

Governor's Task Force
on Broadband
State of Minnesota

Cost Modeling Overview

Agenda

1. Introduction
2. Relevant Work
3. General Approach
4. Things to Consider
5. Methods
6. Questions

Who is CostQuest?



CostQuest Associates

- Cincinnati – Seattle
- Formed in 1999
- Noted economic broadband modeling company
- Noted as an independent expert in understanding communication economics
 - Federal Support Efforts
 - Underlying models for the FCC’s National Broadband Plan and the new Connect America Fund
 - Similar to models used for city analysis
 - Development and use of unique data sets
 - Industry Support Efforts
 - Models that capture the economics of network/broadband deployment
 - Tied to our deep insight into costs and engineering
 - State Support Efforts
 - Underlying models and geospatial support to understand the cost and extent of broadband deployment
 - City Support Efforts
 - Similar to our recent efforts to support the city of San Francisco, our modeling captures the economics of broadband deployment

Similar Work

- State of New York
 - New NY Broadband Program
 - Two phases complete, \$500 Billion budget
- FCC
 - National Broadband Plan (2010-2011)
 - Connect America Cost Model-Distributes funding to support voice and broadband services
- NTIA
 - State Broadband Initiative
- Private Clients
 - Wireless, cable, telcos and investment firms

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Our Approach

What's a cost model?

- A cost model is a computerized application designed to estimate the forward looking cost of deploying telecommunication or data services
 - Forward looking isn't as it is now but how you would build in the most efficient manner possible, today
- The cost model doesn't provide the exact answer, but it is an estimate that allows varying key drivers. It allows what-if analysis
 - Technology choices: Fiber to the Premise, xDSL, LTE, 5G
 - Service or competitive presence
 - Engineering choices: Bandwidth per subscriber, minutes of use
 - Cost of Materials
 - Operational Expenses

What questions have we analyzed?

- The role of mixed modes of technology
- The most 'efficient' deployment scenario by demand location
- The role of wireless in last mile in rural applications
- What is the cost for the service?

New NY Broadband Program

State of New York

- \$500 Million Fund
- Reverse auction funding mechanism
- CQA reviewed bids
- Fiber, wireless, coax/cable technologies studied
- Program covers a portion of upfront capex
- CQ also looks at the financial viability of the project once the state steps away
- Phases I and II of the program have committed funds in excess of \$340 million, including private matching funds, to more than 125,000 locations (housing units and business/organization locations).
- Accepted bids aligned closely, on average, to the CostQuest model, supporting the accuracy of the cost modeling.

State USF

Other States

- Custom Models
 - NY and others
- SBCM Models
 - Similar to FCC efforts, but typically with different goals
 - Can base effort on FCC/CQA CACM model - SBCM
 - SBCM mirrors the FCC's adopted CACM/CAM. Results can be run using either the FCC default input collection or modified inputs of the User's choice.
 - Customizations are not included in SBCM pricing.

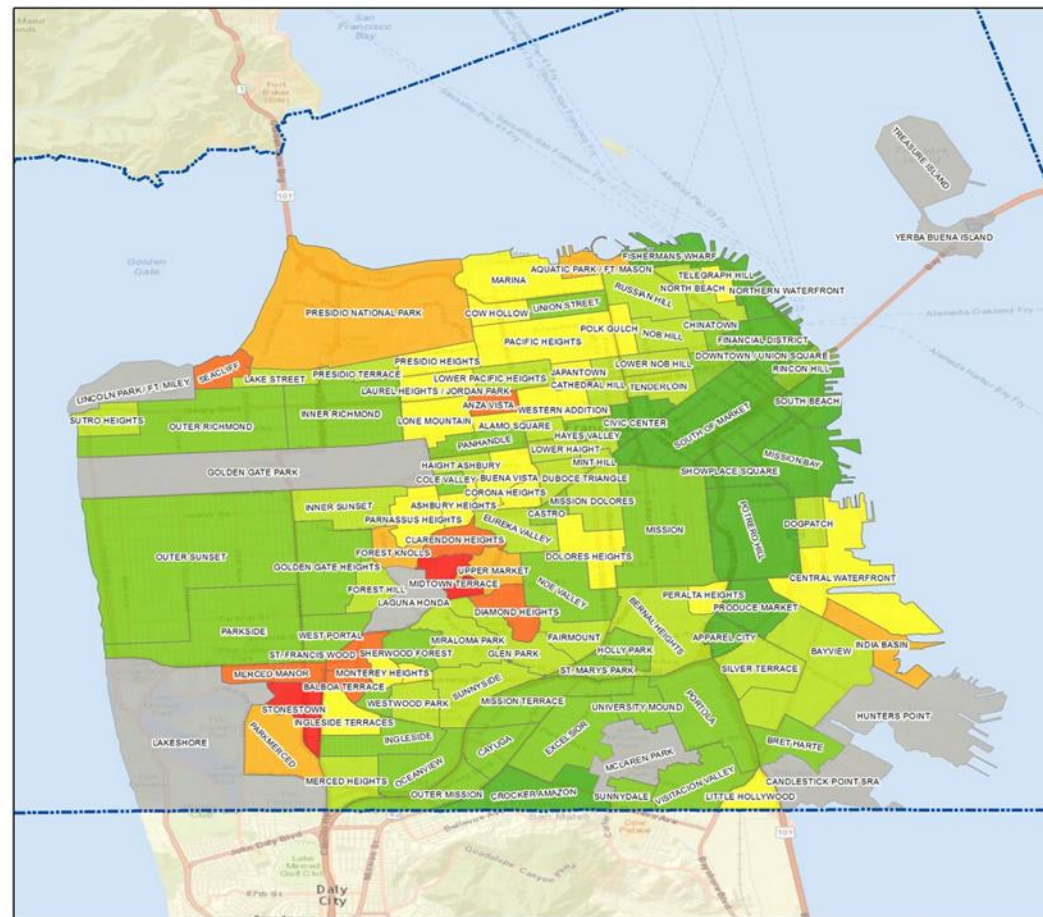
City of San Francisco

San Francisco

- Looked at 4 ownership scenarios
- Used city-owned assets
- Net Present Value of business at 10 years and 30 years
- Contribution at neighborhood level

City of San Francisco

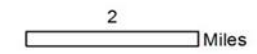
Average Annual Costs in San Francisco based on Retail with Structure Study



Census Designated Place

Annual Costs per Est. Subscriber

- \$443 - \$547
- \$548 - \$616
- \$617 - \$696
- \$697 - \$796
- \$797 - \$915
- \$916 - \$1190
- \$1191 - \$1401



Data Source:
CostQuest Associates Gigabit City Model

Service Layer Credits: Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), MapmyIndia, © OpenStreetMap contributors, and the GIS User Community



Municipal application analysis

- Full modeling of the business
- Demand (take rate) key to business case
- Revenue modeled to understand contribution margin
- Ownership models, including public-private partnerships are modeled

Municipal application analysis – Mora, MN

Demographics in Served Area

AreaSqMiles	4.95
RoadMiles	84.56
HwyMiles	-
ResLocations	1,435
BusLocations	501
Buildings	1,650
MDU	41
Households in MDU	63
ResPopulation	3,492
ResHouseholds	1,527
ResHousingUnits	1,698
BusFirms	437
BusEnterprises	64
BusEmployees	4,238
WirelessTowers	1
ResAndBusPerRoadMile	23.22
ResAndBusPerSqMile	431.27

Supply in Served Area

	Locations Served	Pct.
Cable_3orMore	1,509	77.9%
FW_3orMore	-	0.0%
Mobility_3orMore	1,936	100.0%
Telco_3orMore	1,885	97.4%
Cable_10orMore	1,509	77.9%
FW_10orMore	-	0.0%
Mobility_10orMore	1,936	100.0%
Telco_10orMore	1,726	89.2%
Cable_25orMore	1,509	77.9%
FW_25orMore	-	0.0%
Mobility_25orMore	-	0.0%
Telco_25orMore	27	1.4%

Municipal application analysis – Mora, MN

RetailProvider Study		Inputs Used for Scenario (from "Key Use Assumptions" tab)	
Component:	City Scorecard	Discount Factor	4.0%
Technology:	GPON	Length of Study	30
Provider Type:	RetailProvider	Average Useful Life of Assets	20.5
City:	Minnesota		
State:	Minnesota		

Business Case Summary



		Customer Type	
		Residential	Business
Video & High Speed Data	Install Charge	\$ 300.00	\$ 300.00
	Monthly	\$ 120.00	\$ 150.00
High Speed Data	Install Charge	\$ 300.00	\$ 300.00
	Monthly	\$ 70.00	\$ 100.00
Low Speed Data	Install Charge	\$ 300.00	\$ 300.00
	Monthly	\$ -	\$ -

Demand/Subscribers

Total Locations:	2,199.00	Housing Units:	1,698.00	Business Locations:	501.00
Assumed Take Rate:	44.4%	Assumes a market-wide average take rate leveled over 10 years. Take rates vary across rate plans/services and locations types such as residential and businesses.			
Total Subscribers:	872.56	Residential:	652.24	Business/Orgs:	220.33

Initial Investment with Success Capital

Total Investment (upfront and success based capital costs) to Deploy Network (excludes maintenance capital):	\$3,637,700.02
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Summary of Business Case (levelized multi-year run rate)

Total Annual Costs:	\$580,677.68	Annual Capital Costs:	\$242,081.55	Annual Operational Costs:	\$338,596.13
Annual Revenue:	\$582,021.00	Annual Contribution Margin:	\$1,343.32		
Total 10-Year Levelized Net Present Value of Business (assuming sale of assets at end):	\$596,899.29				

Subscriber Statistics

Per Active Subscriber Statistics	Capital Per ACTIVE line	\$ 5,239.13
	Net Non-Recurring Cost ("Customer Turn Up") per Line TOTAL	\$ 36.42
	Total Monthly Revenue Run Rate per ACTIVE line	\$ 69.85
	Total Monthly Cost per ACTIVE Line Run Rate	\$ 69.69
	Monthly Capital Costs per ACTIVE line	\$ 29.05
	Monthly Operating Expenses Per ACTIVE line	\$ 40.64
Levelized Monthly Contribution per ACTIVE line Run Rate	\$ 0.16	

FCC Connect America Models

FCC's Connect America Fund

- Cost modeling measured the cost to provide broadband voice against a benchmark
- FCC supported areas based on cost and presence of competition.
- Model provided a distribution mechanism for a limited USF budget

Goals, objectives and policy drive the analysis

- What do you build?
 - Does the 25 x 3 network also have to support the 100 x 20 network?
- What scale are you analyzing and reporting?
- Who gets the build, who doesn't?
- Do existing assets come into the analysis?
- What data is available?
- What data gaps have to be addressed?

Multi-Service Models

- Most granular
- Cost by service by customer
- Used in regulatory hearings

Single Service Models

- Broadband and voice services by Census Block
- CACM / New York

Business Case Models

- Gigabit city models
- San Francisco GBCM

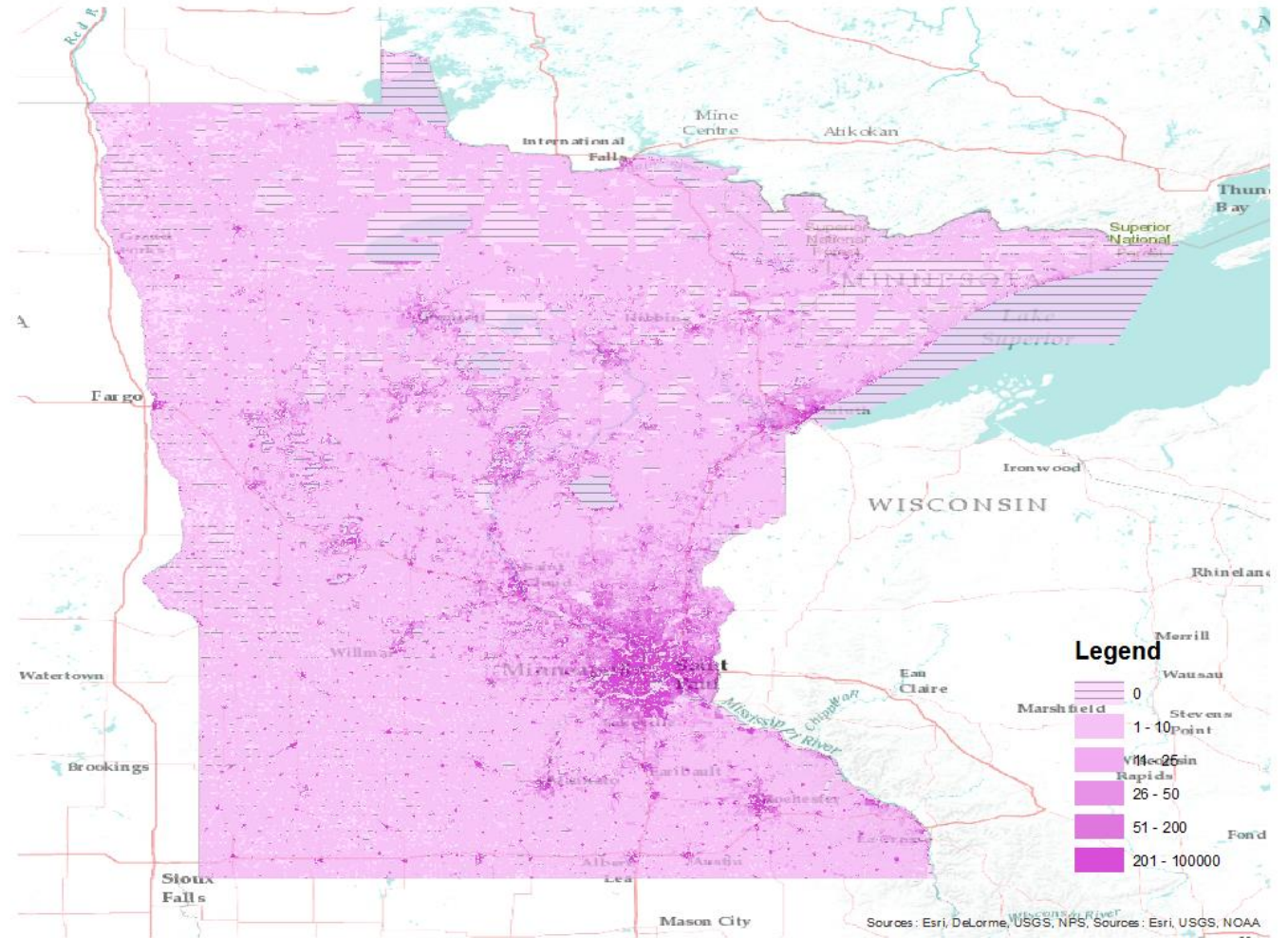
The platform choice is driven by project goals.

Types of Models

For the cost
estimate,
what are you
building

- Minnesota has a mix of densities?
 - How do you define urban and rural?
Does everyone get the same level of service?
- What is the type of network?
 - Fiber to the premise
 - Wireless
 - Hybrids
- What is the scale of the analysis?
 - Demand locations
 - Neighborhoods
 - Cities
 - Counties?

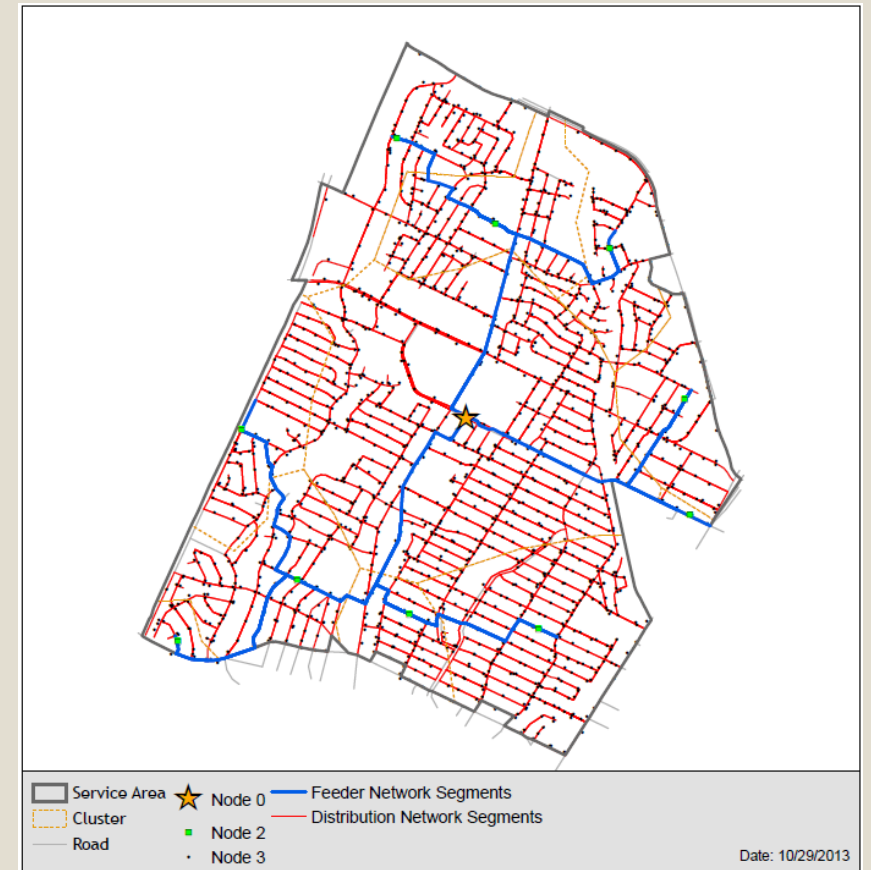
Housing Unit Density



Fiber Deployment Approach

Using CostQuest's network modeling tool, each neighborhood is engineered

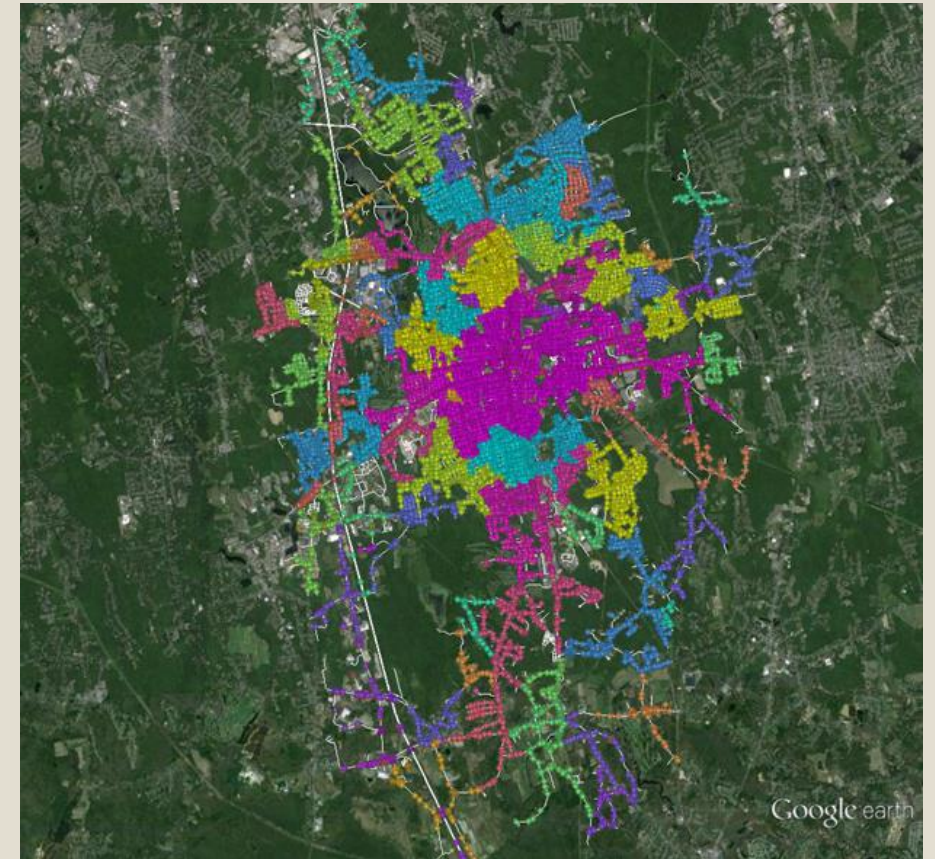
- Capital requirements identified
 - To Pass
 - Success/Connect



Fiber Deployment Approach

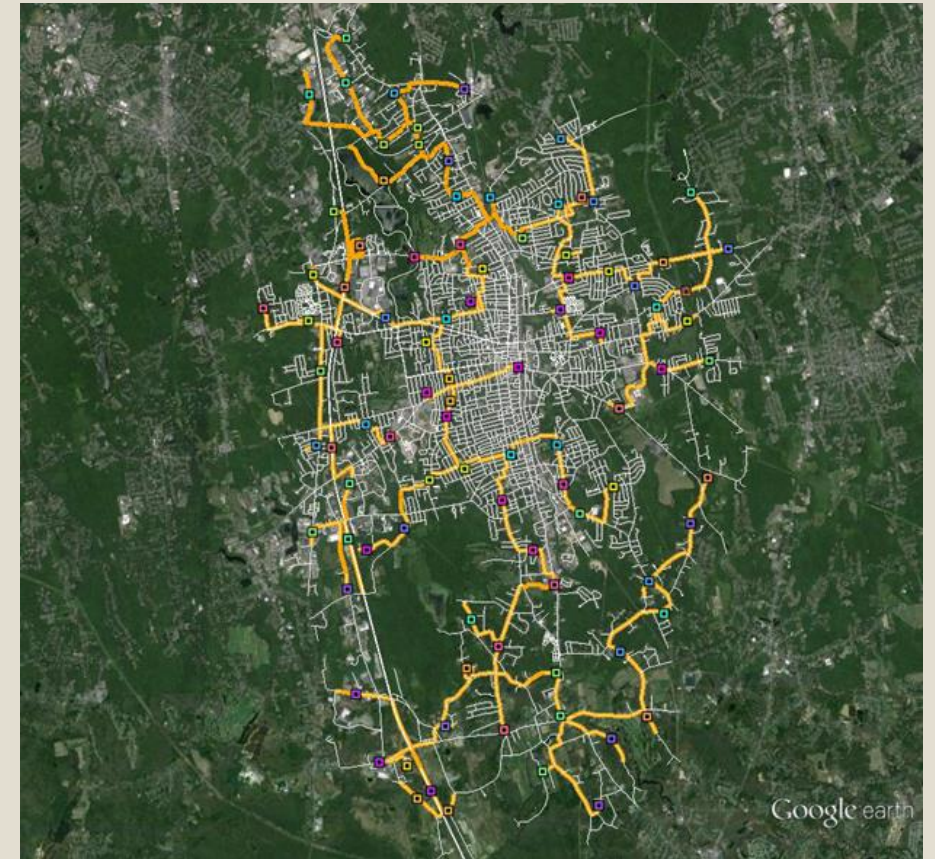
Access Distribution

Service Area Footprint – Pedestals for Customers



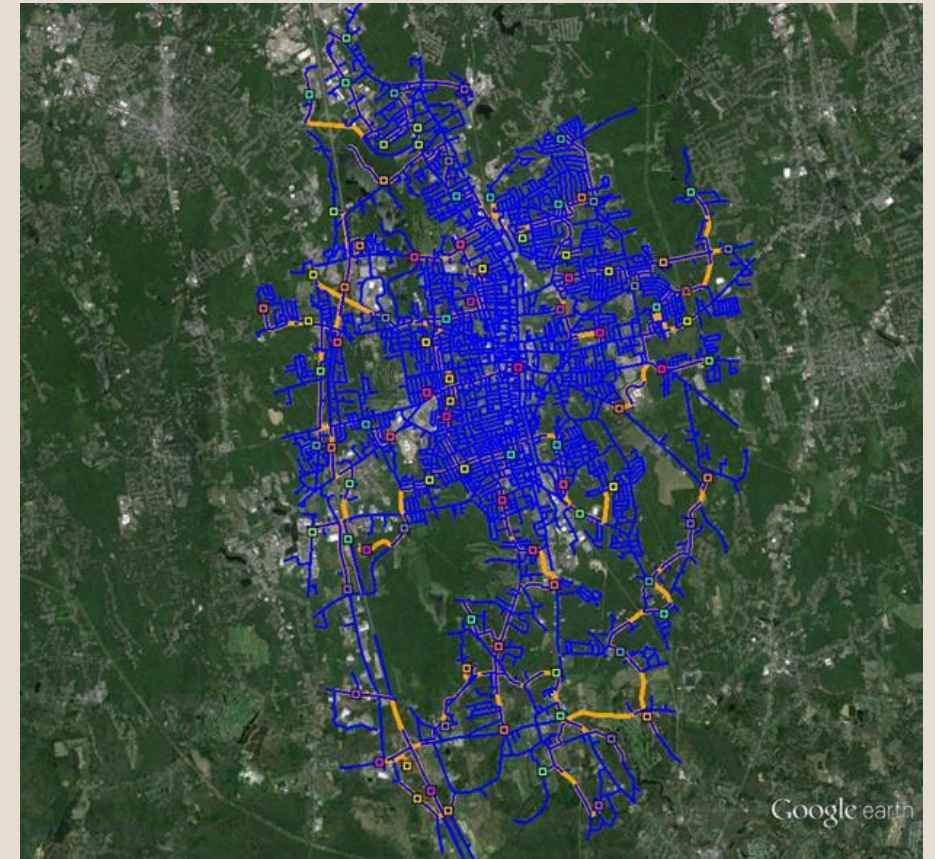
Fiber Deployment Approach

Access Distribution
Feeder Routing



Fiber Deployment Approach

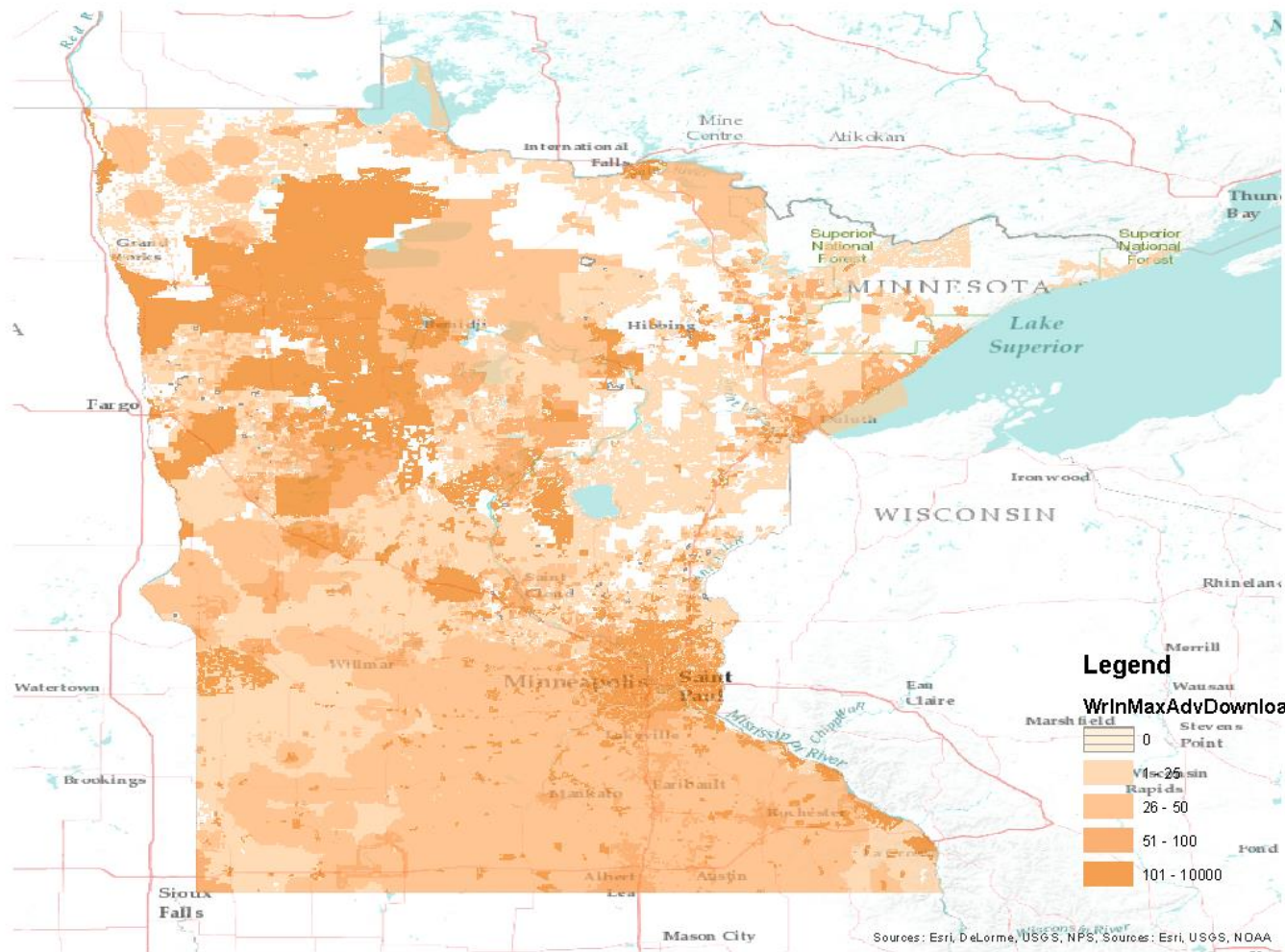
Access Distribution
Distribution Routing



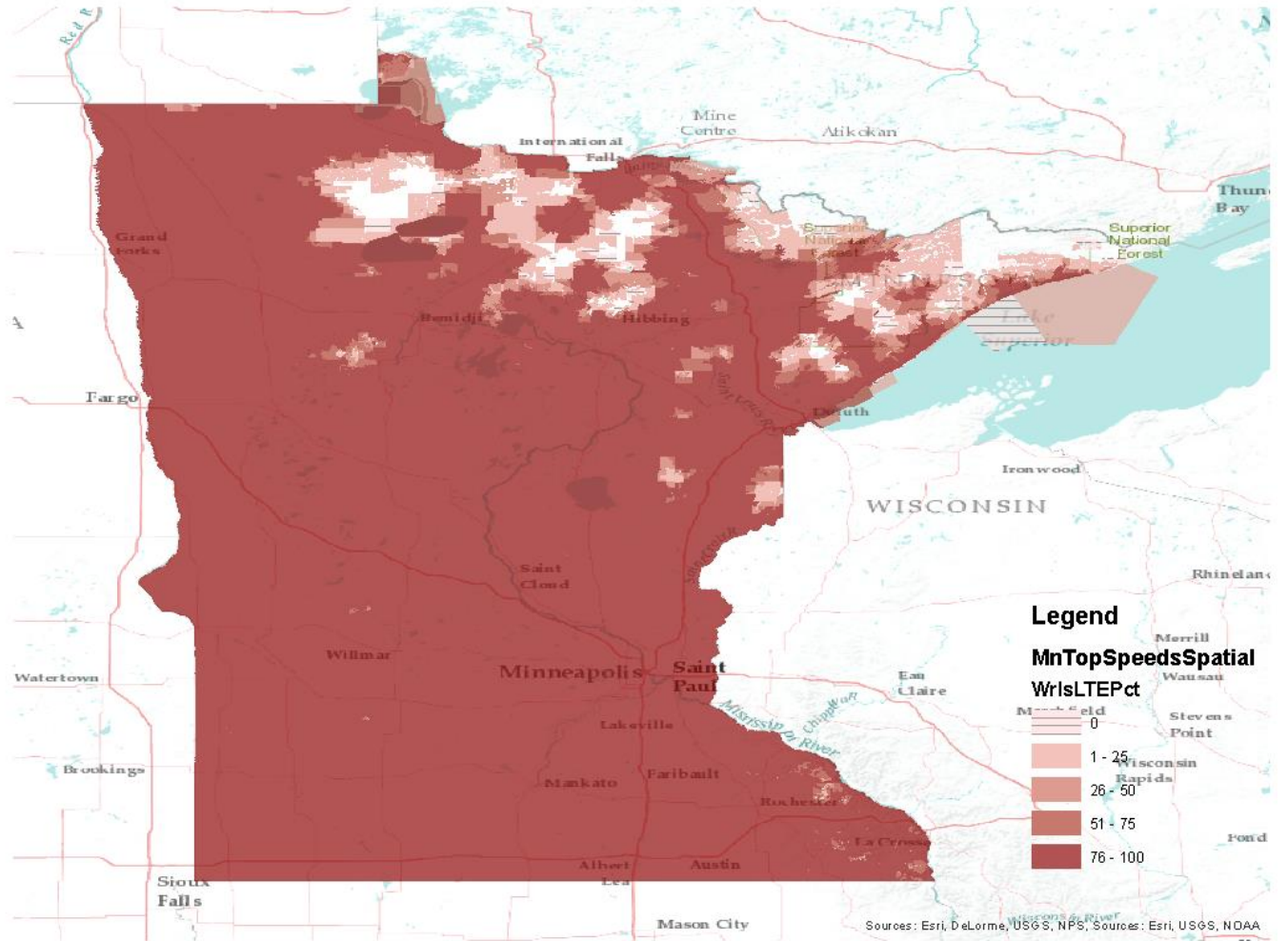
What is the role of existing service?

- Does present service impact where and what is built?
- How are you measuring the presence of existing service?

477 Wireline Speeds



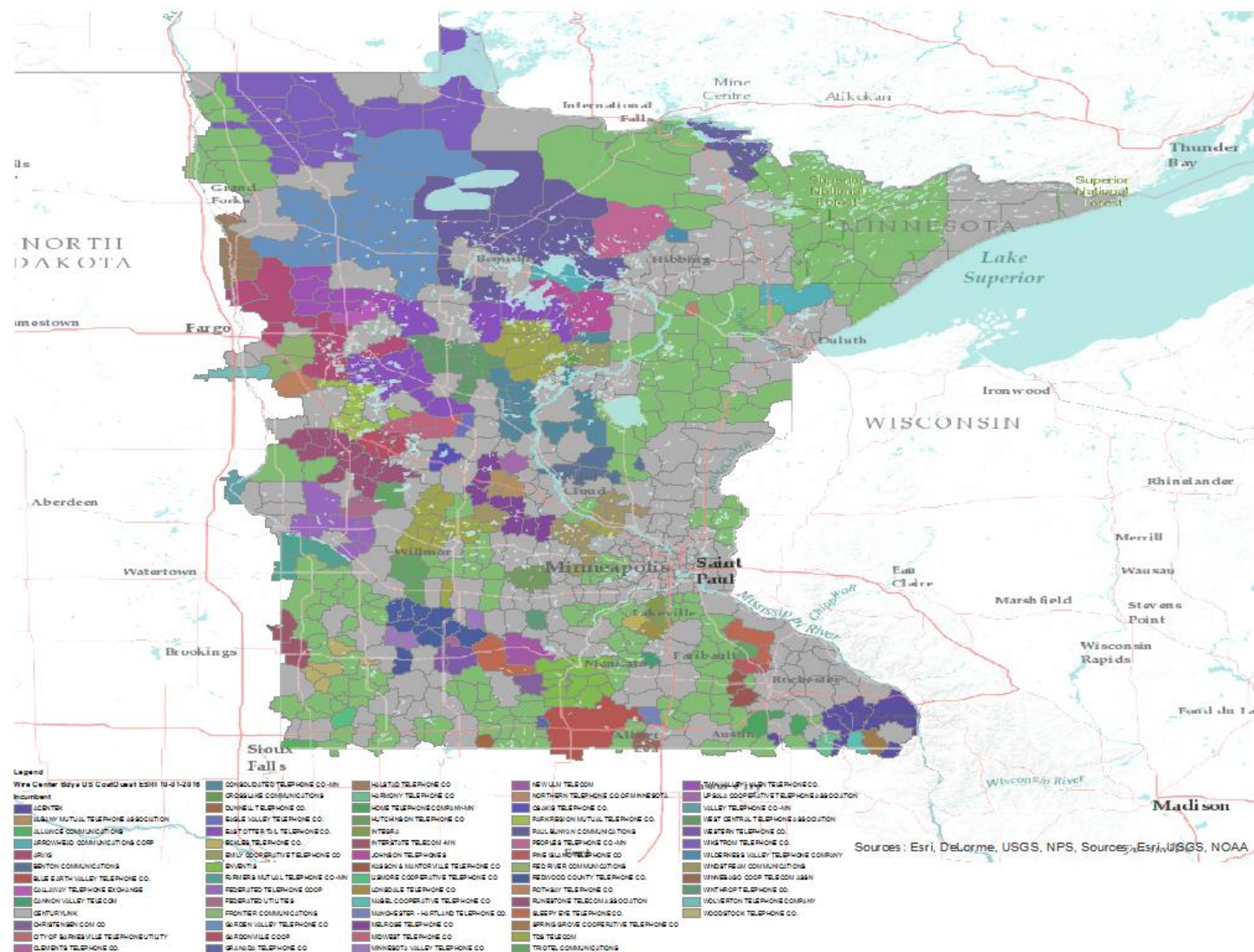
477 LTE Presence



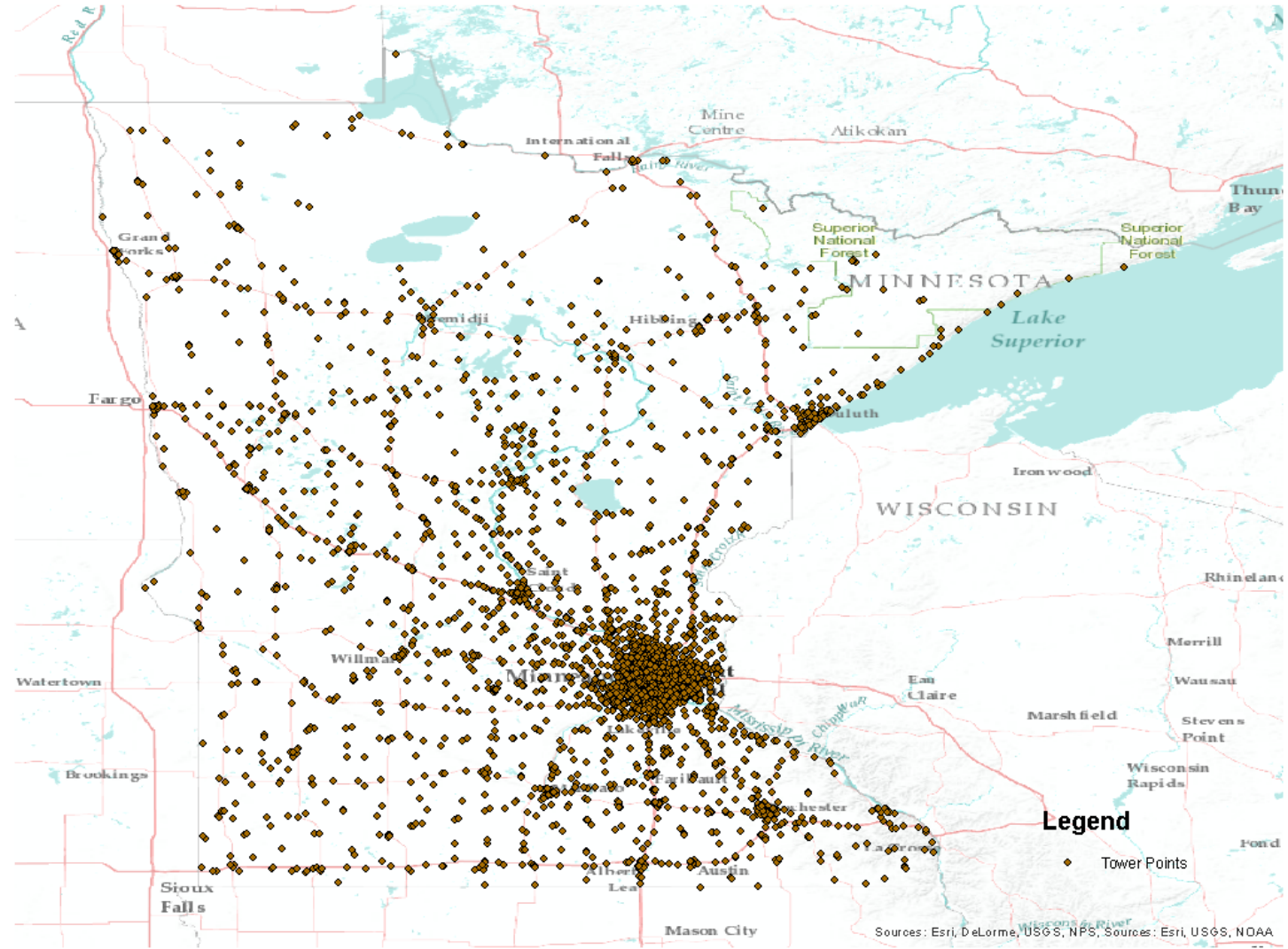
What is the role of existing infrastructure?

- Is a cost carried for 're-usable' assets like telephone poles and conduit?
- Does everyone share a middle mile connection

ILEC Infrastructure



Tower Map



What data is needed?

- One served / all served nature of 477 data
- How far should the state build?-the long driveway / special construction problem.
- Are there pockets of urban unserved due to building ownership
- Does affordability impact the analysis?

Questions?

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