



CostQuest Associates

TFI Communications Technology
Conference, January 25-26, 2018,
Austin, Texas

Communications Public Policy Issues Review

Industry and Infrastructure Impacts

Agenda

1. Introduction
2. Policy Update: Net Neutrality
3. Policy Update: Infrastructure
4. The State of Broadband: Today and Tomorrow
5. Policy Update: Other
6. Possible Impacts to Tax and Valuation
7. 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

Policy Update: Net Neutrality

Net Neutrality in a Nutshell

- Some detail on the Order
 - What it does
 - What it doesn't do
- Potential Consumer Impact
 - Pricing/Value
 - Access to content
- Industry Impact
 - Market control
 - Competition and Consolidation
 - Other
- The Order's Future
 - Short-term
 - Long-term

Policy Update: Infrastructure

Infrastructure Policy: Federal

- Infrastructure Bill
 - Committee Updates
 - Executive Branch

Policy Update: Infrastructure

Infrastructure Policy: Federal

- **Connect America Fund**
 - CAFII Auction
 - Mobility Fund II

CAF II

Infrastructure Policy: Federal

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CAF II

Price Cap residual – this is what's left of the modeled price cap funding that was turned down. **\$2bil per year for 10 years**

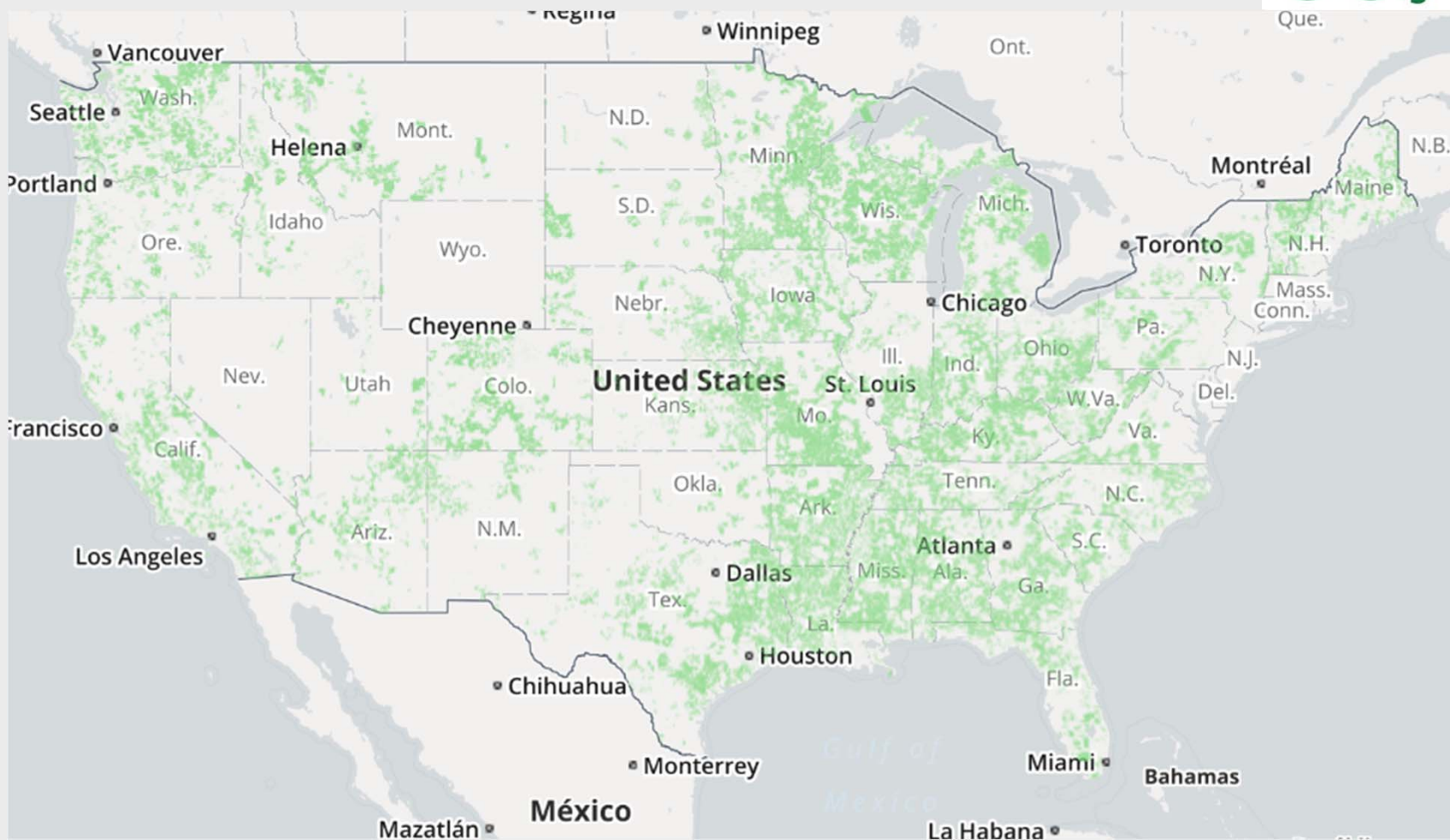
There is a reserve (which is quite a bit higher)

Process

- Eligible areas will be announced (areas w/o 10/1 service)
- Short Form Applications are due
- Auction
- Long Form Applications
- Funding approval
- Validation/Accountability

CAFII Eligible Areas

Mapbox Image



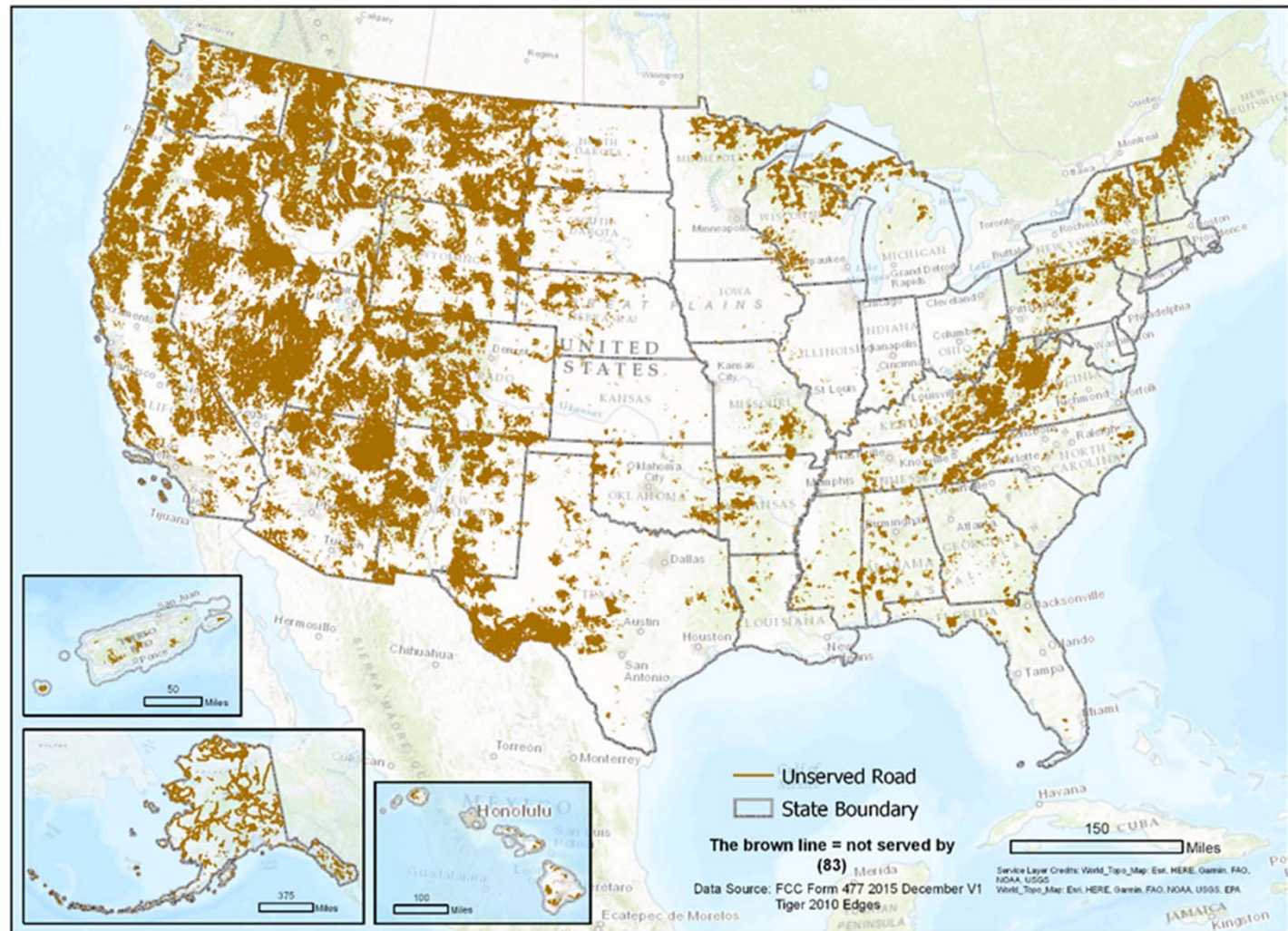
Mobility Fund II

- \$500mil annually for 10 years
- Reverse Auction
- Coverage
- Challenge Process

Unserved Roads of all LTE and above Mobile Broadband

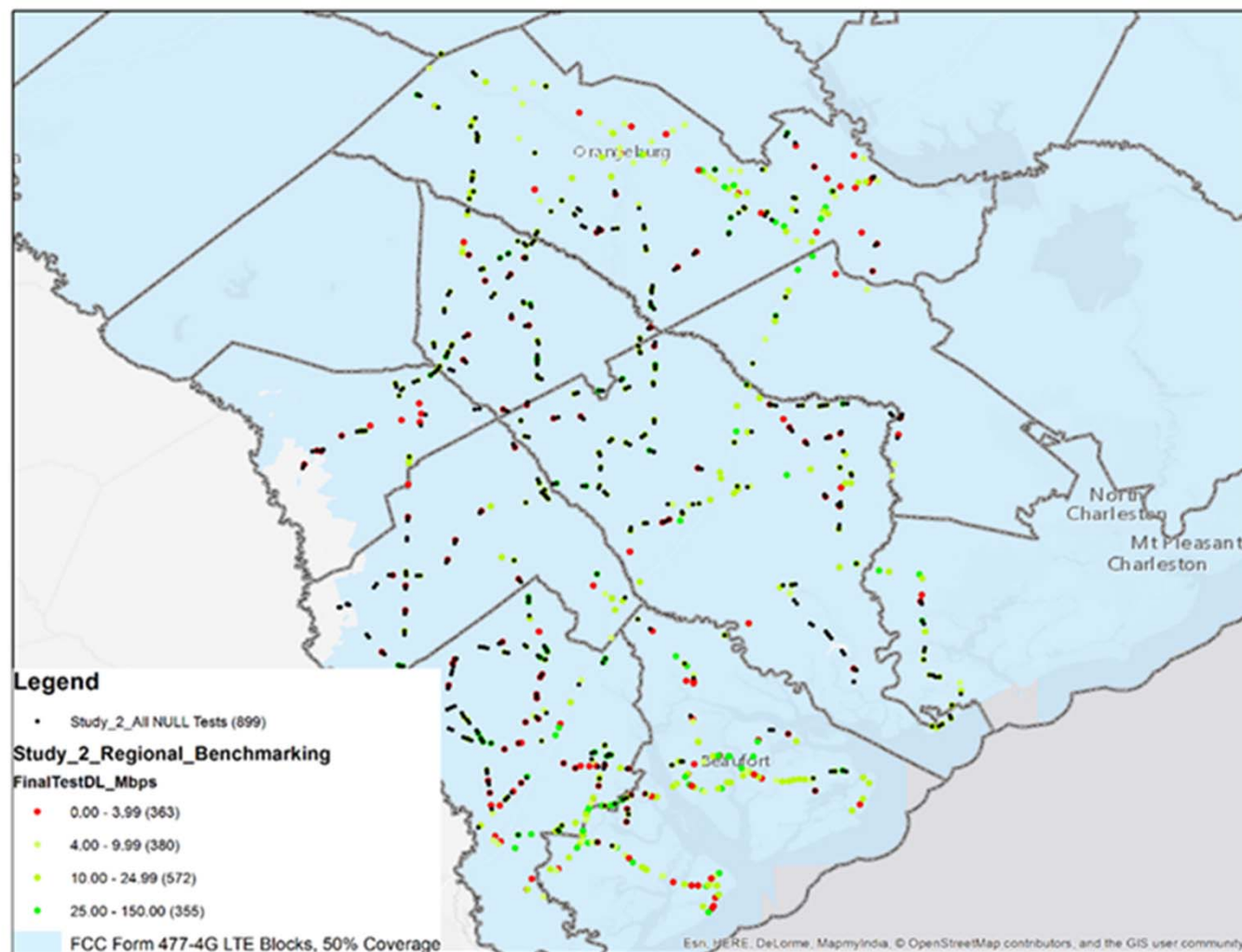


Mobility Fund



Coverage and the Challenge Process

Mobility Fund II



Policy Update: Infrastructure

Infrastructure Policy: State

- State Changes
 - Easing build-out burden
 - State-wide programs
 - FirstNet
 - Other

Policy Update: Infrastructure

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.

Policy Update: Infrastructure

Other States: State Assembly and Governors' House Rumblings

- **Pennsylvania**
- **Georgia**
- **Others**
 - Uptick in interest in State BB Models (leading indicator?)
 - 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.

Policy Update: Infrastructure

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Policy Update: Infrastructure

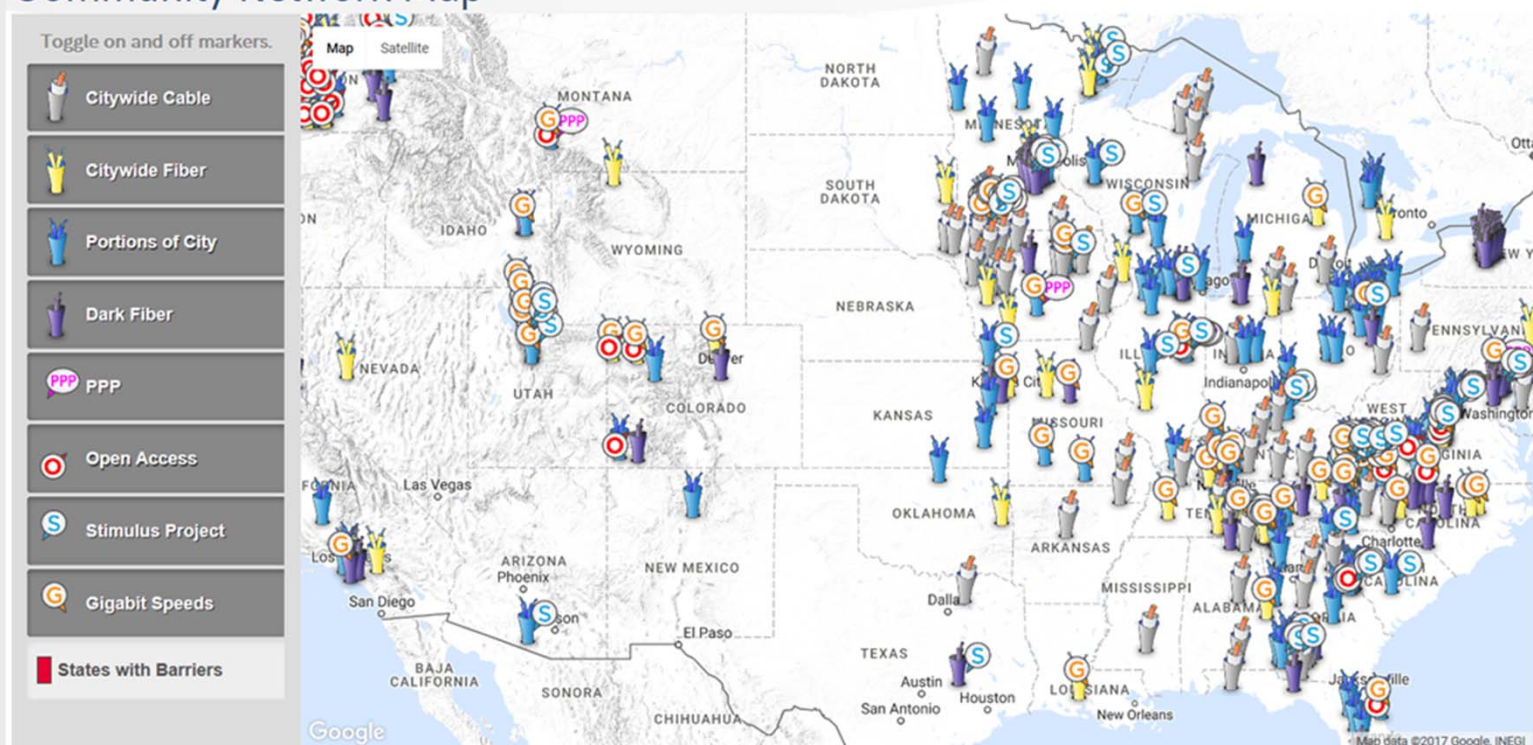
Infrastructure Policy: Local

- Municipal Movements
 - Easing build-out burden
 - City-wide programs
 - Digital Divide
 - PPP Programs (generally)
 - Smart City

- Roughly 100 Citywide Municipal FTTH Networks (<https://muninetworks.org/>)
- Various forms of PPP
- Public Utilities Districts are building in rural towns
- Electric Cooperatives are building in rural and suburban municipalities
- Hundreds of municipalities doing feasibility studies

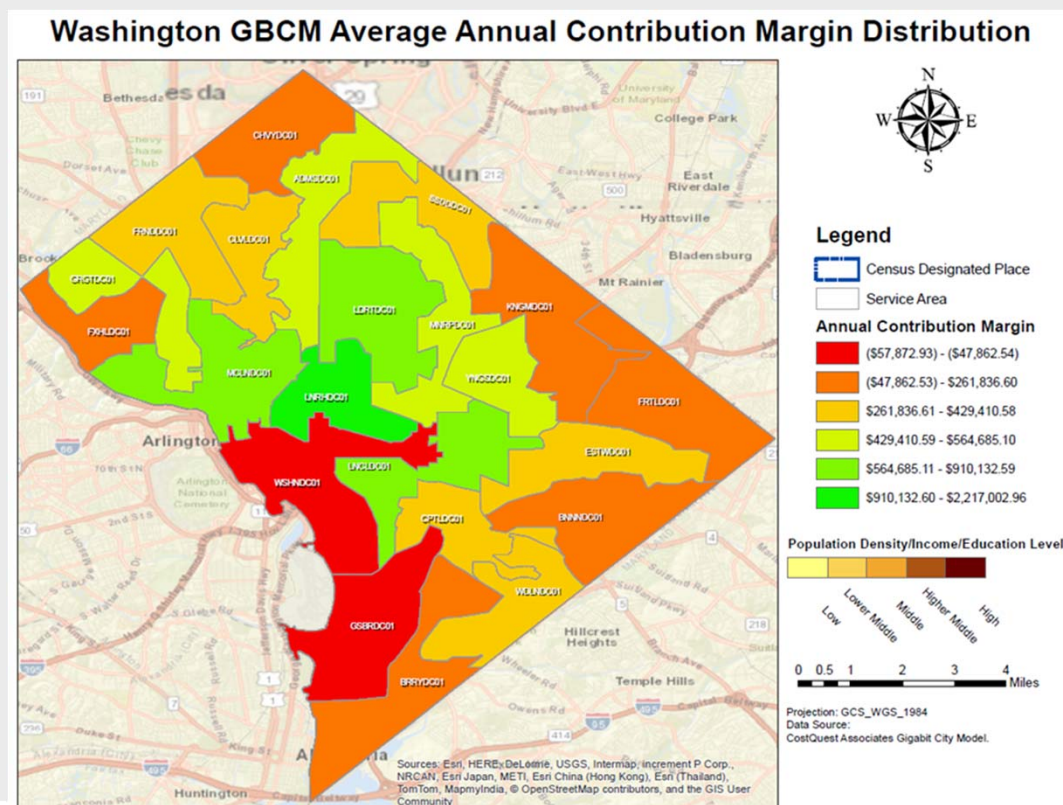
Community Network Map

Municipal Broadband



- Municipal broadband is a neighborhood-by-neighborhood proposition
- Demand drives contribution margin
- Delivery/plant-type are big factors (aerial/underground/buried)
- Lease rates (conduit, pole attachments, etc..) are key

Municipal Broadband



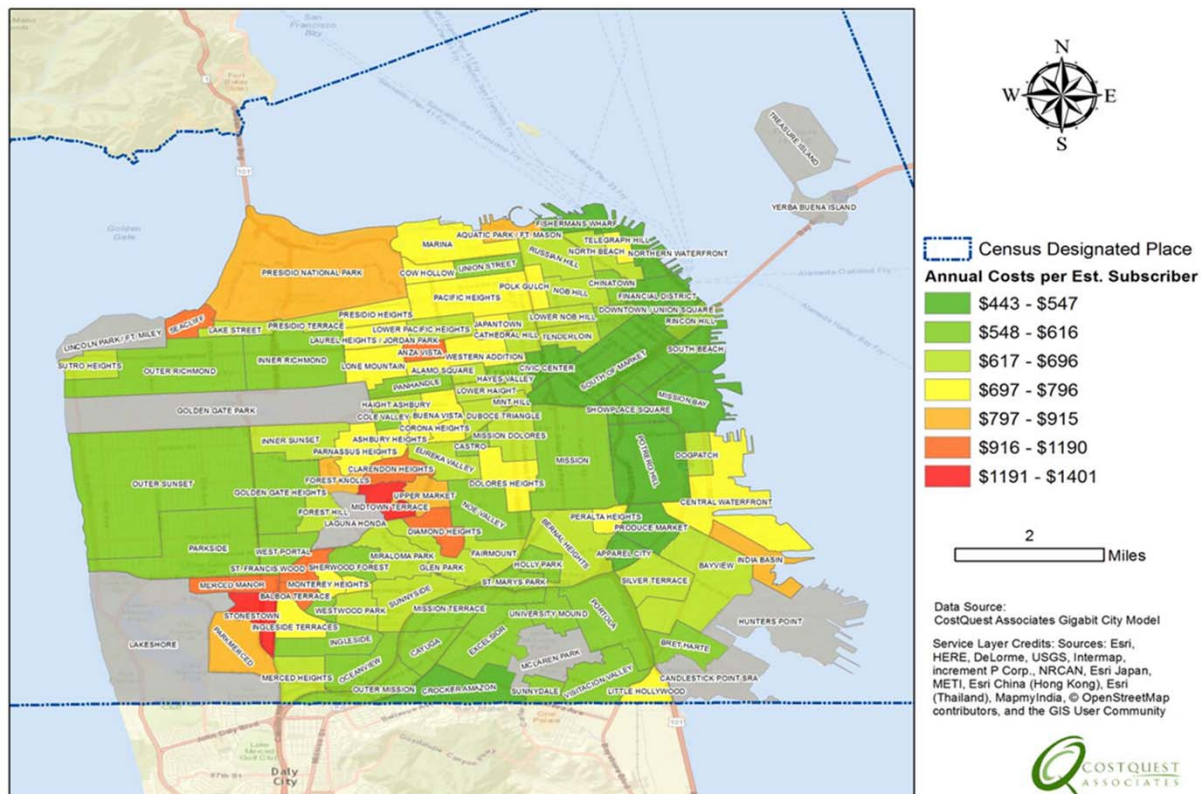
City of San Francisco

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



Municipal FTTH Ranking – Propensity for Success

- We have scored each city in the country in regard to Fiber deployment

Municipal Ranking for FTTH

CDP Prioritization Score (Scale: 0 - 200, Average 100)	MSA Average Prioritization Score (Scale: 0 - 200, Average 100)	Profile	Demand	Supply	Other	Biz Environmen	Sta	CDPName	MSA
200.0	116.1	116	1	1	29	168	VA	Lansdowne	Washington-Baltimore-Arlington, DC-MD-VA-WV-PA
179.6	155.5	626	159	1	70	532	TX	Austin city	Austin-Round Rock, TX
178.2	155.5	551	155	142	117	532	TX	Cedar Park city	Austin-Round Rock, TX
177.4	155.5	1428	1	1	198	532	TX	Kyle city	Austin-Round Rock, TX
177.3	155.5	190	259	163	241	532	TX	Brushy Creek	Austin-Round Rock, TX
176.0	115.1	567	512	1	9	1386	AL	Madison city	Huntsville-Decatur-Albertville, AL
173.9	155.5	739	212	153	141	532	TX	Round Rock city	Austin-Round Rock, TX
173.9	110.3	986	976	1	2	959	FL	Sunny Isles Beach city	Miami-Fort Lauderdale-Port St. Lucie, FL
173.3	123.8	884	1	166	651	532	TX	Little Elm city	Dallas-Fort Worth, TX-OK
173.0	116.1	17	1668	242	5	168	VA	Tysons Corner	Washington-Baltimore-Arlington, DC-MD-VA-WV-PA
172.3	153.7	934	714	1	47	168	VA	Cave Spring	Roanoke, VA
171.7	150.7	571	60	171	884	532	TX	Cibolo city	San Antonio-New Braunfels, TX
171.3	116.1	79	169	260	103	168	VA	McNair	Washington-Baltimore-Arlington, DC-MD-VA-WV-PA
169.8	116.4	2674	1	1	285	869	AZ	Arizona City	Phoenix-Mesa-Scottsdale, AZ
168.5	155.5	312	1030	132	157	532	TX	Jollyville	Austin-Round Rock, TX
167.1	110.3	662	2120	1	11	959	FL	Miami Beach city	Miami-Fort Lauderdale-Port St. Lucie, FL
167.1	123.8	1514	249	1	234	532	TX	Midlothian city	Dallas-Fort Worth, TX-OK
166.3	145.5	3077	351	1	20	532	TX	Mission city	McAllen-Edinburg, TX
166.0	150.7	1969	222	155	168	532	TX	San Antonio city	San Antonio-New Braunfels, TX
165.5	145.5	2395	720	1	19	532	TX	McAllen city	McAllen-Edinburg, TX
165.0	153.7	1995	464	1	144	168	VA	Hollins	Roanoke, VA
164.1	127.6	2020	83	1	726	532	TX	Horizon City city	El Paso-Las Cruces, TX-NM
164.0	116.1	78	489	285	63	168	VA	Fair Oaks	Washington-Baltimore-Arlington, DC-MD-VA-WV-PA
164.0	121.0	1836	1062	1	43	386	SC	Aiken city	Augusta-Richmond County, GA-SC
163.1	123.8	1221	95	177	1026	532	TX	Forney city	Dallas-Fort Worth, TX-OK
163.0	125.0	2249	2600	1	7	70	TN	Millington city	Memphis-Forrest City, TN-MI S-AR
162.9	153.2	1903	465	1	148	532	TX	Killeen city	Killeen-Temple, TX
162.3	123.8	2565	457	1	92	532	TX	Glenn Heights city	Dallas-Fort Worth, TX-OK
162.2	155.5	834	2145	1	59	532	TX	Wells Branch	Austin-Round Rock, TX
161.5	161.5	3191	547	1	30	532	TX	Laredo city	Laredo, TX

Policy Update: Other

Other Policy Issues

- Spectrum
- IoT
- Consumer Protection
- Privacy
- Cybersecurity
- Other

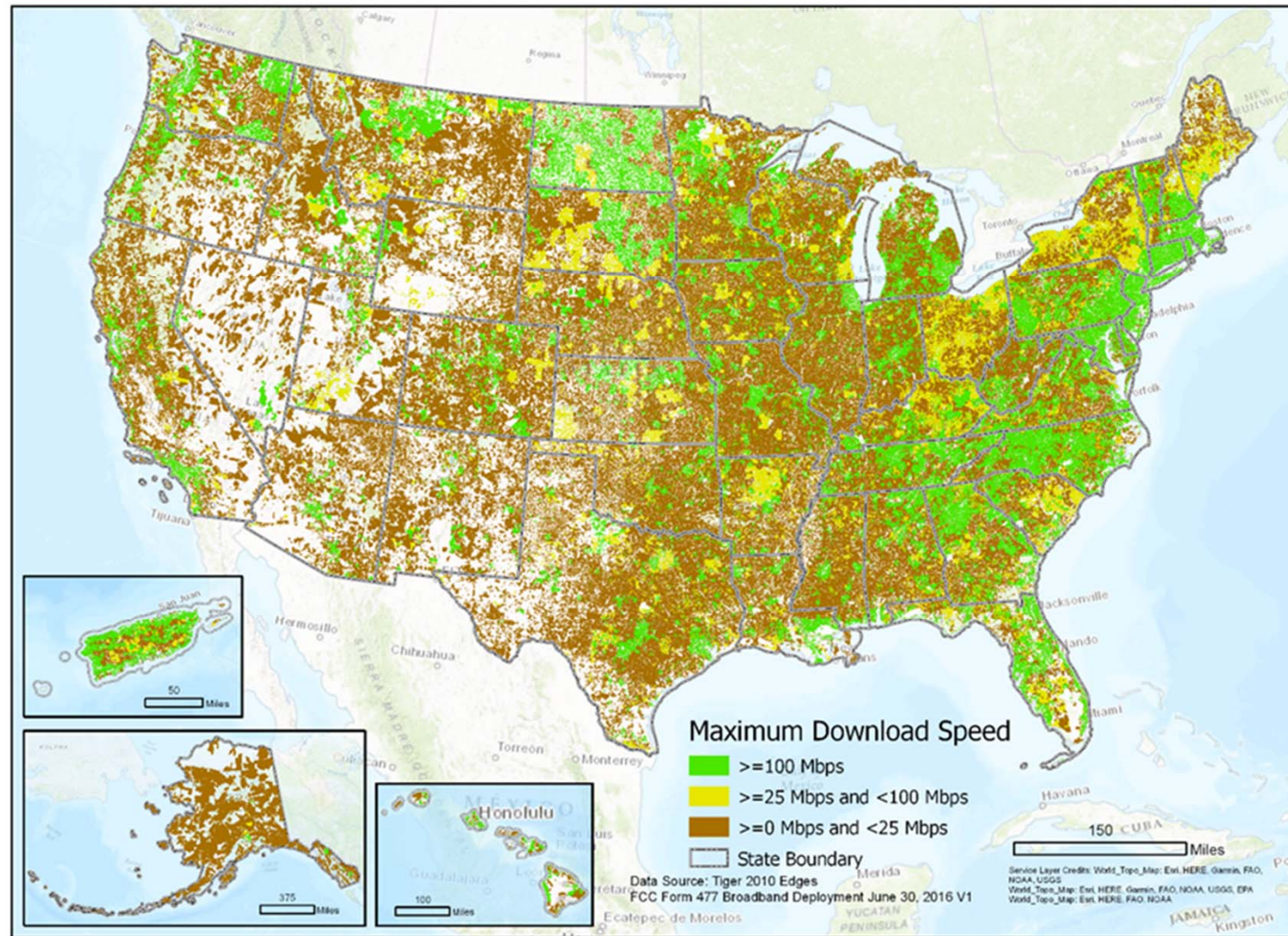
The State of Broadband: Now and Tomorrow

- **Current Coverage and Availability**
 - Terrestrial
 - Mobile Wireless
- **Fiber Deep**
- **5G Deployment**

Current
Coverage:
Terrestrial

Nationwide Terrestrial (non-mobile) Broadband Speed Coverage

CQA



Current Coverage: Terrestrial

State by State Terrestrial Broadband Speed Coverage

State	Served	UNDERServed	UNserved	State	Served	UNDERServed	UNserved
AK	69.3%	3.9%	26.8%	MS	55.6%	12.5%	31.9%
AL	65.8%	16.2%	18.1%	MT	59.7%	10.0%	30.3%
AR	52.9%	24.9%	22.2%	NC	89.5%	2.9%	7.6%
AS	0.0%	0.0%	100.0%	ND	88.2%	3.9%	7.8%
AZ	81.2%	4.6%	14.2%	NE	61.0%	22.6%	16.5%
CA	86.4%	7.6%	6.0%	NH	78.6%	15.2%	6.2%
CO	85.4%	2.9%	11.7%	NJ	98.8%	0.0%	1.2%
CT	99.0%	0.0%	1.0%	NM	71.5%	6.9%	21.6%
DC	98.6%	0.0%	1.4%	NV	88.7%	2.5%	8.8%
DE	96.8%	0.0%	3.2%	NY	70.6%	26.5%	2.9%
FL	91.3%	3.8%	5.0%	OH	22.0%	70.8%	7.2%
GA	85.1%	5.3%	9.6%	OK	68.1%	6.1%	25.8%
GU	0.0%	100.0%	0.0%	OR	86.7%	2.1%	11.2%
HI	94.9%	0.0%	5.1%	PA	87.7%	6.1%	6.2%
IA	76.9%	5.4%	17.7%	PR	86.9%	2.6%	10.5%
ID	66.5%	12.2%	21.3%	RI	98.3%	0.0%	1.7%
IL	89.5%	1.7%	8.8%	SC	48.7%	40.2%	11.1%
IN	74.1%	11.5%	14.3%	SD	71.7%	12.4%	15.9%
KS	72.6%	11.0%	16.4%	TN	85.7%	3.1%	11.3%
KY	25.2%	61.3%	13.5%	TX	53.7%	31.5%	14.8%
LA	78.8%	4.6%	16.6%	UT	86.8%	5.6%	7.6%
MA	94.8%	2.7%	2.5%	VA	85.5%	4.0%	10.5%
MD	95.5%	0.3%	4.2%	VI	0.0%	98.3%	1.7%
ME	17.6%	72.1%	10.3%	VT	76.5%	8.3%	15.2%
MI	84.6%	1.9%	13.5%	WA	91.0%	2.7%	6.3%
MN	82.1%	5.1%	12.8%	WI	40.3%	44.1%	15.6%
MO	76.7%	3.8%	19.5%	WV	68.1%	5.3%	26.6%
MP	0.0%	0.0%	100.0%	WY	65.6%	8.5%	25.9%

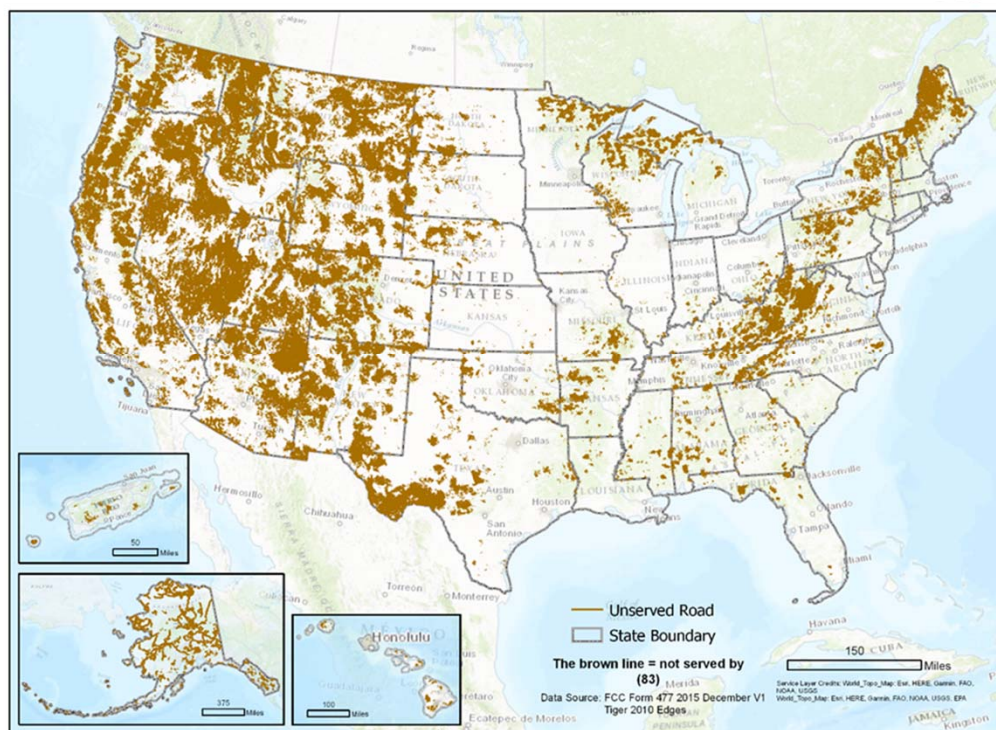
Source: June 2016 FCC 477 Data

Produced by: CQA

Current Coverage: Mobile

Unserved Roads of all LTE and above Mobile Broadband

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Road Based LTE Coverage

State	LTE Road Coverage	State	LTE Road Coverage
AL	97.2%	NV	60.4%
AK	27.0%	NH	90.3%
AZ	75.2%	NJ	99.9%
AR	94.6%	NM	80.5%
CA	88.9%	NY	94.8%
CO	83.9%	NC	96.4%
CT	99.9%	ND	96.2%
DE	100.0%	OH	98.2%
DC	100.0%	OK	97.0%
FL	98.5%	OR	71.3%
GA	98.1%	PA	94.1%
HI	95.6%	RI	100.0%
ID	71.7%	SC	99.0%
IL	99.8%	SD	97.3%
IN	99.6%	TN	97.0%
IA	99.9%	TX	94.3%
KS	99.8%	UT	70.8%
KY	89.7%	VT	82.9%
LA	98.4%	VA	93.1%
ME	74.2%	WA	80.3%
MD	99.8%	WV	74.5%
MA	99.1%	WI	94.0%
MI	93.5%	WY	81.4%
MN	95.7%	AS	0.0%
MS	98.3%	GU	100.0%
MO	98.3%	MP	0.0%
MT	61.8%	PR	99.1%
NE	98.2%	VI	98.1%

Source: Dec 2014 FCC 477 Data

Produced by: CQA

CQA

The State of Broadband: Now and Tomorrow

- **Fiber Deep: How far into the network?**
- **Fiber Ubiquity: Competition and the new “land race”**
- **In Support of Mobility**

The State of Broadband: Today and Tomorrow

- **5G Deployment Update**

- Timeline
- Costs
- What it means for other technology modes
- Densification of the network

Wireless Model: 5G Deployment

Worked with FCC to develop 5G Costs to Deploy

- Ubiquitous
- Supported Autonomous Driving
- Supported various demand scenarios

Wireless Model: 5G Deployment

Study Description		User Demand	Total Investment
Scenario 1	Ubiquitous Coverage	2Gb/Mo.	\$61B
Scenario 2	Ubiquitous Coverage, Future Demand	50Gb/Mo.	\$145B
Scenario 3	Ubiquitous Coverage, Autonomous Vehicle support	2Gb/Mo.	\$185B
Scenario 4	Ubiquitous Coverage, Autonomous Vehicle support, Future Demand	50Gb/Mo.	\$250B

Wireless Models: 5G Deployment

High-Level Method

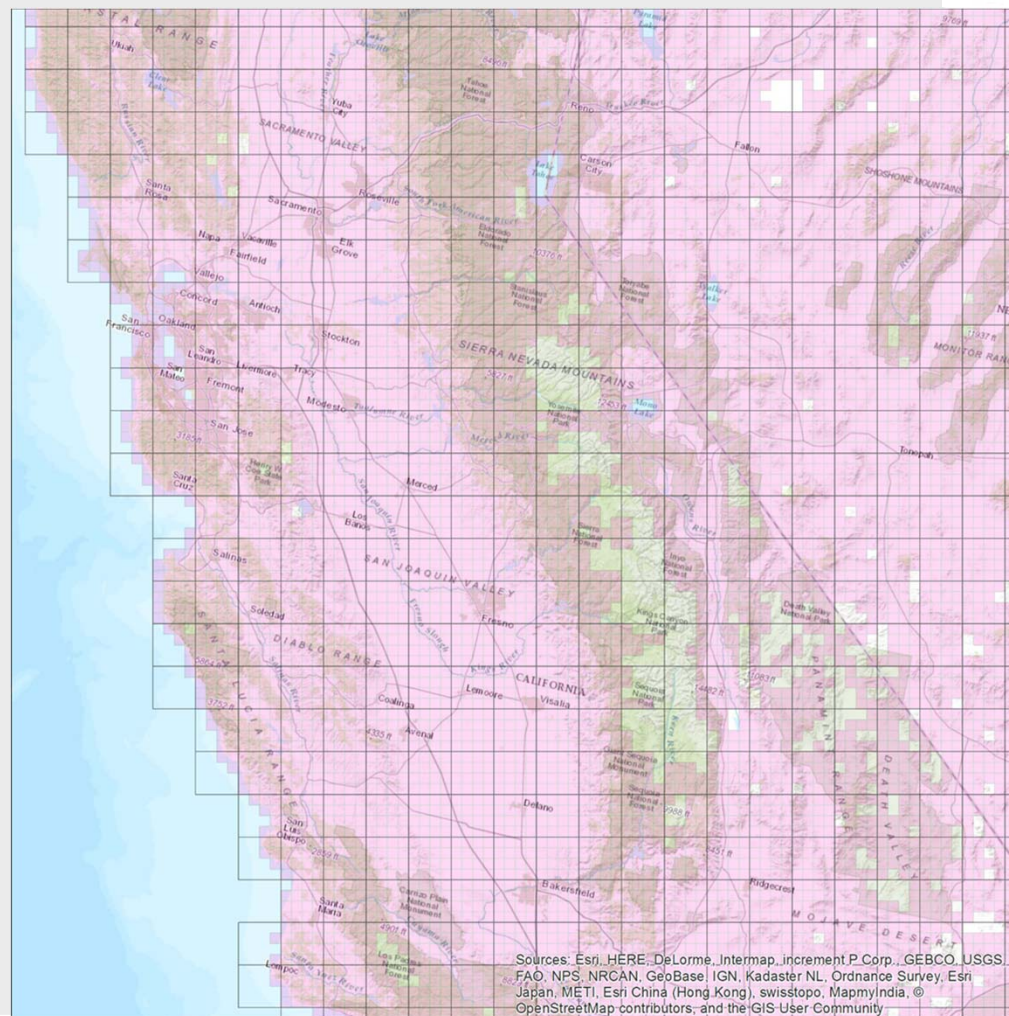
We created Multiple grid sizes (each nesting in the next bigger size – we processed from the largest down – if the largest had no roads, we threw out, repeat)

- Level1: 25,600M MacroGrid (hits the ~12,800m (or ~8 mile radius) coverage if box is placed, on average in the middle)
- Level2: 6,400M MacroGrid (hits the ~3200m (or ~2 mile radius) coverage if box is placed, on average in the middle)
- Level3: 1,600M MacroGrid (hits the ~800m coverage if box is placed, on average in the middle)
- Level4: 400M MicroGrid (hits the ~200m coverage if box is placed, on average in the middle)

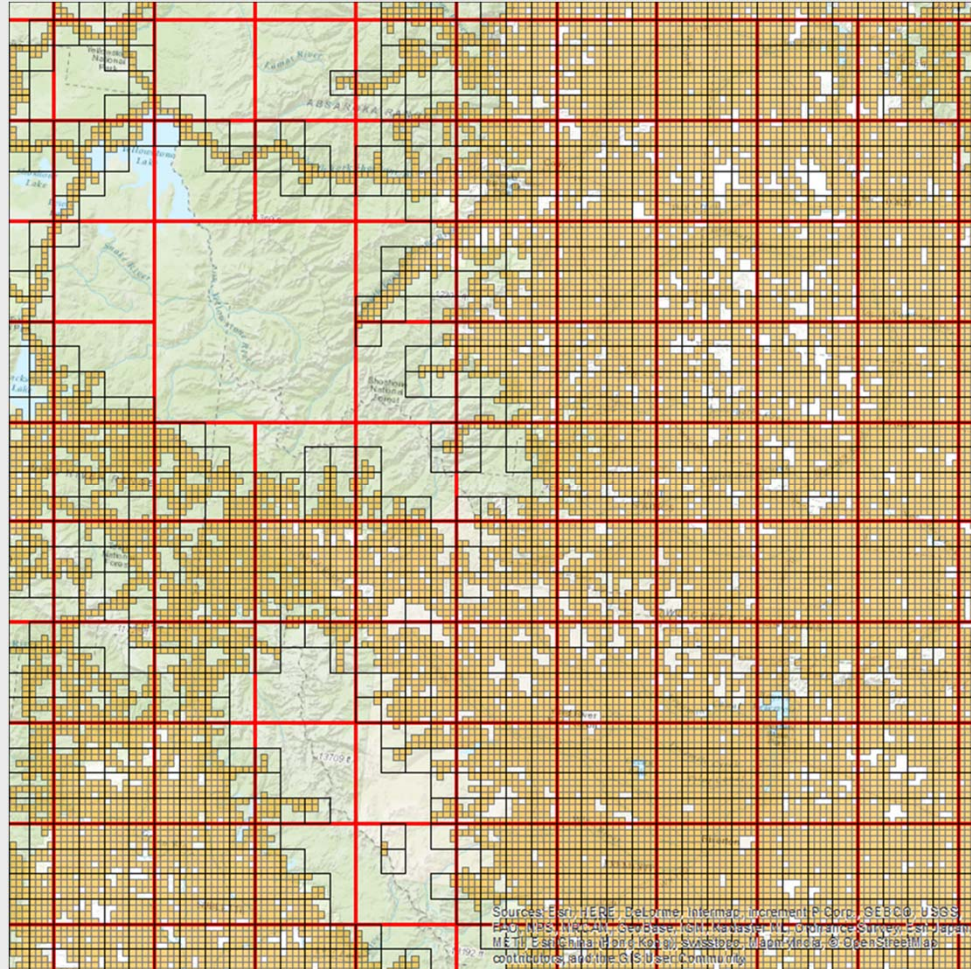
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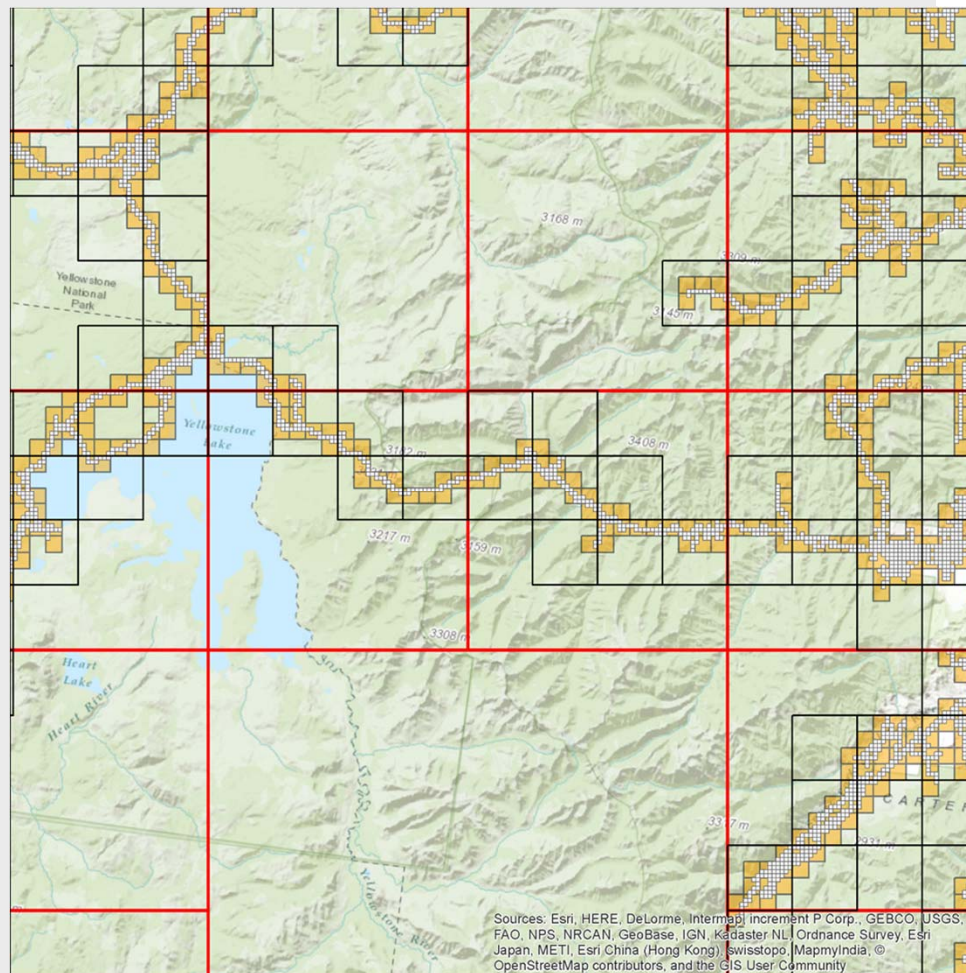
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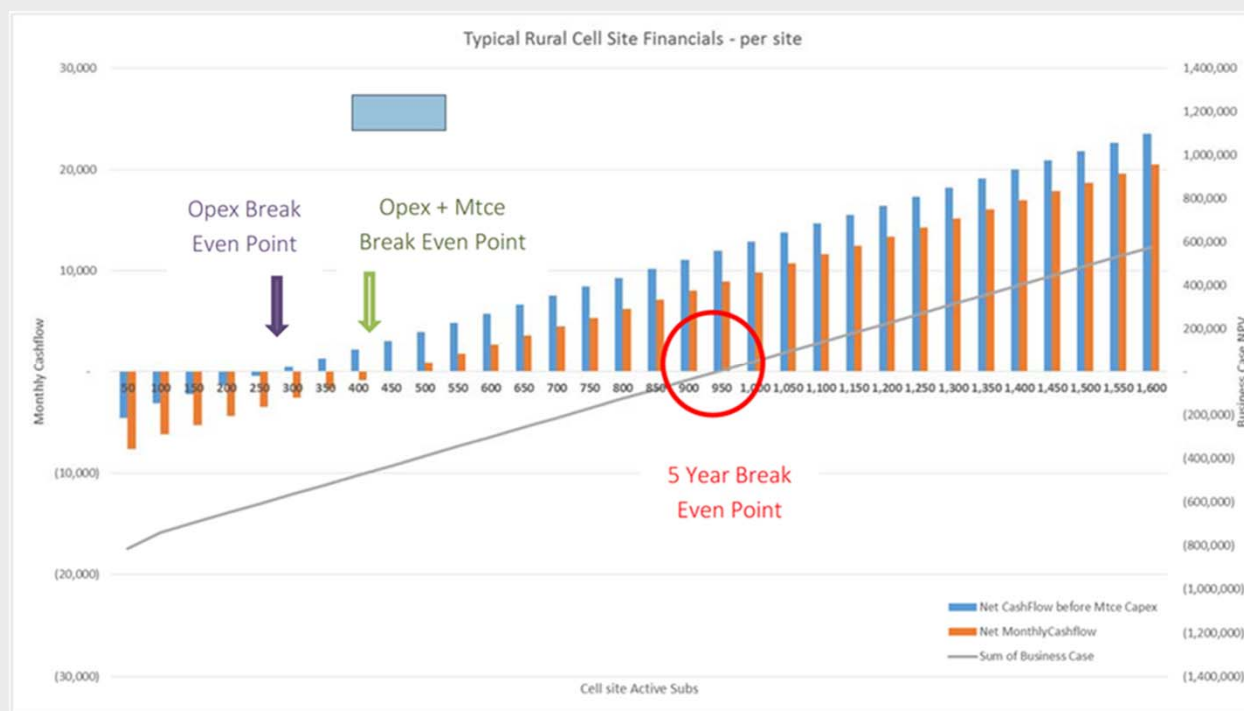
Wireless Models: 5G Deployment



Wireless Models: 5G Deployment



5G Deployment Barriers?



Policy Update: Other

Other Policy Issues

- Spectrum
- IoT
- Consumer Protection
- Privacy
- Cybersecurity
- Other

The Impact of Policy and Technology Changes:

Tax, Valuation/Appraisal, Other

Potential Impacts

- Net Neutrality
- Fiber Deep
- 5G/Densification
- Other

Questions?

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