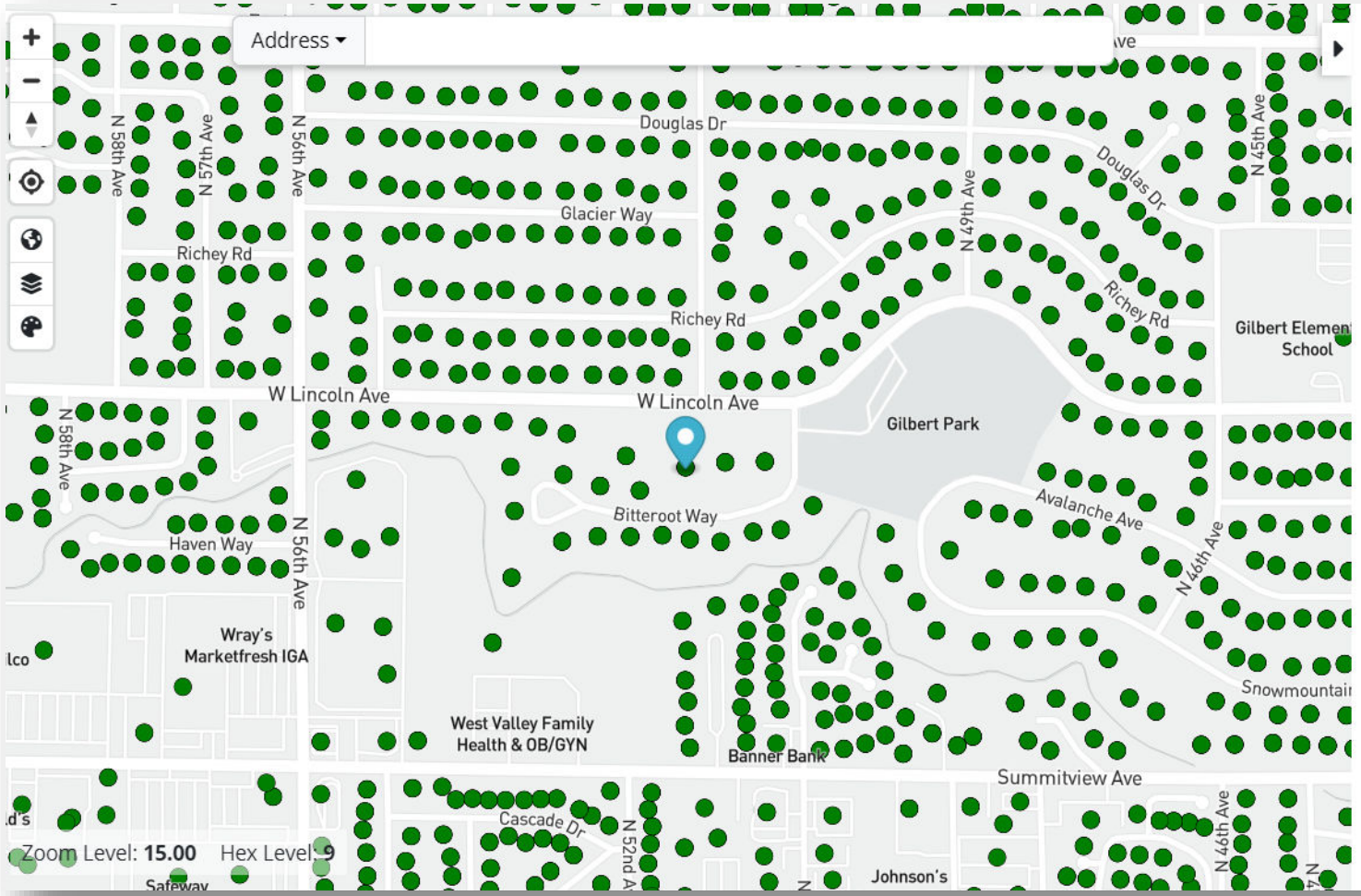
The Broadband Data Act:

- Outlined the collection of broadband coverage at the location level (the FCC)
  - Set the timeline as a "Biannual collection"
  - Replacement of 477
- Outlines the basis of the Fabric (CostQuest):
  - The Fabric shall contain geocoded information for each location, serve as the foundation upon which all data relating to the availability of fixed broadband internet access service shall be reported and overlaid
- Created the challenge process
  - Include a process for verifying the data submitted through the challenge process in order to ensure the reliability of the data
  - Develop a process through which entities or individuals may also challenge service provider information

The Result – First Location-Level National Broadband Map



The Result – First Location-Level National Broadband Map



Fixed Broadband | Mobile Broadband

Selected Location Location Challenge

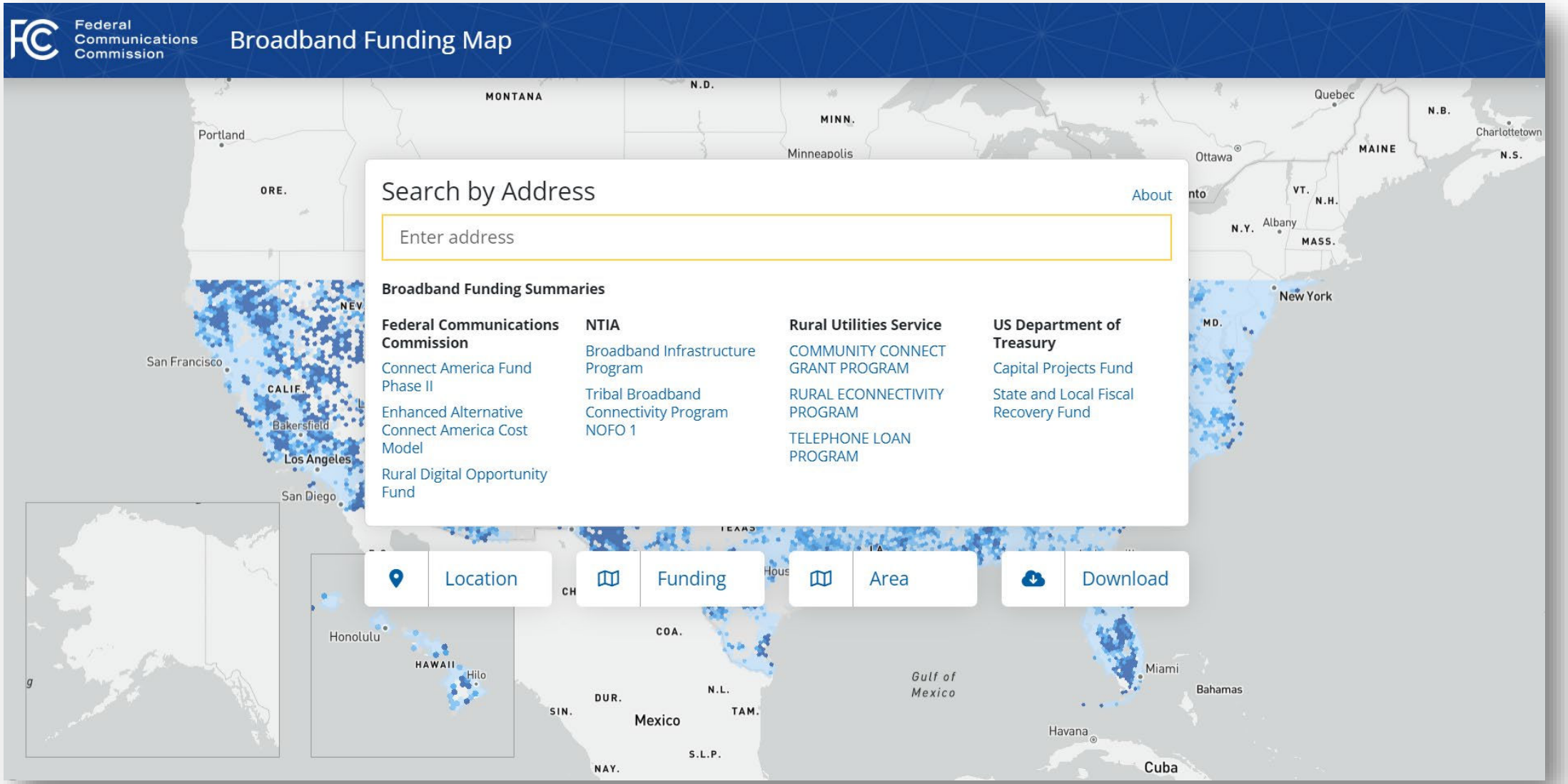
YAKIMA, WA 98908

Status: **Served** | Residential | Unit Count: 1

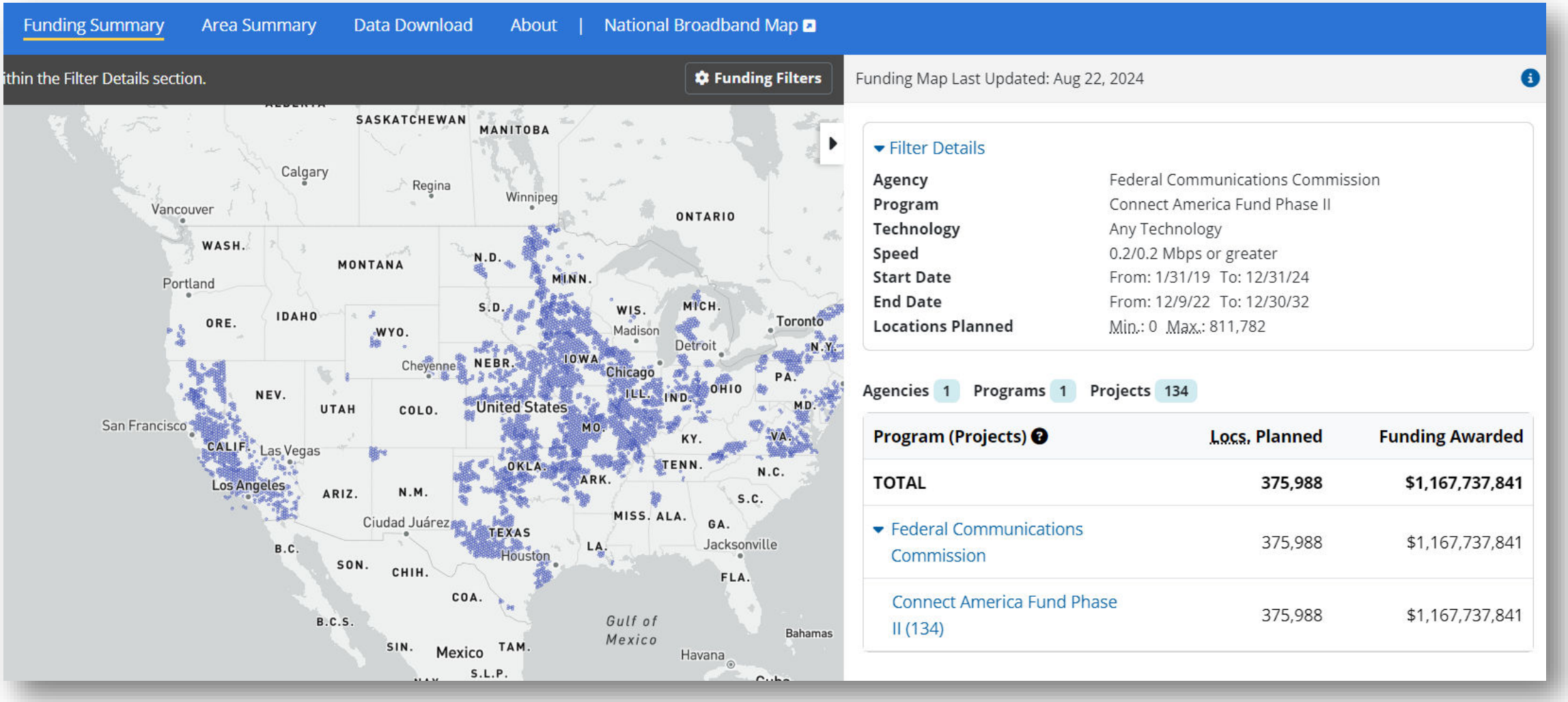
Broadband Availability Availability Challenge

Provider	Technology	Down (Mbps)	Up (Mbps)	Chall.
CenturyLink	Copper	0.2	0.2	
Gigabeam Internet	Unlicensed Fixed Wireless	100	100	
HughesNet	GSO Satellite	100	5	
PocketiNet	Unlicensed Fixed Wireless	10	1	
PocketiNet	LBR Fixed Wireless	100	30	
Spectrum	Cable	1000	35	
Starlink	NGSO Satellite	220	25	

The Result – National Broadband Funding Map



The Result – National Broadband Funding Map



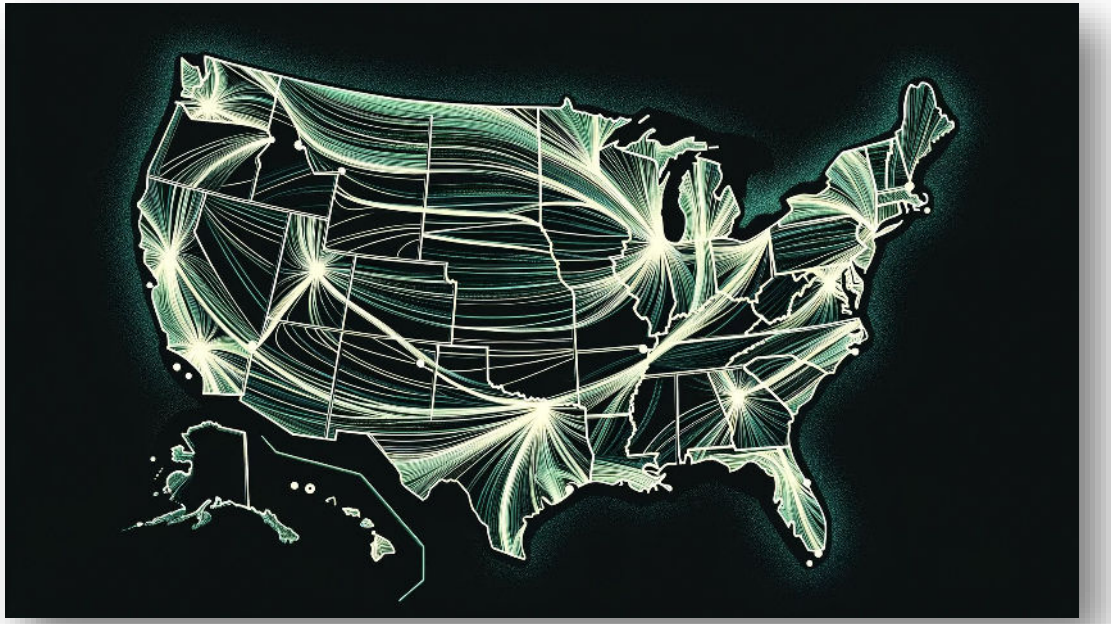
Our Mission – Identify locations to help close the digital divide

1. Identify all BSLs across the US to reveal coverage gaps and get reliable internet to everyone.

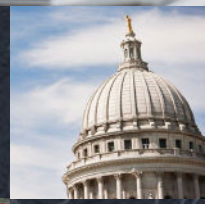
Our Mission: Provide Data to Make Efficient Use of Resources

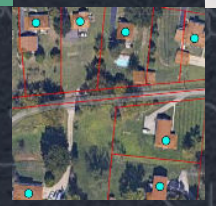
2. Provide data to help policy makers and the industry better target resources to areas in the most need:

- Reduce funding waste
- Provide a national location database – foundation for all parties to make decisions from
- Add precision & continuity in decision-making from government to industry



Fabric Overview





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FCC Definition Of A Broadband Serviceable Location

- The FCC defines a BSL as a business or residential location in the United States at which fixed broadband Internet access service is, or can be, installed.
- CostQuest developed a process that aggregates hundreds of data sources, applies statistical scoring, and managed crowdsourcing to pinpoint the exact rooftop locations of virtually every structure that is a candidate for broadband.
- **Issue:** How to determine which buildings on a parcel are the BSL

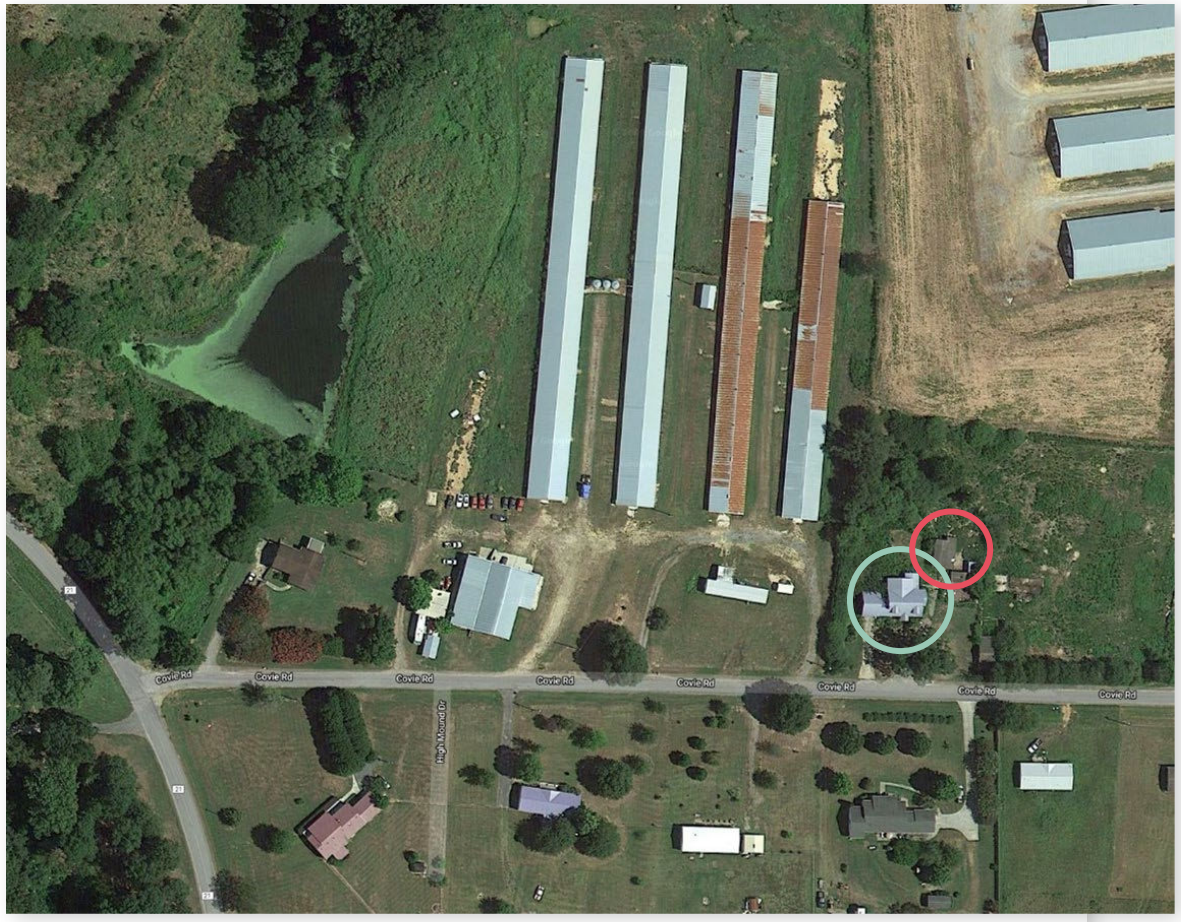
The Fabric – How it works

Goal

- Identify the structures that have or may need service

Issues

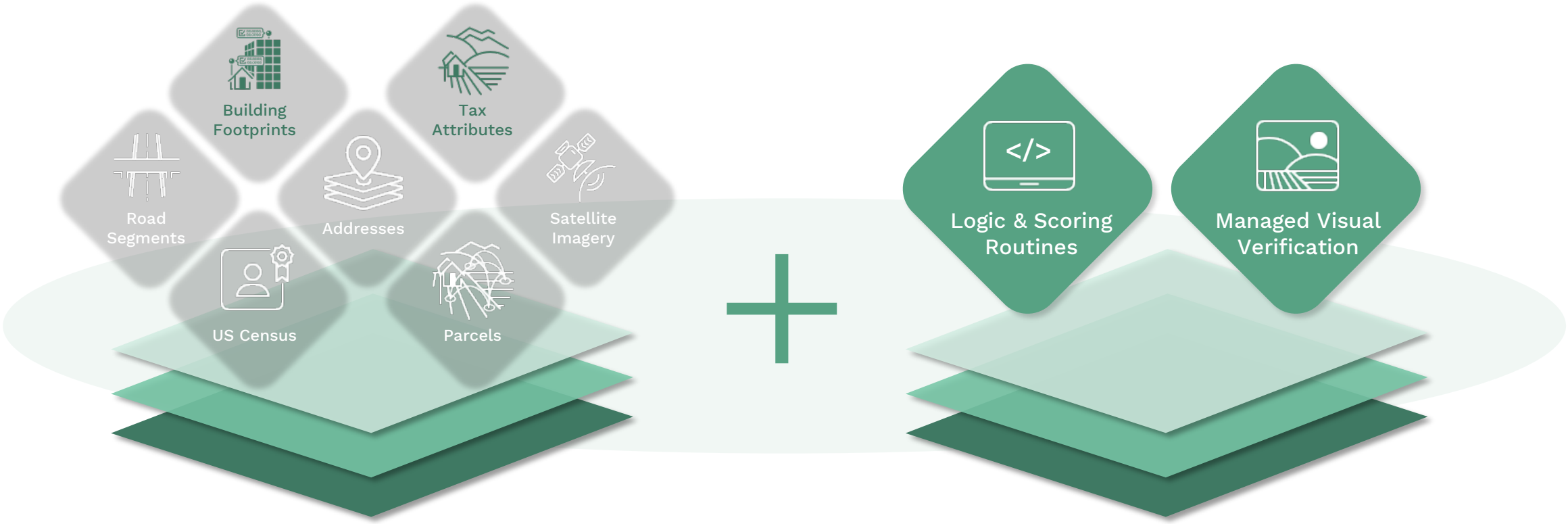
- Secondary structures (chicken coops, barns, garages, etc.)
- Addresses aren't automatically geocoded



Data Sources

1. Bring in Data Sources & Process

2. Train Models & Visually Verify



Broadband Serviceable Location Fabric

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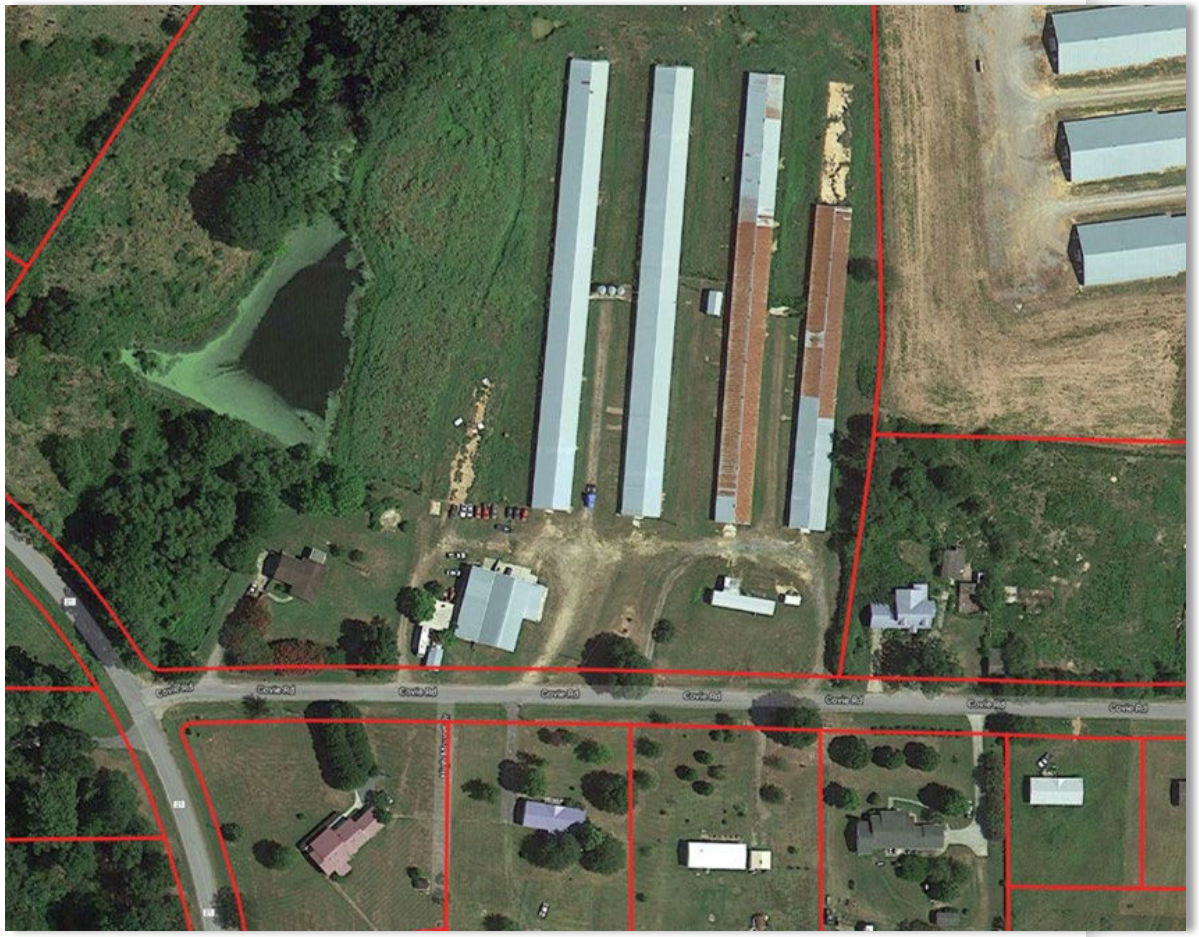
The Fabric – How it works

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 are structures that have or may need service?
- 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 – How it works

Step 3

Location and Structure logic is applied to aggregate data sources

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

Step 4

Visual Verification

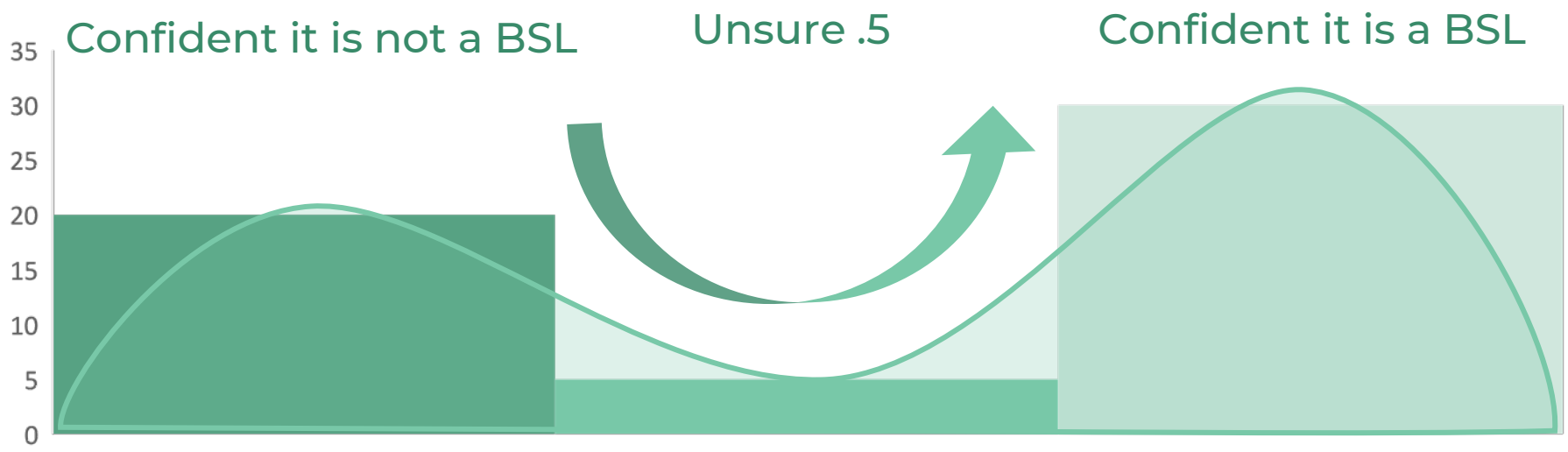
Step 5

Once the location is identified, the best address for the location is selected

Visual Verification – Confidence Scoring

Visually verified

- In each version release we visually verify 600,000-800,000 locations to improve our models
- To date we have visually verified >3.2mm and include improvements from the public challenge process



How the Fabric is Used by NTIA, FCC, and Other Federal Broadband Granting Authorities

The Fabric: a national foundation of locations used by federal agencies to map service availability, distribute, and track funding.

FCC uses for:

- Broadband Data Collection
- National Broadband Map & National Broadband Funding Map
- ACP Obligations
- USF Obligations (RDOF, ENHANCED ACAM, etc.)

Federal Broadband Granting Authorities:

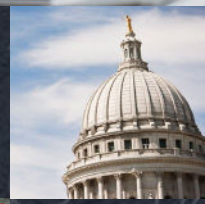
Federal Broadband Granting Programs

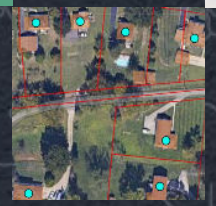
NTIA BEAD Programs – Minimum geography for bidding

- USDA Programs
- Treasury Programs
- Etc.

Each Fabric Location's unique Location_ID, address, coordinates, etc. will be the same across all programs.

Fabric & BDC Versioning





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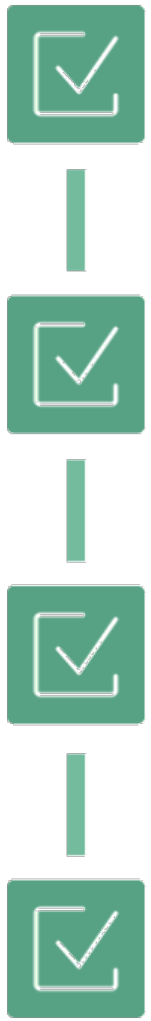
Why the Fabric & BDC Changes: Location & Coverage Changes

- FCC Challenge Process – Allows location and coverage challenges
- CostQuest Continuous Improvements
- New Construction
- ISP reported coverage – progress on new build-outs, etc.



Fabric Continuous Improvements – Data Sources & Logic to Improve Outputs

Improving Address Assignment

- Improved addressing
  - In V2, added secondary addresses to capture all units in a building/location
    - Also, updated an address zip code logic step, reducing interpolated records
  - In V3 and later, improvements to address assignment

Improved exclusion zones

- Exclusion zones prevent false positives in areas we know there cannot be active locations eg.: National Park boundaries
- Rocks in the desert, on glaciers, in forests
- To date, 227,263 square miles of land have been identified as exclusion zones.

New sources of information to improve identification

- In V2, data set added for demolished houses in Detroit, monuments and memorials in DC
- In V3, data set added for new addresses to better identify new construction areas
- In V5, we utilized alternative population measures to increase accuracy of identifying the BSL's especially in rural areas – human geography data/light sourcing data

Fabric Continuous Improvements – Data Sources & Logic to Improve Outputs

Updating Parcels

- In V2, improved identification of parcels of roads – increased footprint count
  - Parcels inform the processing in the model
  - Parcels of roads led to some misinterpretation of structures
- With each release, parcel boundary information is updated. With each release we gain increased accuracy of parcel boundary information

Adding Footprints

- Using deep learning, we were able to identify 316,832 building footprints across 446 communities in Alaska as well as 63,874 footprints in American Samoa, Northern Mariana Islands and Guam.
- We implemented the same process in High Growth Areas where we sourced additional imagery that had newer vintages

Model Improvements

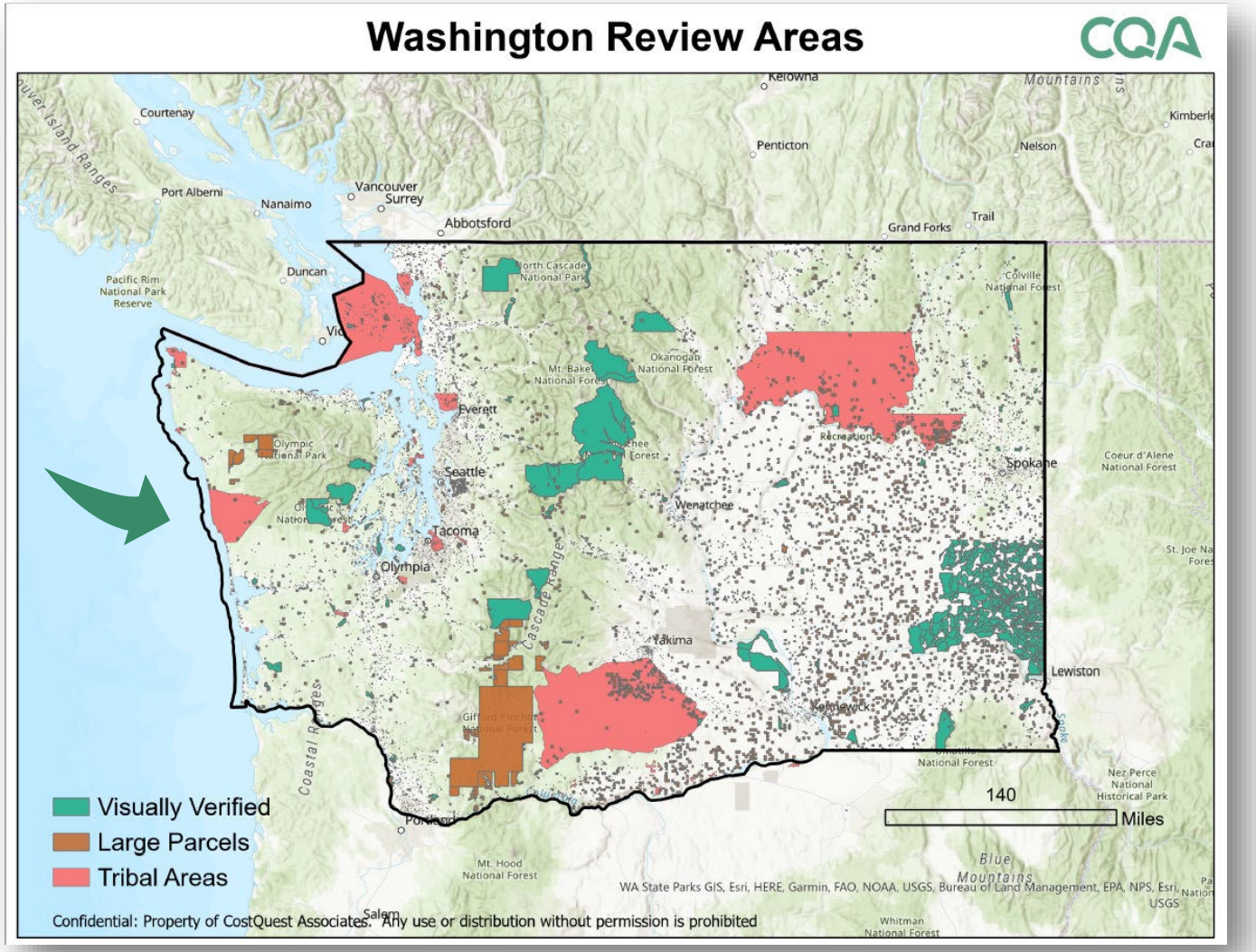
- Improved approach to identify parcels as either multiple location or single location parcels
  - This helps improve our accuracy in rural areas and in tribal lands
- Removing false positives

Fabric Continuous Improvements – Tribal Areas

Tribal Area Improvements :

This image of WA captures improvements in attributes that affect Tribal Areas in Fabric V3

- Such as identifying multiple locations on 1 large parcel



Fabric Continuous Improvements – New Construction

CostQuest's Fabric captures new construction over time, as datasets are refreshed between releases. Most new locations in the Fabric are from new construction.

The slides that follow capture an area a high growth area from V1 to V5:

- Note that in all slides, the background imagery is current and does not necessarily represent the nature of the area at the time of our data creation

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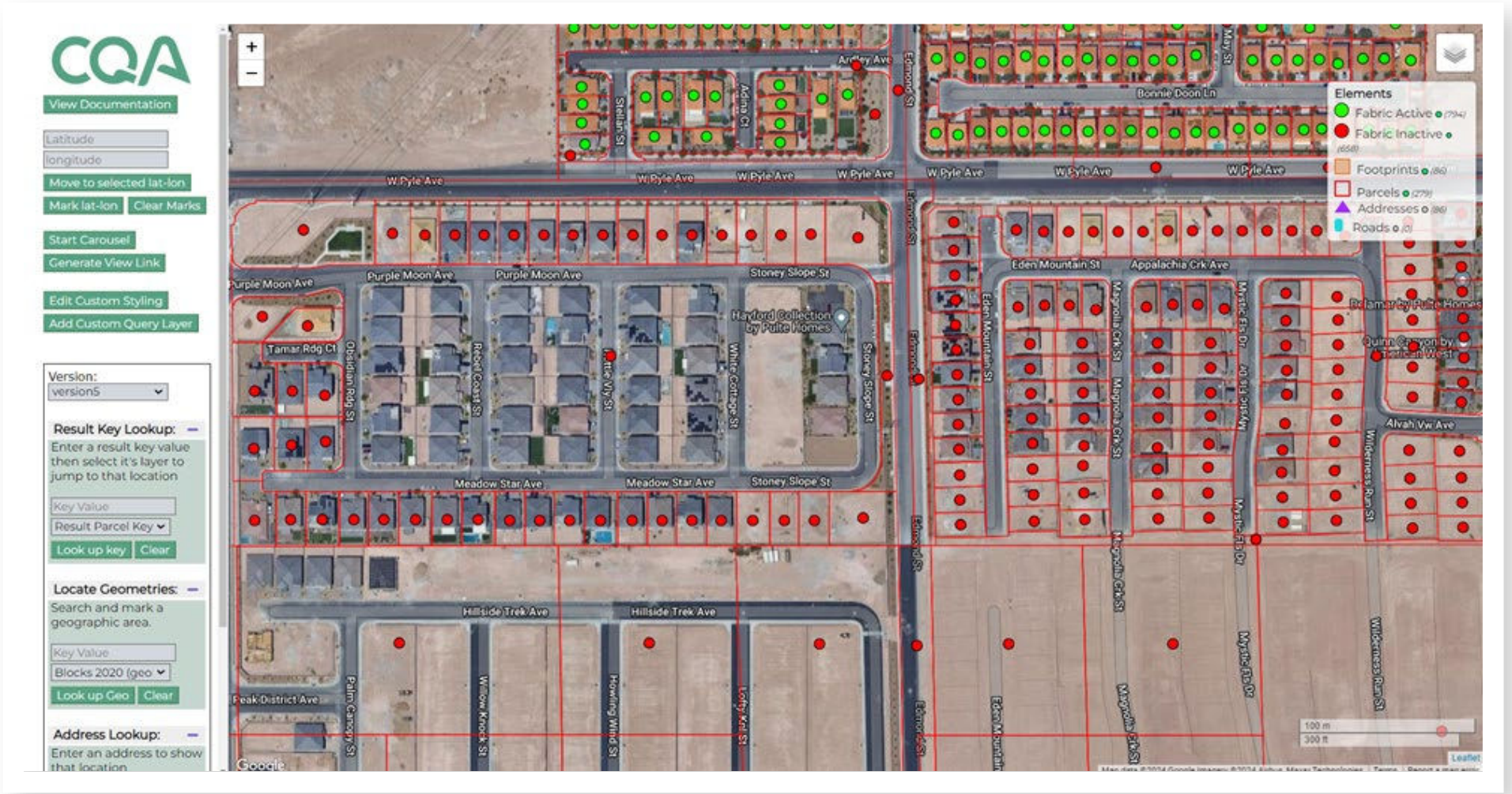
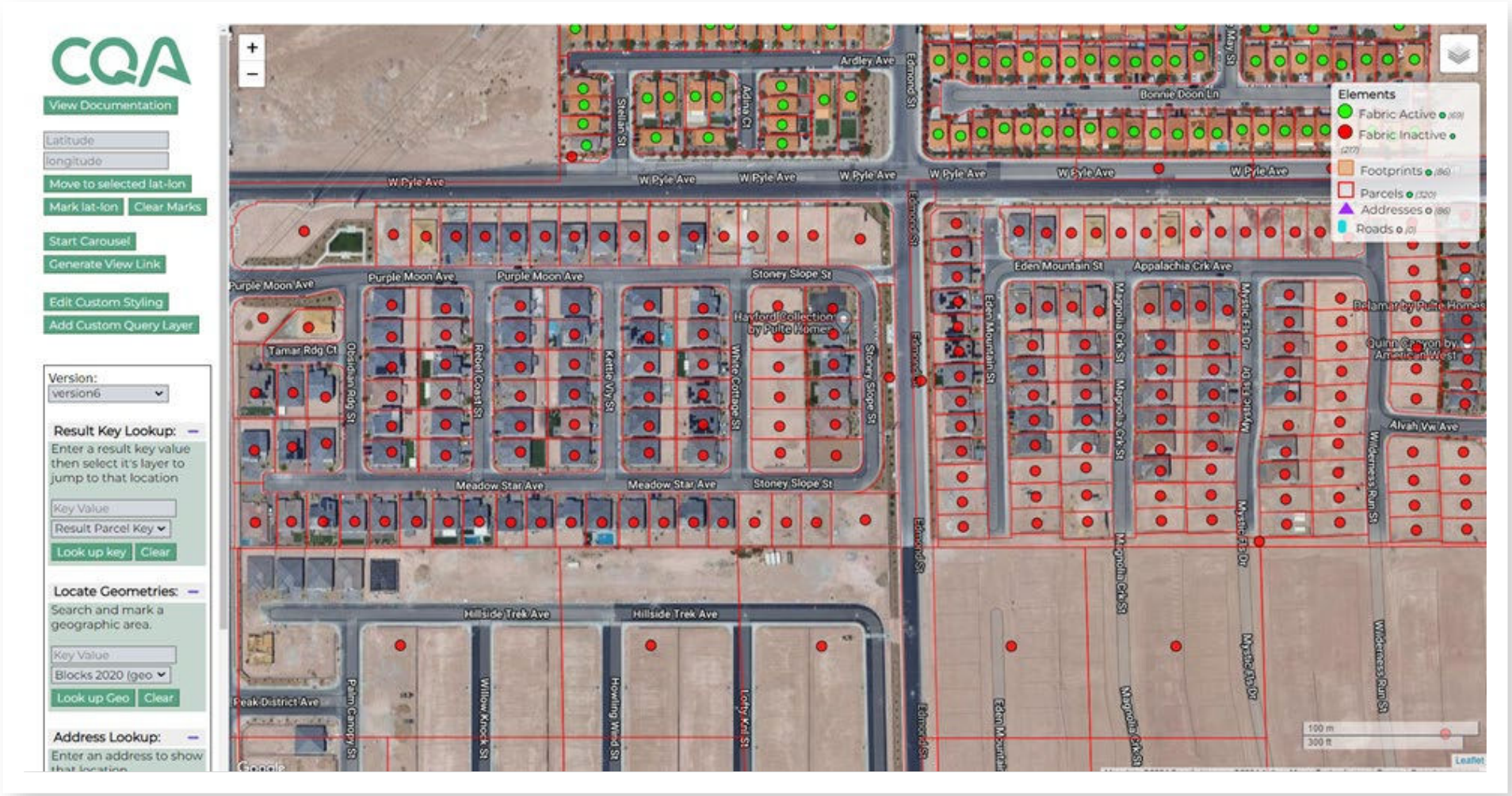
Fabric Continuous Improvements – Temporal Change



FCC V1: Released June 2022

Fabric Continuous Improvements – Temporal Change



FCC V2: Released December 2022

Fabric Continuous Improvements – Temporal Change

FCC V3: Released June 2023

Fabric Continuous Improvements – Temporal Change

FCC V4: Released December 2023

Fabric Continuous Improvements – Temporal Change

FCC V5: Released June 2024

Fabric Accuracy

- Improved statistical models to better select parcels with a BSL.
- Improved identifying the correct structure that is the BSL on a parcel.
- Reduced false positives by 40% from V1 to V5.
- Reduced false negatives by 31% from V1 to V5.

Version	Correctly Identify a parcel with BSL (%)	Correctly Identify correct structure as BSL on parcel (%)	Reduction in Overall Type I Error Rate (false positives)	Reduction in Overall Type II Error Rate (false negatives)
V1:V5	**99.5%** (19% reduction from V1 in misses)	**98.8%** (64% reduction from V1 in misses)	**40%** from V1	**31%** from V1

Continual Changes – ISP Reported Coverage from BDC

Nationwide

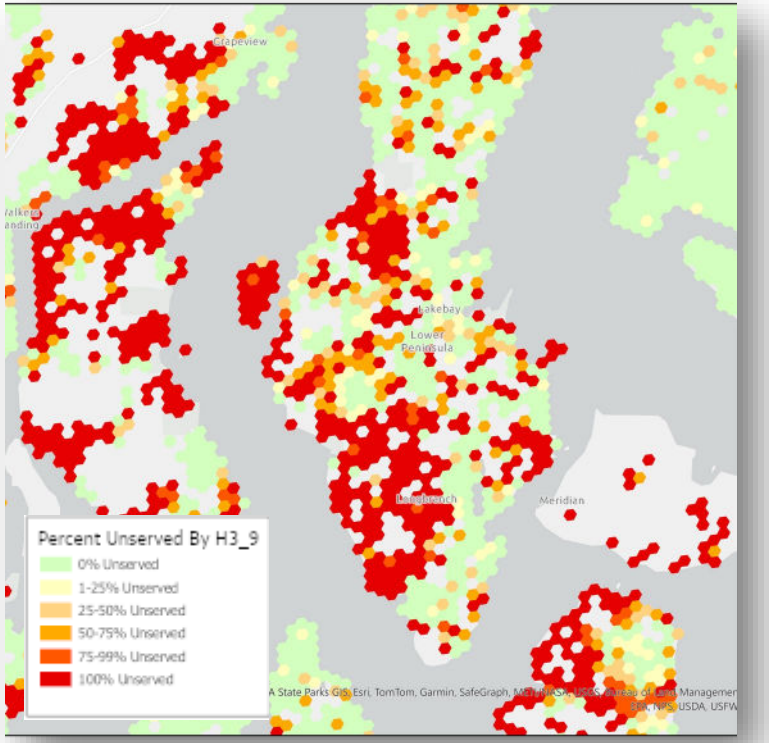
	Total Location Count	Unserved Count	Underserved Count	Served Count
Version 2	114.5 M	8.5 M	3.5 M	102.5 M
Version 3	115.3 M	7.2 M	3.0 M	105.1 M
Version 4	**115.7 M**	**6 M**	**2.9 M**	**106.8 M**

Washington

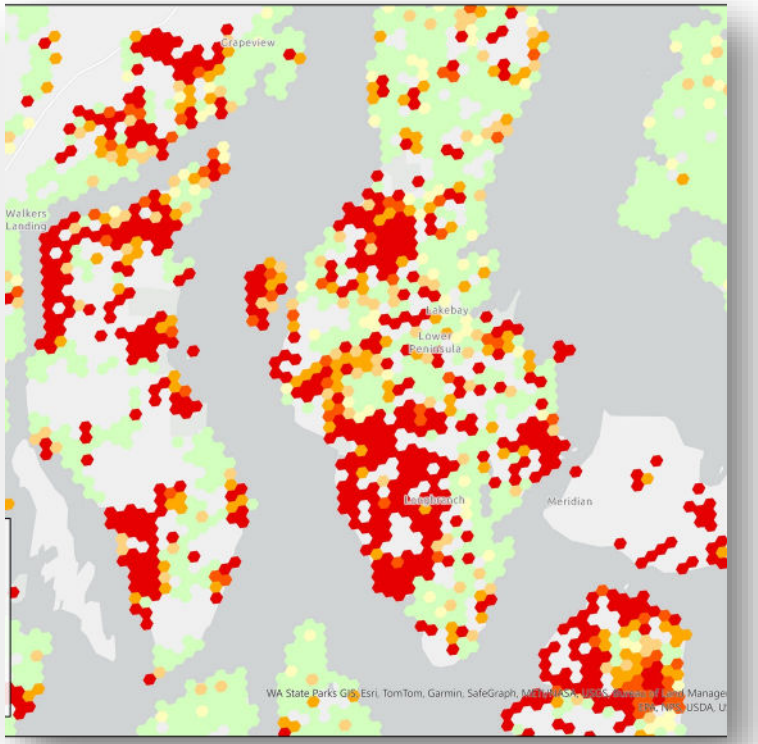
	Total Location Count	Unserved Count	Underserved Count	Served Count
Version 2	2.5 M	236,136	85,433	2.2 M
Version 3	2.5 M	216,006	76,195	2.2 M
Version 4	**2.6 M**	**201,189**	**85,436**	**2.3 M**

Continual Changes – ISP Reported Coverage from BDC

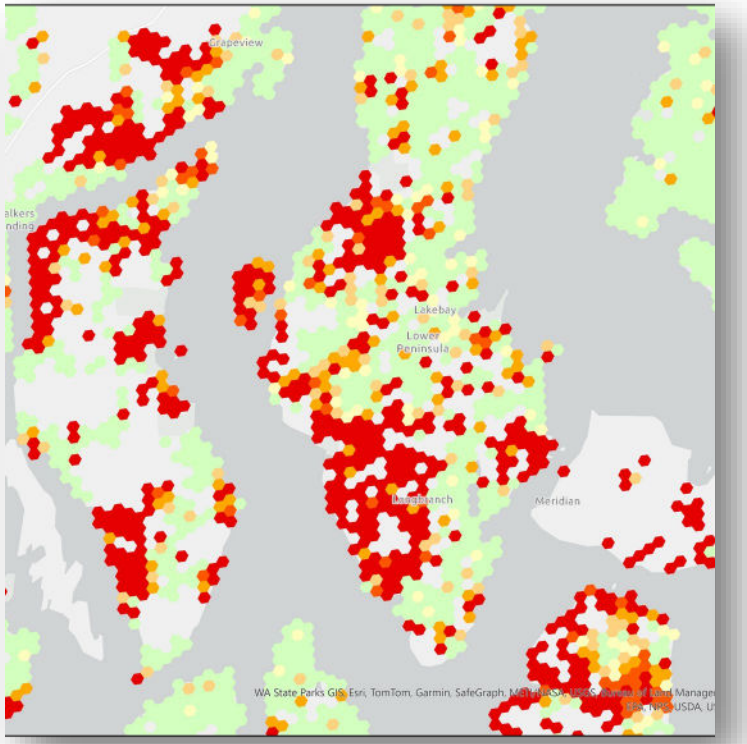
V2



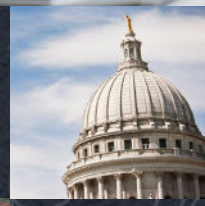
V3

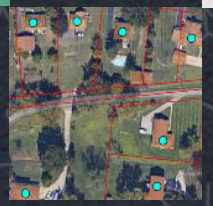


V4



Fabric in the BDC and FCC Programs





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FCC License rights

Tier 1: FCC

- Rights to use in BDC and on Broadband Map, publish summary results of coverage, publish served, unserved and underserved locations

Tier 2: ISPs, State, Local and Tribal Government Entities

- Rights to create BDC filing data, create challenge data, share with other licensees

Tier 2a: Designated Entities

- Tier 2 rights + ability to create consumer facing Broadband coverage maps, create derivative reports, collect coverage information from other Tier 2 entities

Tier 3: US Government Entities

- Rights to publish summary results of coverage, rights to create online map, rights to create challenges

Tier 4: Other parties

- Rights to create challenge data

Tier 4R: Research

- Rights to use the Fabric data for Research efforts

Tier 2 License for FCC Programs

License rights cover: ISPs, State, Local and Tribal Government Entities

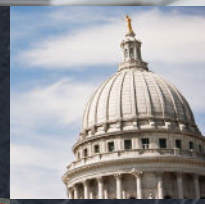
The permitted uses of the Fabric data under this license are as follows:

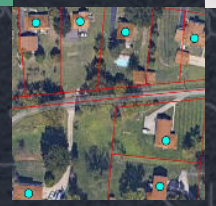
- Create, correct, challenge and/submit broadband availability data to the FCC in the Broadband Data Collection
- Fulfill reporting and/or compliance requirements associated with the Affordable Connectivity Program
- Fulfill reporting and/or compliance requirements in regard to the Universal Service Fund in USAC's High-Cost Universal Broadband (HUBB) program.
- Reviewing, implementing, and/or revising deployment obligations for the Rural Digital Opportunity Fund (RDOF), and other FCC program outlined in the license agreement.

Other information:

- It does not allow use of the data for state and federal granting programs or commercial uses outside participation in the FCC programs.
- Be cognizant of permitted uses under the license - CostQuest conducts ongoing reviews and audits for proper product usage.

Fabric in BEAD & Other Granting Programs





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Covers National Fabric & CostQuest's National Fiber and Fixed Wireless Cost model data for NTIA & Pass-Through Entities

License rights cover:

Tier A: NTIA

- Rights to use in Federal Broadband Programs

Tier B: Federal Broadband Grant Administrators (e.g., USDA, Treasury, etc..)

- Rights to use in Federal Broadband Programs

Tier C: Pass-Through Entities (e.g., States and Territories)

- Rights to use in Federal Broadband Programs

Tier D: Subgrantees (e.g., ISPs that participate in the federal grant program)

- Use of the Fabric Locations for BEAD and Federal Granting Programs

Fabric License for Federal Broadband Granting Programs

Tier C License for Pass Through Entities (e.g., States and Territories)

License rights cover: Pass Through Entities Administering Federal Broadband Granting Programs

The permitted uses of the Fabric data under this license are as follows:

- Rights to use Fabric and Cost Data in Federal Broadband Grant Programs
- It does not allow use of the data for commercial uses outside participation in federal granting programs
- Be cognizant of permitted uses under the license - CostQuest conducts ongoing reviews and audits for proper product usage

Fabric License for Federal Broadband Granting Programs

Tier D License for ISPs Participating in Federal Broadband Granting Programs

License rights cover: Approved Participants & Subgrantees (e.g., authorized participants in the program)

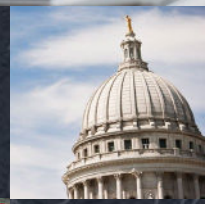
The permitted uses of the Fabric data under this license are as follows:

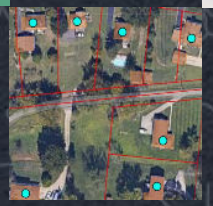
- The license covers participating, reporting, and challenging use cases associated with Federal Broadband Granting Programs and the eligible locations
  - Which includes the NTIA BEAD Program
- It does not allow use of the data for commercial uses outside participation in federal granting programs
- Be cognizant of permitted uses under the license - CostQuest conducts ongoing reviews and audits for proper product usage

The NTIA license rights can be used across agencies and grant participants under the Federal Broadband Granting Authority (FBGA):

- Department of Agriculture
- Department of Commerce
- Department of Education
- Department of Housing and Urban Development
- Department of Labor
- Department of the Interior
- Department of Treasury
- Federal Communications Commission
- Institute of Museum and Library Services (IMLS)
- National Science Foundation
- Northern Border Regional Commission (NBRC)
- Appalachian Regional Commission
- Delta Regional Authority
- Denali Commission

Fabric BSLs in BEAD





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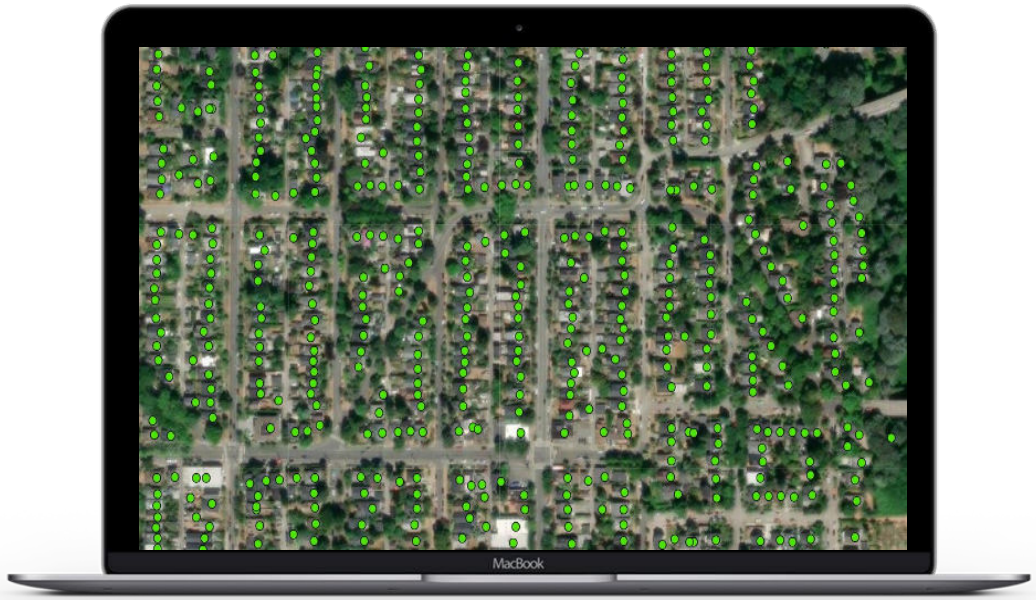
Challenge Process Determines BSLs Eligible for BEAD Funding

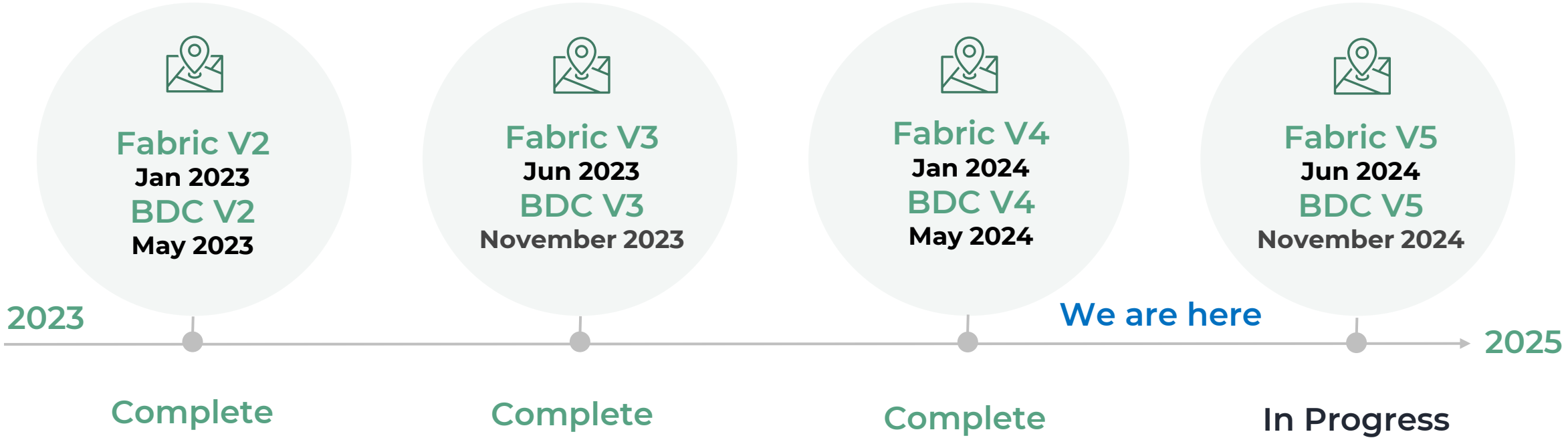
- Each state/territory runs Challenge Process based on Fabric BSLs and BDC Coverage data
- Results of the Challenge Process are approved by NTIA – 10.6 & 10.7 files
- Outcome: Broadband Serviceable Locations and CAIs eligible to receive BEAD funding
- Next step: Develop eligible BSLs into Project Areas for bidding



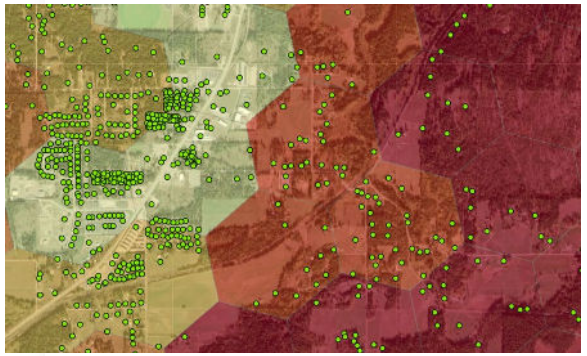
Different Iterations of the Fabric & BDC Will be Used in BEAD

Know which version of Fabric BSLs and BDC data the state is using in their BEAD program.

Each state is or will be using one or a combination of the following BDC/Fabric Iterations for NTIA efforts:



Data Up-Versioning



A state may start its challenge effort with one iteration of the Fabric and BDC data from the national broadband map and choose to 'up-version' before the grant effort begins.

For example:

- Louisiana used BDC V2 in its challenge efforts and then up-versioned to BDC V3 in its filing of eligible locations at NTIA

Coordinate with your Broadband Office on what version of the Fabric and BDC data to use.

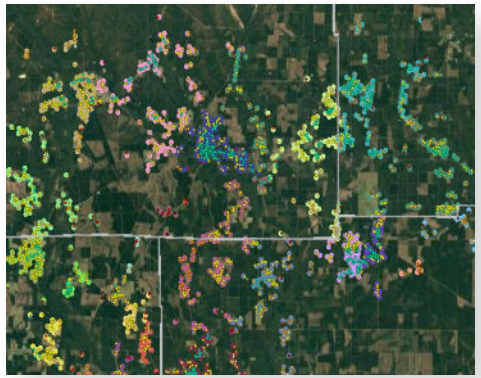
Fabric Role in BEAD State Project Areas

State Project Areas:

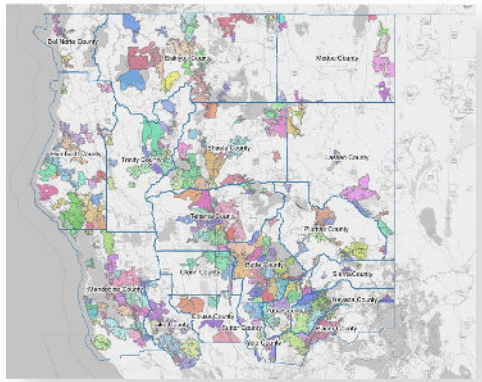
Represent geographic aggregations or location-level areas of unserved and underserved locations available for BEAD Funding.

Project Area Types

- Hex9
- Census tract, block group, block
- Location based – custom geographies defined by applicants
- Objective driven clustering
- City
- County
- School districts



HEX9



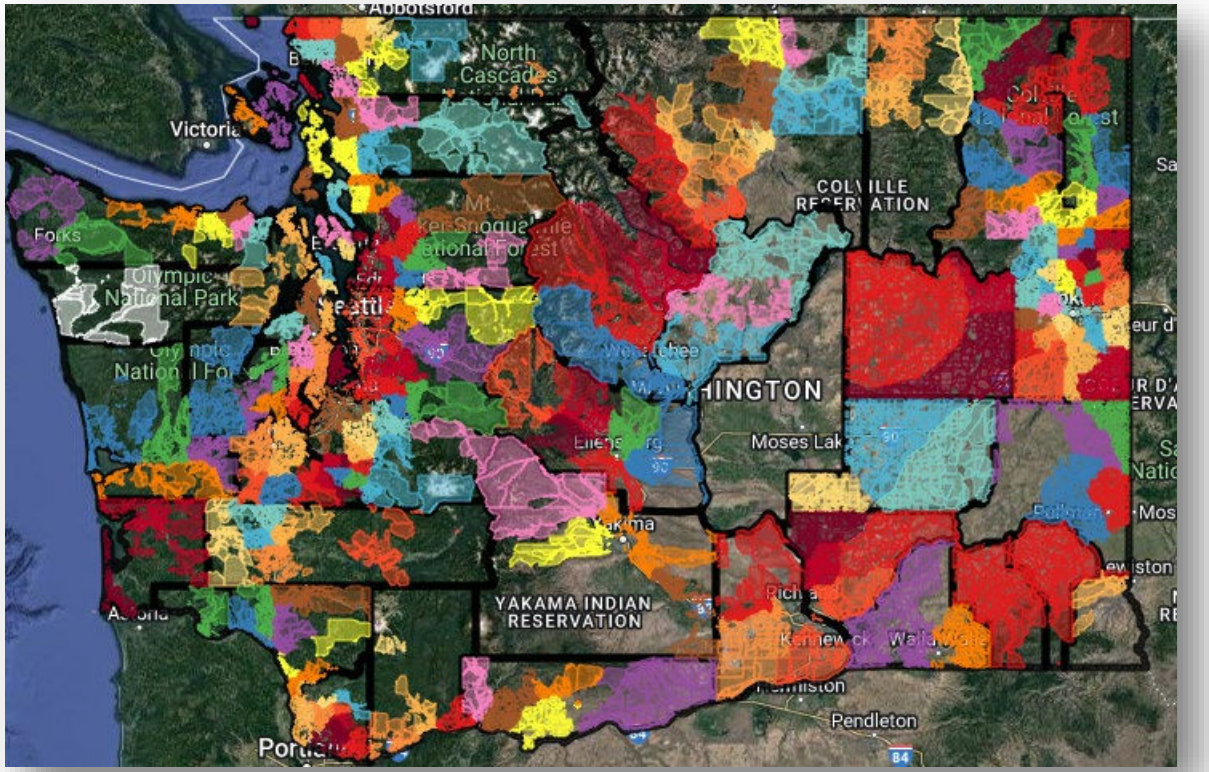
CLUSTERING

APPLICANT DEFINED/ LOCATION-LEVEL

State BEAD Program Example – Washington

*WA Project Area Type:

County boundaries with projects within these boundaries targeted at approximately 1,000 BSLs.



*SUBJECT TO CHANGE

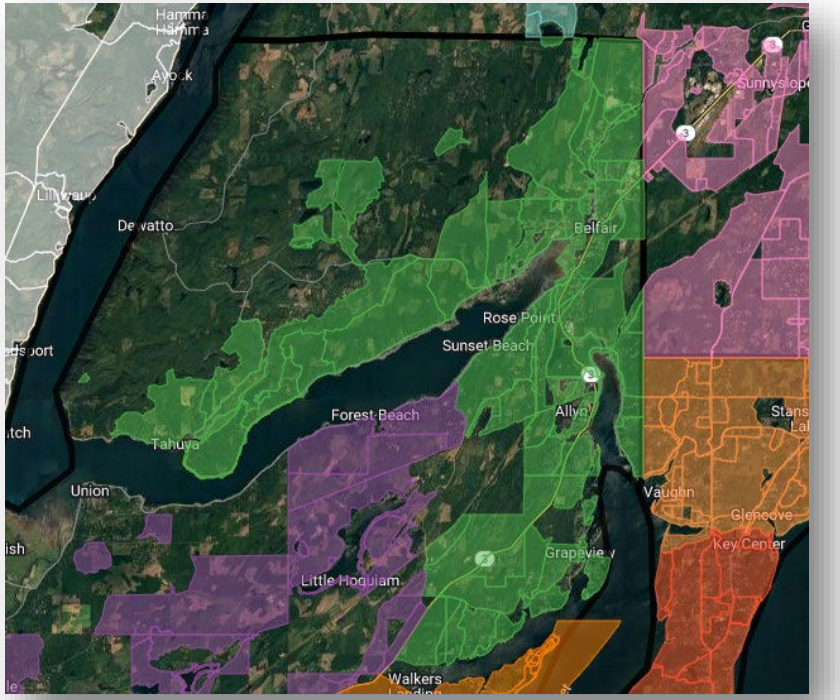
*Example of draft project area

Green project area:

Mason County-77

BSLs: 1330 (total unserved/underserved)

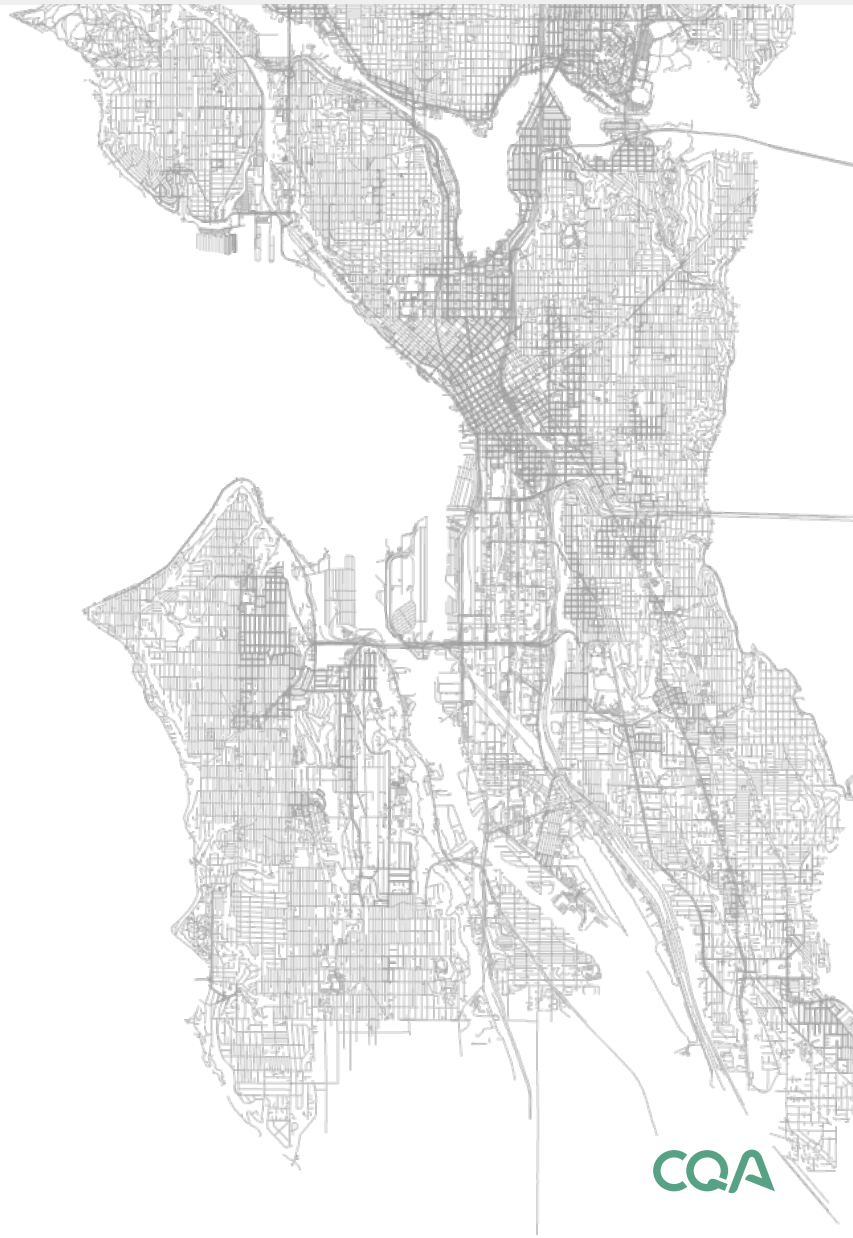
Block: 530459603021021



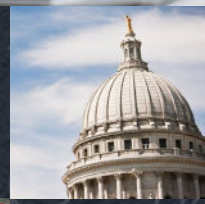
*SUBJECT TO CHANGE

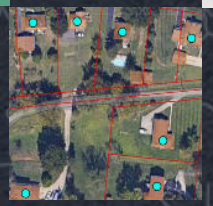
Key Takeaways

- Understand Fabric BSLs & BDC Landscape
  - Tier 2 & D Licensing Types – very limited – know allowable uses under each
    - Commercial licenses available
  - Fabric Versions & Up-versioning
    - Use most recent Fabric version for BDC Filings
    - Use Fabric version specified by grant program – for BEAD each state/territory will be different



Q&A





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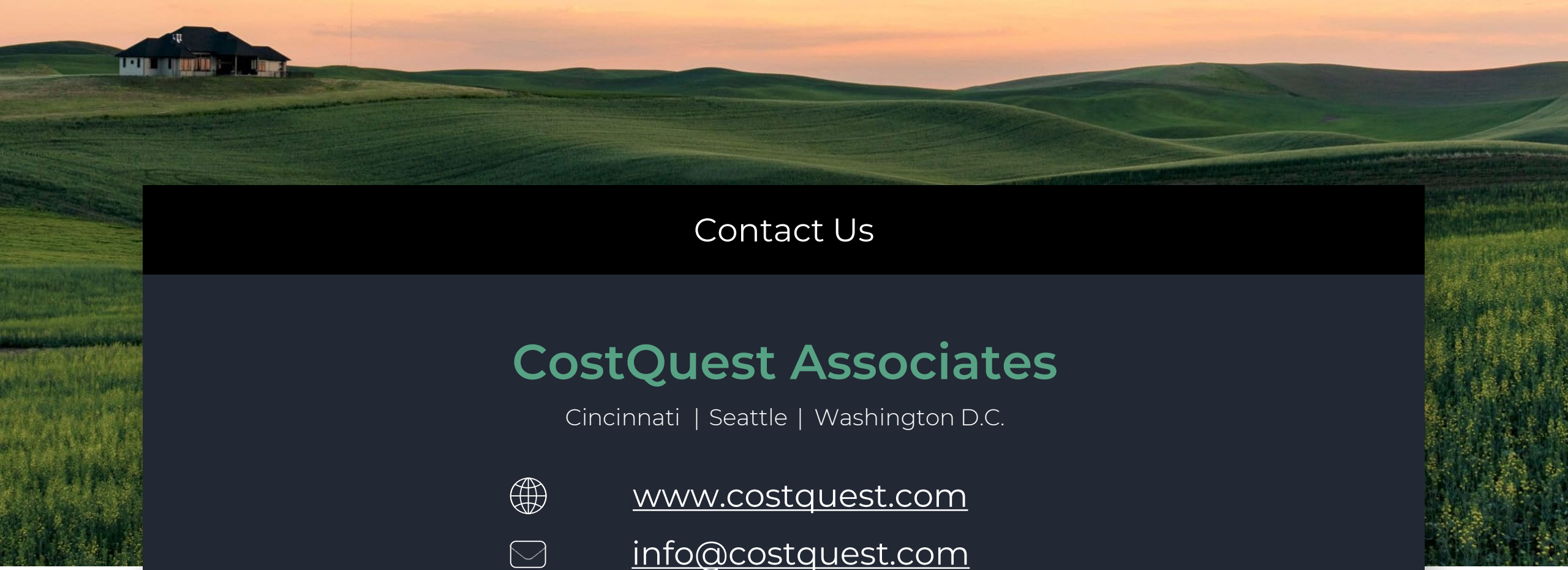

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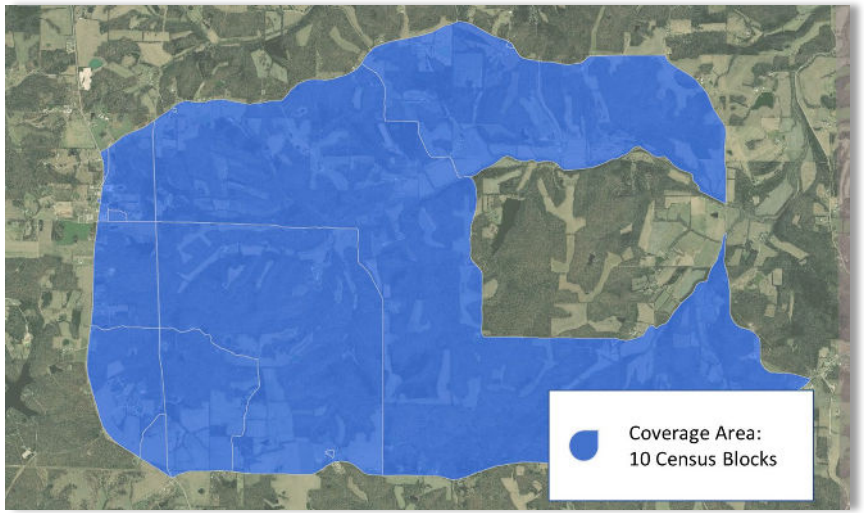
How we got here

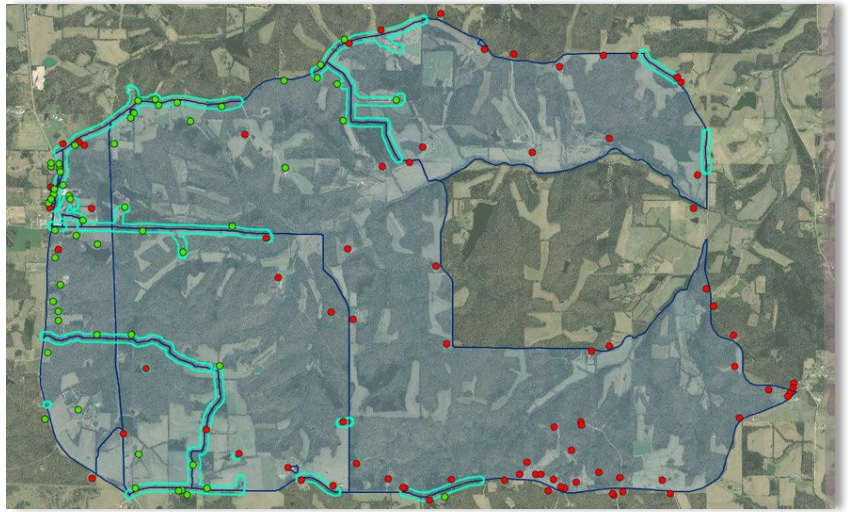
Broadband Mapping Initiative Pilot with US Telecom for the FCC

Building a better broadband map.

Result: You can't efficiently deploy service to locations you can't see on your map.

While national estimates of the broadband gap have been available through the FCC broadband reporting, the information reported hasn't been at the granular level needed to identify where broadband is lacking. In 2019, CostQuest Associates (CQA) managed a Broadband Mapping Initiative Pilot program in Missouri and Virginia to demonstrate the feasibility of identifying the precise number and location of every structure in the states that are available for broadband access. With the combination of industry expertise and help from trade associations and select providers, CQA created the Broadband Serviceable Location Fabric, to make it possible to precisely map where broadband is available and where it isn't. It was discovered in the Pilot that as many as 38% of additional rural locations are unserved in census blocks that would have been filed as served in today's FCC Form 477 reporting approach. Therefore, exemplifying the need for granular data in broadband maps, a need the Broadband Serviceable Location data (BroadbandFabric) can now fill. To learn more about the Broadband Mapping Initiative Pilot with US Telecom visit **here**.





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