



BUILT ON DATA

# Nebraska Universal Service Funding

2024 Update

10/23/2024

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# CostQuest Associates

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BroadbandFabric

# Agenda

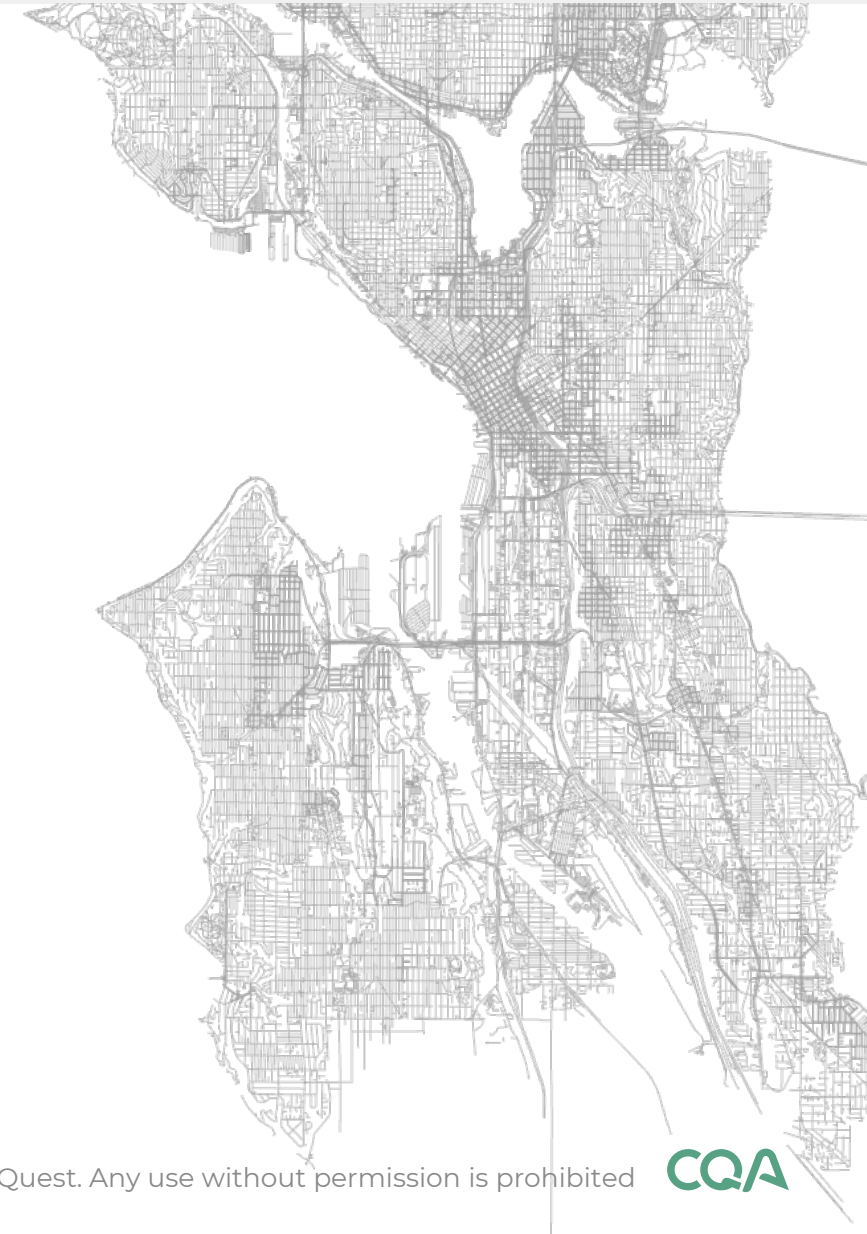
Location Fabric

NE Cost Model Assumptions

NE Cost Model Results

Current Cost Models

Q&A





Section Title

# The Fabric

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## Demand Development

# The Modeling Workflow



Goal: Develop Forward Looking Greenfield cost to serve model. Each BSL will receive Fiber service.



Steps: Generate Demand, Model the Network, Calculate Component Amounts and Calculate Investment

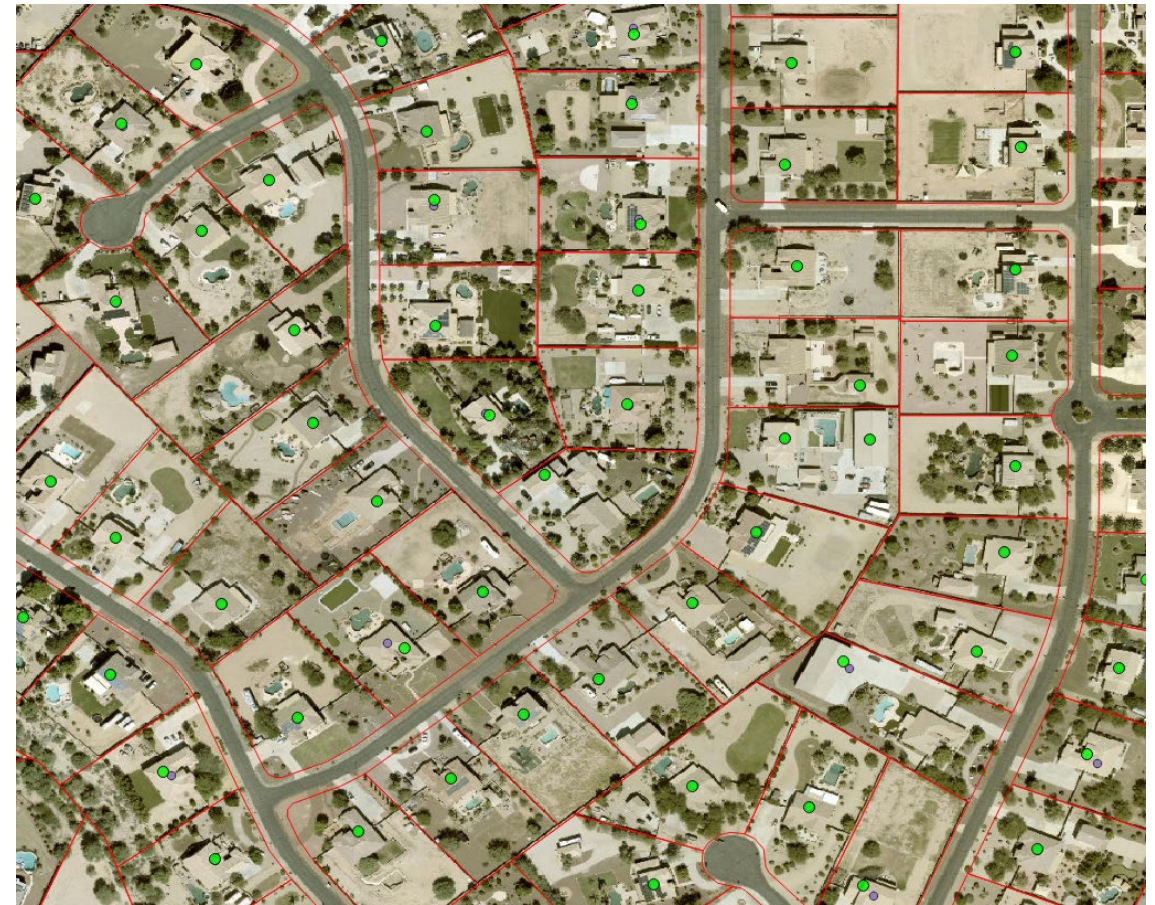


# What is the Broadband Services Location Fabric?

The Nebraska Cost Model uses demand data identical to the FCC Fabric. Nationally, the Fabric dataset contains over 115 million individual location structures across the U.S., where fixed broadband internet access service is, or can be installed.

The first FCC dataset was first provided in 2022.

Data are updated two times per year, and we are now at FCC version 5. Each version includes updates resulting from challenges and updated source data.



## Fabric Production Data sources

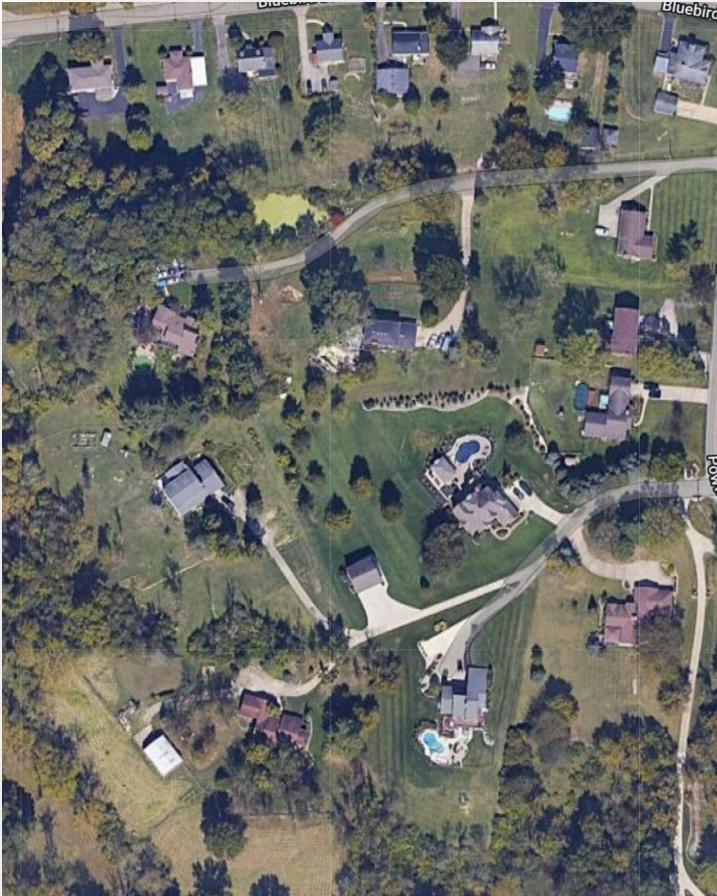
- Parcels
- Satellite Imagery
- Building footprints
- Tax Attributes
- Address datasets
- Roads





# Data and Steps to Identify BSLs

## Objective: Locate BSLs



## Process: Pull in Parcels



## Process: Pull in footprints

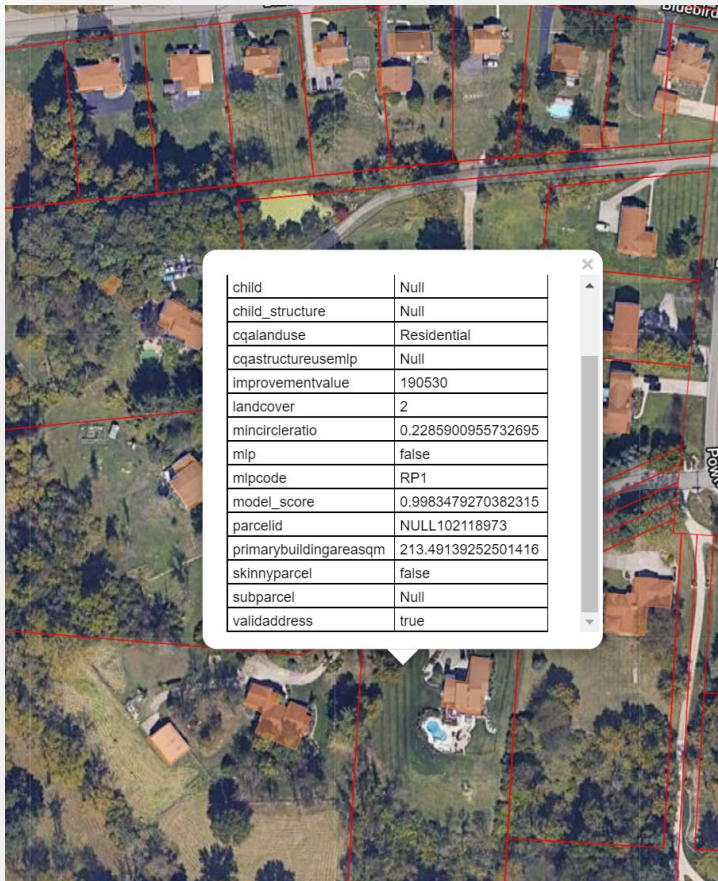




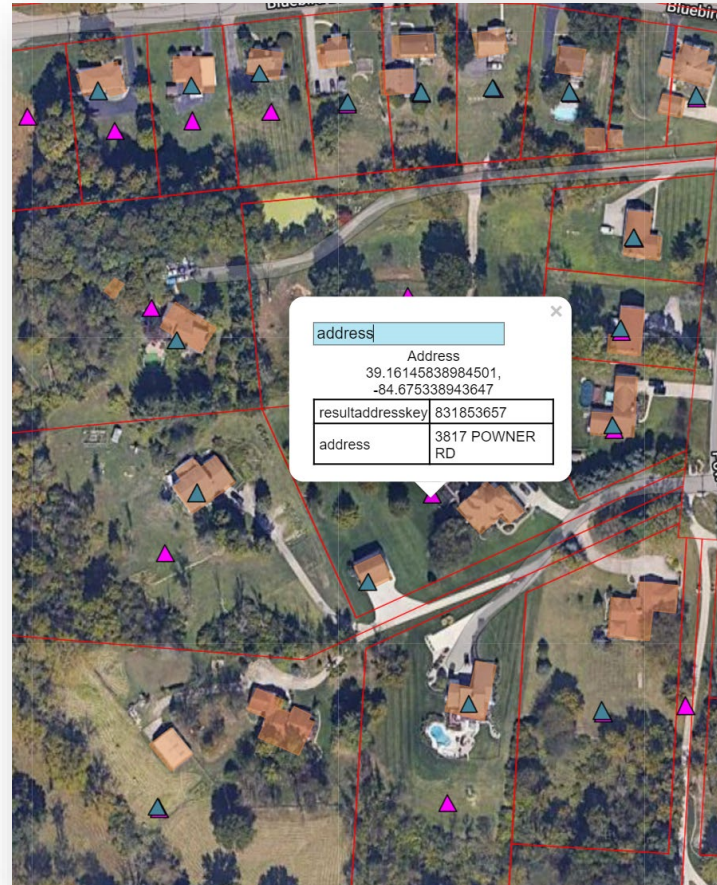
# Data and Steps to Identify BSLs

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Process: Link tax assessor data



Process: Link addresses



Process: Identify BSLs





- A separate set of model works in non-parceled areas. It looks at the following:
  - structure footprint characteristics (size of footprint; number of vertices that constitute the footprint [complexity])
  - next smaller and larger structure characteristics (area; vertices; points; distance; dimensionality)
  - distance to roads
  - land cover such as agricultural, developed, etc.



# Nebraska Cost Model Assumptions

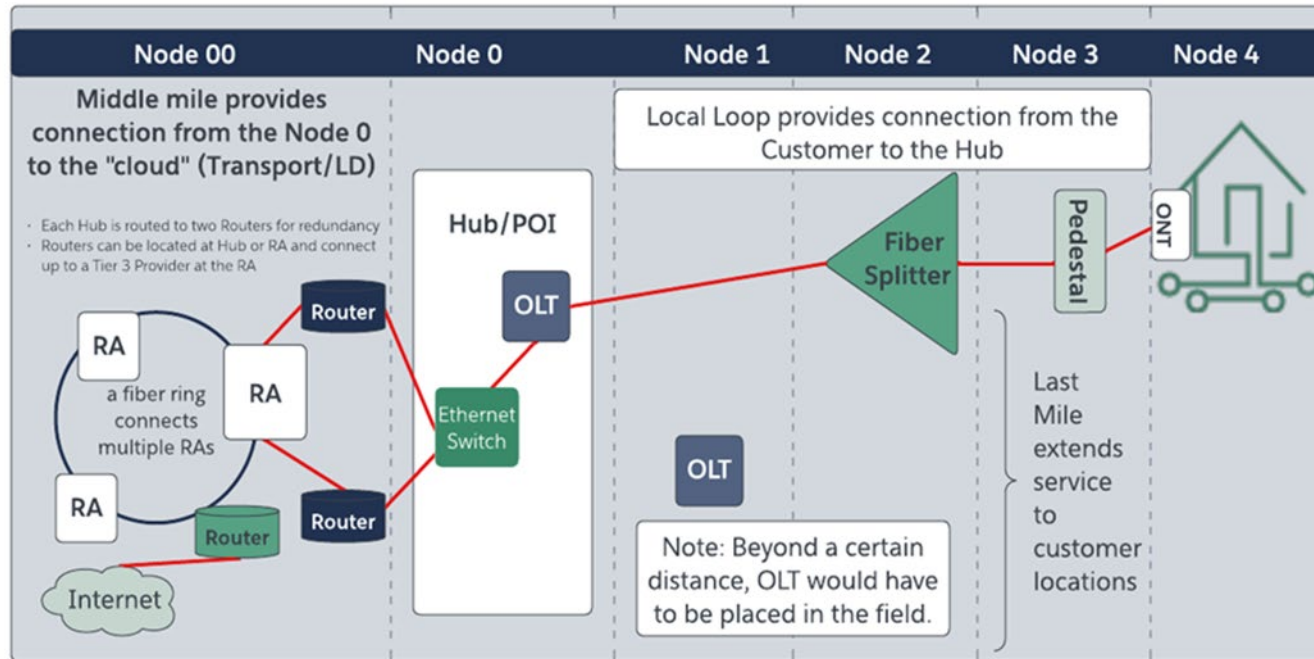
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## Sources/Background



# Nebraska Cost Model

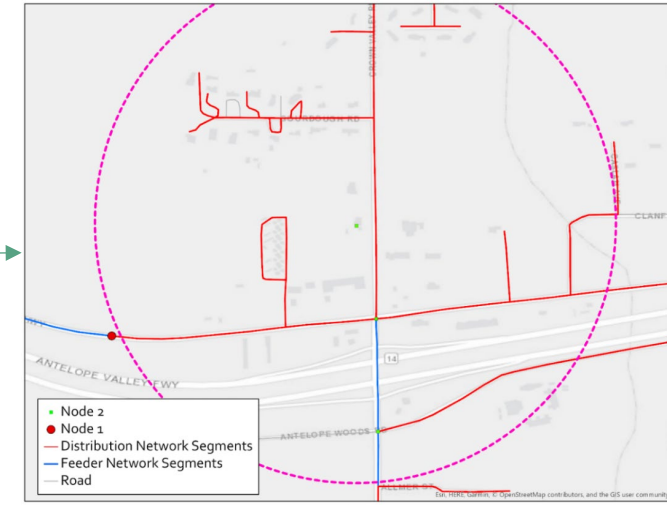
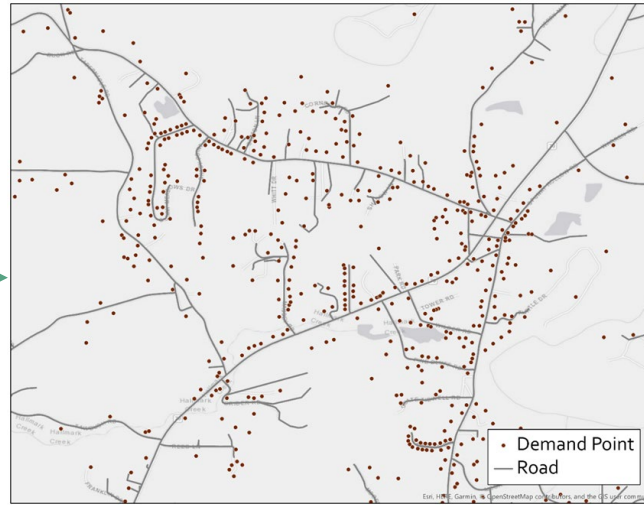
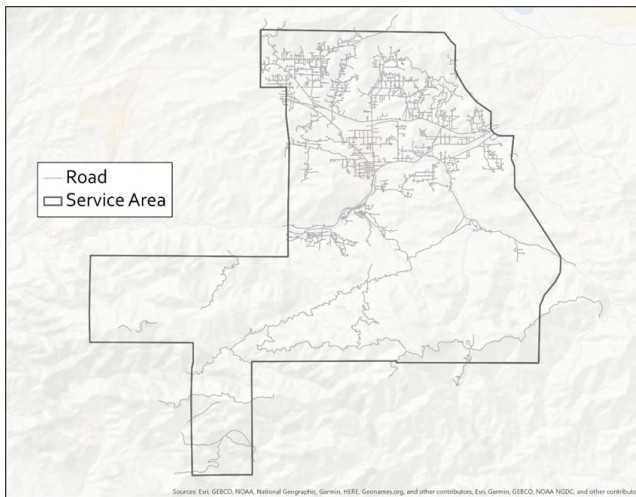
1. Processing steps remain consistent with the processing methods developed for the Connect America Models.
2. Changes were made to support the following:
  1. Updated Service Area Boundaries
  2. Location Level Cost Output
  3. Updated Material Costs
  4. Network technology
  5. Broadband coverage



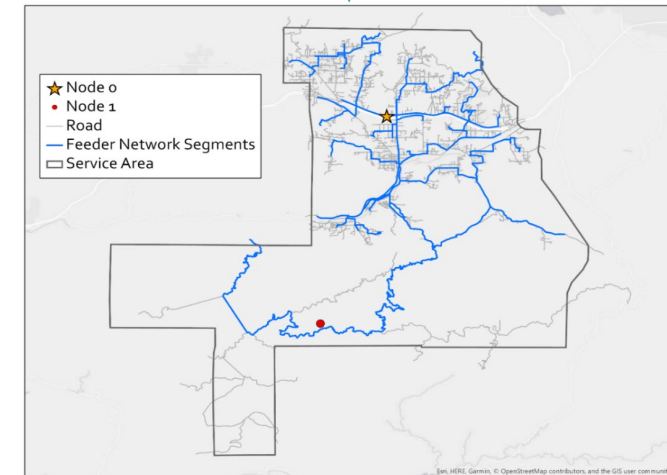
NE SBCM includes network elements from ONT to Internet peering point.

1. **Input definitions** – defines unit prices for materials and labor (P), engineering assumptions, and cost factors.
2. **Demand** – defines demand points and serving areas. FCC Fabric (06/30/2024).
3. **Node3** – defines the logical placement of drop terminals based on engineering/capacity/distance assumptions.
4. **Clustering** – defines logical groups of locations to be assigned to a splitter. Defines efficient road pathing to connect demand points to drop terminals to splitters, to central offices, to internet peering.
5. **Configuration** – Based on clustering and road pathing results, defines efficiently sized network elements by cable segment or device to determine Quantities (Q).
6. **Investment** –  $P \times Q$
7. **Cost Derivation** – Application of cost factors against investment to determine monthly recurring costs for Capex and Opex.
8. **Disaggregation/Reporting** -- Final investment and cost results calculated by BSL. Additional reports can be derived based on coverage, serving area, operating company, etc..





- Model starts with serving areas and demand points.
- Demand locations clustered into logical groups for drop terminals (Node3) and splitters (Node2).
- Cables are routed along roads to define distribution cables, and feeder cables that connect end users back to serving central offices (Node0).
- Middle mile modeling connects Node0 locations to internet peering locations.



- The material price inputs were derived from a survey of carriers and finalized in DA-14-534, Connect America Phase II Cost Model Inputs Order. Where necessary and data available, values for labor and material were updated to current values. The update process correlated input values from a variety of current sources, including RSMeans and proprietary industry data.
- Labor costs, pulled from DA-14-534, were adjusted through a combination of data from RSMeans Open Shop Labor Rates (2023), RS Means City Index Estimates, Bureau of Labor Statistics, federal salary locality adjustments, and proprietary industry data. Costs of construction (poles, trenching, placement of conduit, and manholes) were adjusted from Connect America platform inputs to current values by applying indices and adjustments in these sources. Labor costs represent prevailing wages.
- FTTP equipment (and engineering assumptions) were updated to reflect XGS-PON.
- The result of the input update and the inputs as a whole are not intended to reflect values for any specific carrier (or type of carrier), but to reflect the costs of material and labor for FTTP experienced within the overall market.
- Inputs are identical to those used to support NTIA's BEAD program with V5 of the FCC Fabric. Specifically for NE, modeling results relied on state specific serving areas rather than carrier agnostic serving areas.

## Model sample tables

Plant Type	Type or Size	Structure	Description	Size or Type
Poles	25	Duct	1-PTS-77-4"	FO
	30		1-4" w /3 in-Du	FO
	35	Inner Duct		FO
	40			FO
	45	Manholes	SB 30"X12"	1
	50		HH 3x5 or 4x6	2
	55		PTS 65 (6x8x4) or 4x8x4	3
	60		38Y (6x12x7)	5
Anchor	NA			
Guy (all types)	NA			

Plant Type	Type or Size	Underground Material Cost	Buried Material Cost	Aerial Material Cost
Fiber	6			
	12			
	24			
	48			
	72			
	96			
	144			
	216			
	288			
	360			
	432			
	576			
	720			

There are hundreds of inputs (if not 1000+) related to labor, material, loadings, and network assumptions.

Item	Closure and Setup (Cost per Splice)	Placing Cost per Foot	Splicing (cost per 100pairs or per FO strand)	Telco Admin/Inspection Hrs per Media Segment
AerialFO				
BuriedFO				
UndergroundFO				

Underground Excavation Summary Table - Trenching cost per foot

Density Group	Terrain				UOM
	NORMAL	SOFTROCK	HARDROCK	WATER	
URBAN					per foot
SUBURBAN					per foot
RURAL					per foot

Buried Excavation Summary Table - Trenching cost per foot

Density Group	Terrain				UOM
	NORMAL	SOFTROCK	HARDROCK	WATER	
URBAN					per foot
SUBURBAN					per foot
RURAL					per foot

- Additional inputs account for labor loadings, engineering requirements, and sharing assumptions (i.e. pole sharing).
- Plant mix (percentage of aerial, buried, or underground applies by SAC, feeder vs distribution vs middle mile.
- Regional cost adjustments apply by Zip3 area to reflect cost variation within a study state.



- Demand data – FCC V5 Broadband Services Location Fabric. June 30, 2024.
- Serving Areas – NPSC provided boundaries
- RSMeans for labor costs and regional adjustments.
- USGS Statsgo data to define normal, soft rock, hard rock, or water. Data determine when additional cost applies.
- 2020 Census data to define census geographies and demographics.
- Service Status - <https://broadbandmap.fcc.gov/home>, December 31, 2023
- Funding Programs -- <https://fundingmap.fcc.gov/home>,

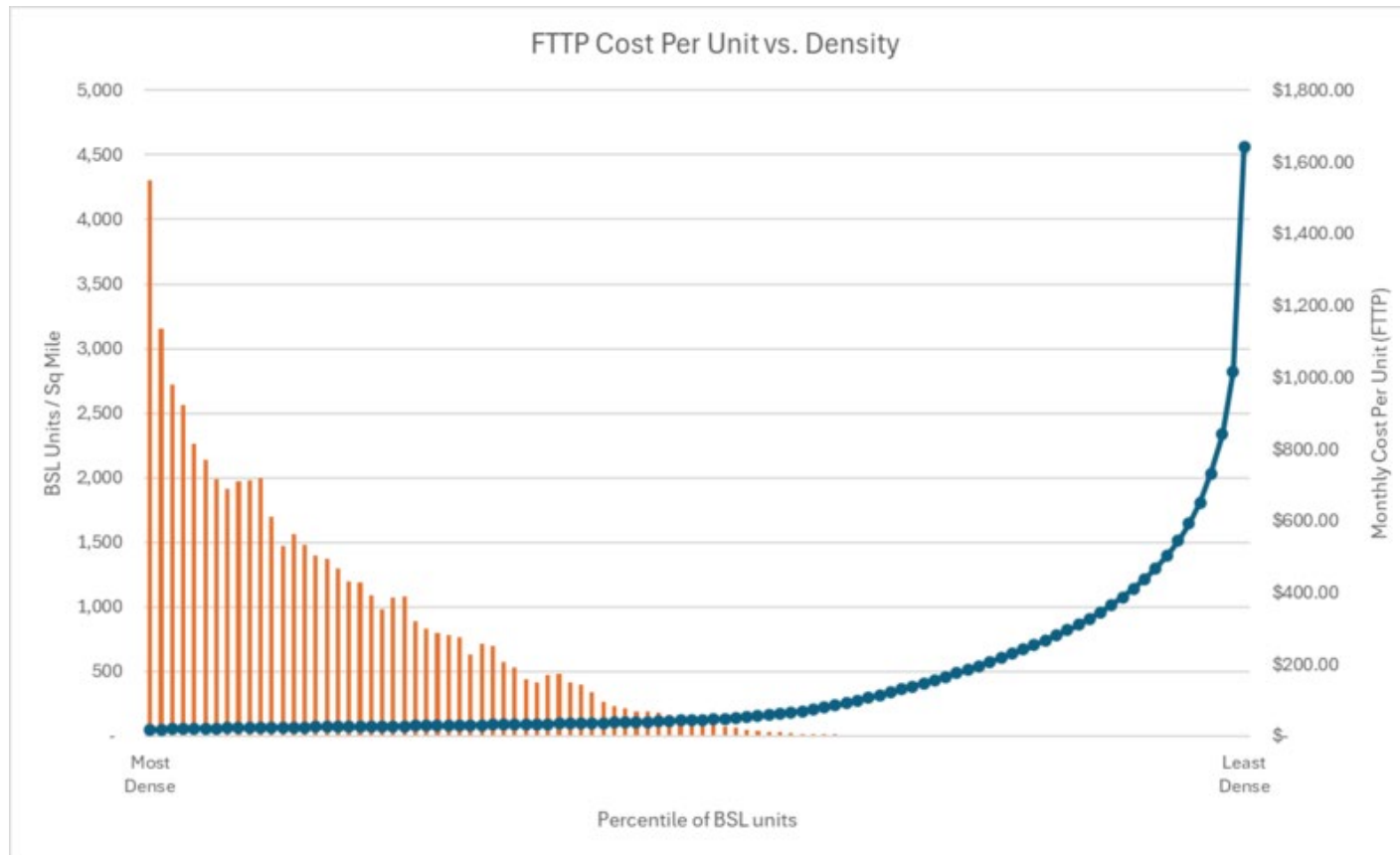
Federal Program	Not in BDC	Served	Underserved	Unserved
Not In BFM	7,907	-	-	-
No Program	2,577	838,640	17,153	23,152
Rural Digital Opportunity Fund	2	5,824	2,351	6,901
RDOF/Tribal Broadband Connectivity Program NOFO 1	-	37	-	1
Rural Digital Opportunity Fund / Enhanced Alternative Connect America Cost Model	-	7	-	2
Tribal Broadband Connectivity Program NOFO 1	2	1,799	23	155
Tribal Broadband Connectivity Program NOFO 1 / Connect America Fund Phase II	-	283	1	15
Tribal Broadband Connectivity Program NOFO 1 / Enhanced Alternative Connect America Cost Model	3	636	1,518	421
Connect America Fund Phase II	1	4,927	682	3,403
Connect America Fund Phase II / Enhanced Alternative Connect America Cost Model	-	1	-	-
Enhanced Alternative Connect America Cost Model	190	73,038	10,513	11,636
RURAL ECONNECTIVITY PROGRAM / Enhanced Alternative Connect America Cost Model	-	266	312	45
<b>Total Units</b>	<b>10,682</b>	<b>925,458</b>	<b>32,553</b>	<b>45,731</b>

# Nebraska Cost Model Results

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Subhead goes here

# Cost Results



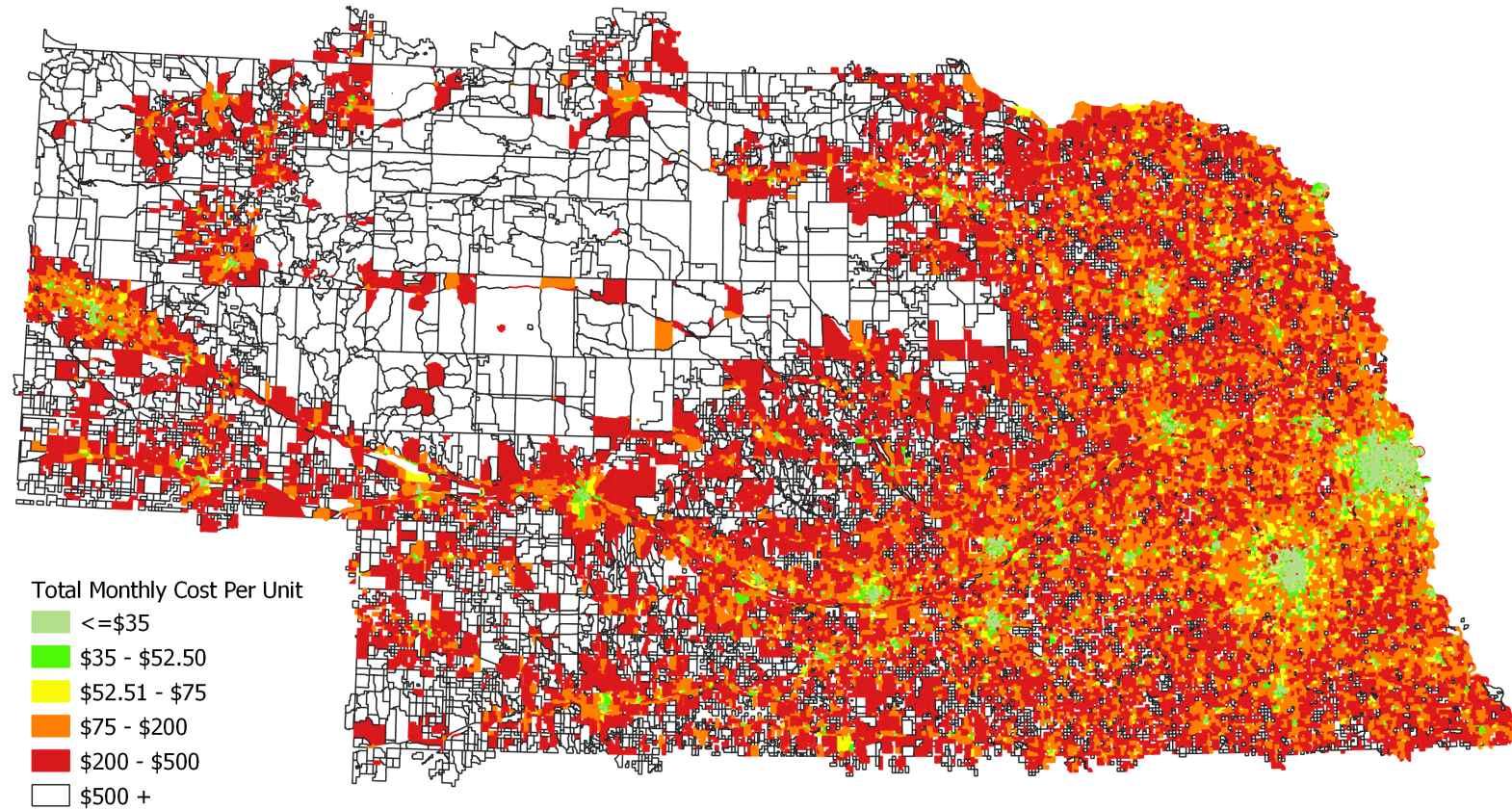
Cost per unit is inversely related to density (locations/Sq mile) where costs in more densely populated areas are less than costs in sparsely populated areas.

Unserved areas are generally less populated compared to served areas.



# Where are higher cost areas?

Monthly Cost Per Unit by Census Block



# Current Results vs 2021 Modeling

	2024 Results				2021 Results				Percentage Change		
	Node4 Working Cust	Investment Per Unit	Monthly Cost Per Unit		Node4 Working Cust	Investment Per Unit	Monthly Cost Per Unit		Node4 Working Cust	Investment Per Unit	Monthly Cost Per Unit
RoR	123,014	\$ 9,807.61	\$ 183.61		144,784	\$ 7,703.71	\$ 144.43		-15.0%	27.3%	27.1%
PC	891,410	\$ 2,362.04	\$ 47.33		922,496	\$ 2,121.40	\$ 43.63		-3.4%	11.3%	8.5%
Total	1,014,424	\$ 3,264.92	\$ 63.85		1,067,280	\$ 2,878.68	\$ 57.31		-5.0%	13.4%	11.4%

Current study results reflect the cumulative impact of demand changes, technology updates, and input updates.

Across all coverage areas, investment and cost per unit increased by a greater amount in RoR than in Price Cap areas.

Overall, investment and cost per unit increased over 11% while demand declined an average of 5%.

# Current Cost Models

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## Comparison/Contrasts

# E-ACAM vs. NTIA BEAD Support vs. NE-SBCM

	Prior NPSC (2021)	Current NPSC (2024)	NTIA (BEAD Support)	EACAM
<b>Investment Modeling</b>				
Service Areas	NPSC Defined	NPSC Defined	CASA	FCC Defined
Model Platform	ACAM Like	CACM/ACAM Like Platform + CostProLoop	CACM/ACAM Like Platform + CostProLoop	ACAM
Input Vintage	CAFI/ACAM Order ~ 2010	June-24	June-24	CAFI/ACAM Order ~ 2010
Plant Mix	ACAM	ACAM	CACM	ACAM
Splitter Ratio	32	64	64	32
Loop Technology	G-PON	XGS-GPON	XGS-PON	G-PON
Fabric (Demand Locations)	Original FCC Demand (2013) GeoResults 3Q2012 with US Census 2010.	FCC V5 BSL Fabric	FCC V5 BSL Fabric	FCC V2 BSL Fabric
Results Granularity	CB 2010	Location/Unit	Location/Unit	CB 2020
Fixed Wireless	N/A	N/A	5G large carrier style network	N/A
<b>Cost Factor Data</b>				
Discount Rate/Cost of Money	9.75%	9.75%	8.50%	9.75%
Term	N/A	N/A	20	N/A
Build timing	N/A	N/A	4 years	N/A
Subscription timing	N/A	N/A	4 years	N/A
ARPU	\$ 75.00	\$ 75.00	\$ 75.00	\$ 75.00
Take Rate	70%	70%	70%	70%
Opex	CACM/ACAM	CACM/ACAM	CACM/ACAM	ACAM
Depreciation	CACM/ACAM	CACM/ACAM	Replacement Capex using the same lives as CACM/ACAM	CACM/ACAM
Income Taxes	Original CACM/ACAM ~2010	CACM/ACAM like updated to current Federal corporate guidelines	CACM/ACAM like updated to current Federal corporate guidelines	Original CACM/ACAM ~2010
Sales Tax	Original ~2010	1/1/2024	1/1/2024	Original ~2010
Regional cost adjustments	Original ~2010	1/1/2024	1/1/2024	Original ~2010

There are two federal models to be aware of – E-ACAM and modeling used for BEAD.

NE-PSC modeling and the federal models all have the same processing logic and come from CQA's CostPro platform and CACM/ACAM/SBCM.

Differences are related to input assumptions and the granularity of results.

Since the original modeling for NE, key assumptions updates

Demand,

GPON to XGS-PON, and

Cost input assumptions.

Otherwise, logic remains the same as prior modeling.



## Contact Us

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