UPTOWN
SERVICES, LLC

Community-Wide Broadband Initial Scoping Study

for

Truckee Donner PUD

January 2023

Uptown Services, LLC

Dave Stockton & Neil Shaw, Principals

OBJECTIVE: *Identify and evaluate options for the District to enhance the availability, affordability, reliability, and capacity of broadband infrastructure for residents and businesses…*

STUDY SCOPE:

1. TASK 1: Market and Customer Demand Analysis

2. TASK 2: Potential Utilization of Current TDPUD Assets

3. TASK 3: Middle & Last Mile Routes/Service Areas and Capex Budget

4. TASK 4: Potential Funding Sources

5. TASK 5: Analysis of Business Model Options

6. TASK 6: Service Provider Partnership RFI

TASK 1: Market & Customer Demand Analysis

Incumbent Broadband Offerings

- Optimum (formerly Suddenlink) appears to have fully upgraded its HFC plant to DOCSIS3.1 and can offer gig service.
- AT&T offers DSL plans depending upon the proximity of the service address to their Central Office. In conducting availability searches on their website, only a 1.5M tier was returned.
- Plumas Sierra has deployed some fiber within the TDPUD service area but plans are expensive

	Download	Upload	Price	Data Cap?	ACP?	Technology
Optimum (Altice)	300M 500M 940M	10M 20M 35M	Months 1-24/ Month 25+ $40.00 / $50.00* $60.00 / $70.00* $80.00 / $90.00*	No	Yes	Cable Modem (DOCSIS 3.1)
AT&T**	1.5M	?	$55	?	Yes	DSL
Plumas Sierra	50M 100M 250M 500M 1G	50M 100M 250M 500M 1G	$79 $99 $149 $199 $299	No	Modified discount program	Fiber

Optimum pricing per optimum.net, AT&T pricing per att.com, PST pricing per plumassierratelecommunications.com all as of Oct. 2022.
*Optimum prices reflect AutoPay & Paperless Billing discount of $5/month. **Working with ISPs and reselling local loop access.

ALTERNATIVE RESIDENTIAL INTERNET

- Oasis has deployed fiber to some locations, but primarily serves the TDPUD service area with fixed wireless. SkyFiber is another locally available fixed wireless option. Both services are expensive and offer limited capacity.
- Starlink is available as a Low Earth Orbit satellite service but is expensive.

	Download	Upload	Price	Data Cap?	Contract?	Technology
Oasis	10M 20M 40M 40M 70M 150M 150M	1M 2M 10M 10M 25M 35M 35M	$65 $75 $85 $95 $105 $130 $155	400GB 800GB 1.2TB 2TB 2TB 1.5TB Unlimited	Yes, from 1-3 years with early termination fees of up to $350	Fixed Wireless
	Oasis will construct fiber to neighborhood clusters with sufficient interest. Currently there is one active "Fiber Class Internet Hub at a residence on Alder Road available to serve neighbors within 2 miles with up to 1G. Pricing is custom quoted.					Fiber*
SkyFiber	25M 50M 100M 200M	15M 25M 50M 50M	$149 $169 $179 $199	?	?	Fixed Wireless
Starlink	250M – 350M	?	$110.00 *(plus $649 for hardware + shipping)*	No		LEO Satellite

Oasis pricing per oasisbroadband.net, SkyFiber pricing per skyfiberinternet.com, and Starlink pricing per starlink.com all as of Oct. 2022.
*Very limited availability and requires the host end use to bear all initial construction costs.

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- Optimum has standard business Internet plans up to 940Mbps, but plans require term contracts.
- AT&T has DSL plans available with speeds up to 1G but with minimal pricing information without a custom quote.
- PST has some fiber availability but only advertises a single 75M tier.
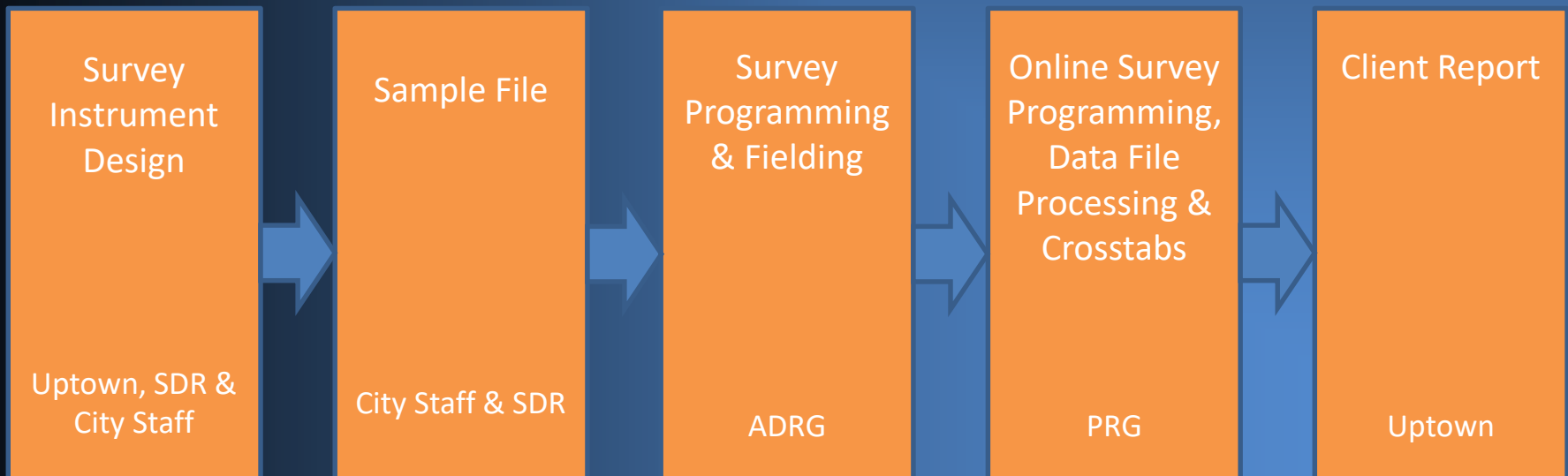
	Download	Upload	Price	Contract	Data Cap?	Technology
Optimum (Altice)	200M 300M 500M 940M	?	$69 *(1 Year)* $69 *(1 Year)* $89 *(2 Years)* $149 *(2 Years)*	?	No	Cable Modem (DOCSIS 3.1)
AT&T	10M 20M 50M 100M 1G	?	All custom quote	?	?	DSL or Fiber* *(Dedicated Internet)*
Plumas Sierra	75M	15M	$109 *(Minimum install fee is $500)*	?	?	Fiber

Optimum pricing per optimum.net, AT&T pricing per att.com, PST pricing per plumassierratelecommunications.com all as of Oct. 2022.
*Not available in all areas.

TASK 1: Broadband Quantitative Survey

Survey Design

◈ The quantitative research process utilized both subject matter and functional expertise across multiple contractors by specialty:

◈ **Uptown Services**: Subject expertise and study data needs

◈ **SDR Consulting (Rick Hunter)**: Research expert overseeing design and execution (23 years experience with 200k completed research projects)

◈ **American Directions Research Group**: Survey fielding and data collection (7 US-based call centers with capacity to complete 85k person-hours of call interviews per month)

◈ **Prairie Research Group (James Wolken)**: Online survey programming, crosstab analysis and production of output banners (25 years experience)

| Survey Instrument Design

Uptown, SDR & City Staff | Sample File

City Staff & SDR | Survey Programming & Fielding

ADRG | Online Survey Programming, Data File Processing & Crosstabs

PRG | Client Report

Uptown |
|---|---|---|---|---|

◈ Phone and online surveys

   ❖ Total sample (n) of 2,601 respondents of universe (N) of ≈15,000 households

      ❖ 400 via phone survey (list included wireline and wireless numbers)

      ❖ 2,201 via online email invitation

      ❖ 920 completed speed tests

   ❖ ± 1.7% sample error at 95% confidence interval

   ❖ Survey offered in English and Spanish, with 7 completes in Spanish
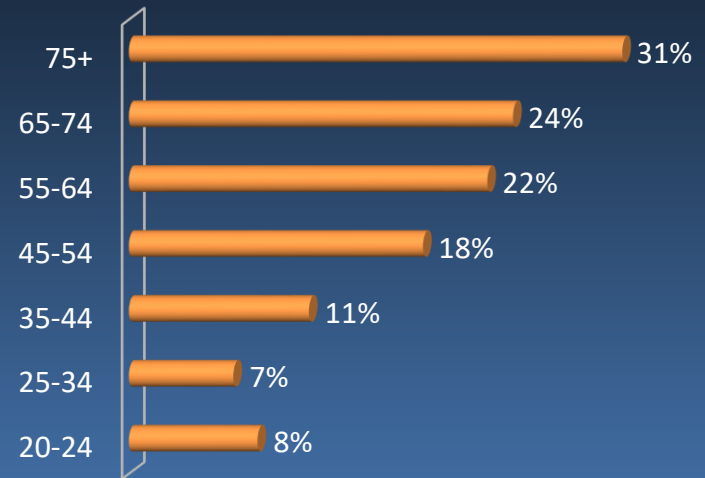
◈ Age quotas used to ensure robust sample across all age groups. Results weighted to reflect actual age distribution from 2020 American Community Survey (US Census Bureau) data

◈ Respondents screened to ensure

   ❖ Decision-maker for telecommunications and entertainment services in the home

   ❖ Reside within TDPUD service area

   ❖ Respondents with immediate family members employed by any company providing Internet service were excluded
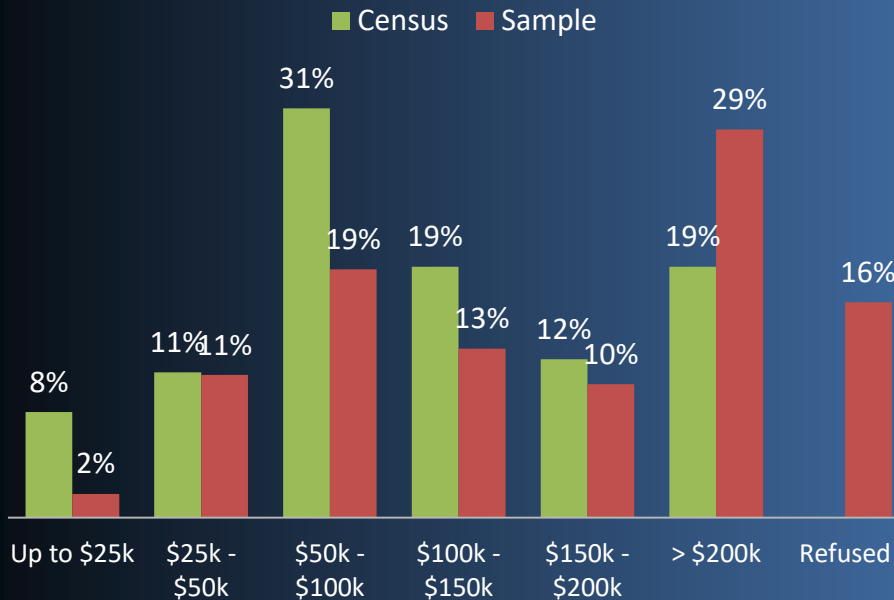
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◈ Survey results are weighted to reflect the actual age distribution (by age decile) per the 2020 census.

◈ The income profile of the sample is not dissimilar to the universe of residents, but skews to higher income because older (and lower income) households are more likely to refuse to state income.
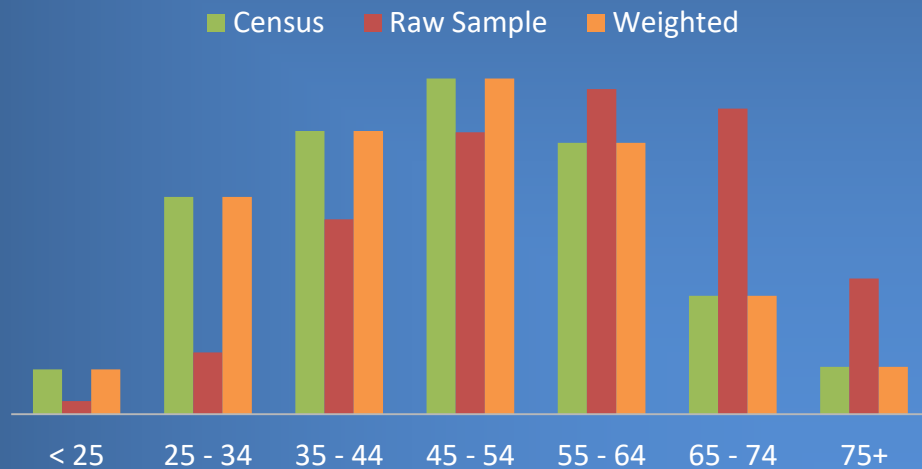
Percent of Sample Not Stating Income
(By Age)

Age	%
75+	31%
65-74	24%
55-64	22%
45-54	18%
35-44	11%
25-34	7%
20-24	8%

Household Income

Legend: ■ Census ■ Sample

	Census	Sample
Up to $25k	8%	2%
$25k - $50k	11%	11%
$50k - $100k	31%	19%
$100k - $150k	19%	13%
$150k - $200k	12%	10%
> $200k	19%	29%
Refused		16%

Head of Household Age
(Unweighted Sample)

Legend: ■ Census ■ Raw Sample ■ Weighted

Categories: < 25, 25 - 34, 35 - 44, 45 - 54, 55 - 64, 65 - 74, 75+
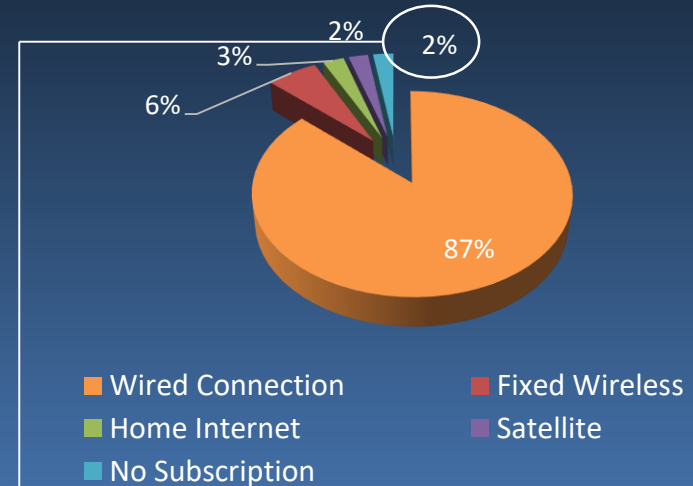
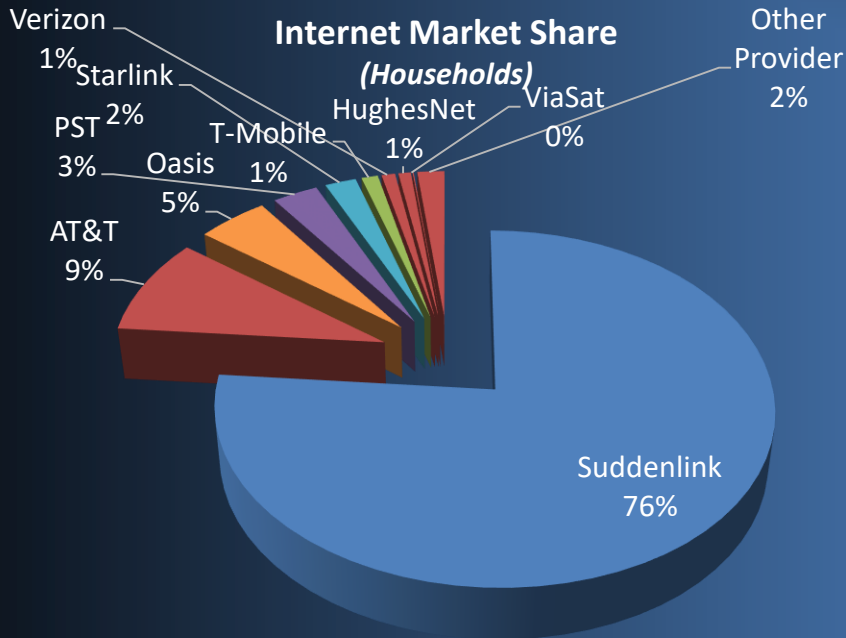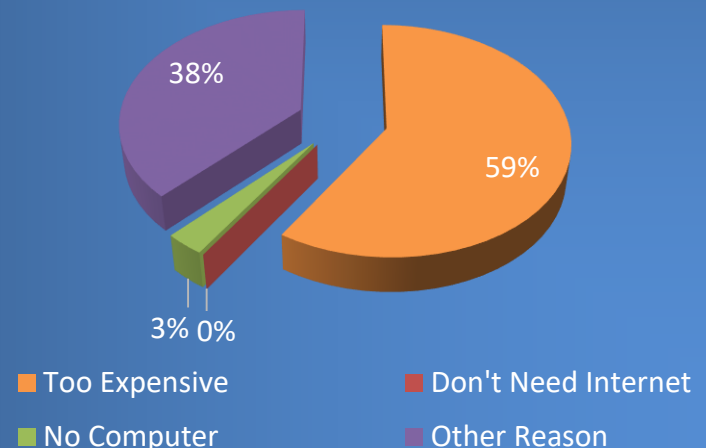# TASK 1: Broadband Quantitative Survey

Current Broadband Services Usage

INTERNET SERVICE PURCHASING BEHAVIOR

◈ 98% of TDPUD households subscribe to Internet service at home, with 87% via a wired connection

◈ Suddenlink (now Optimum) has 76% market share of the residential broadband market

◈ Affordability is the primary reason for lack of an Internet subscription
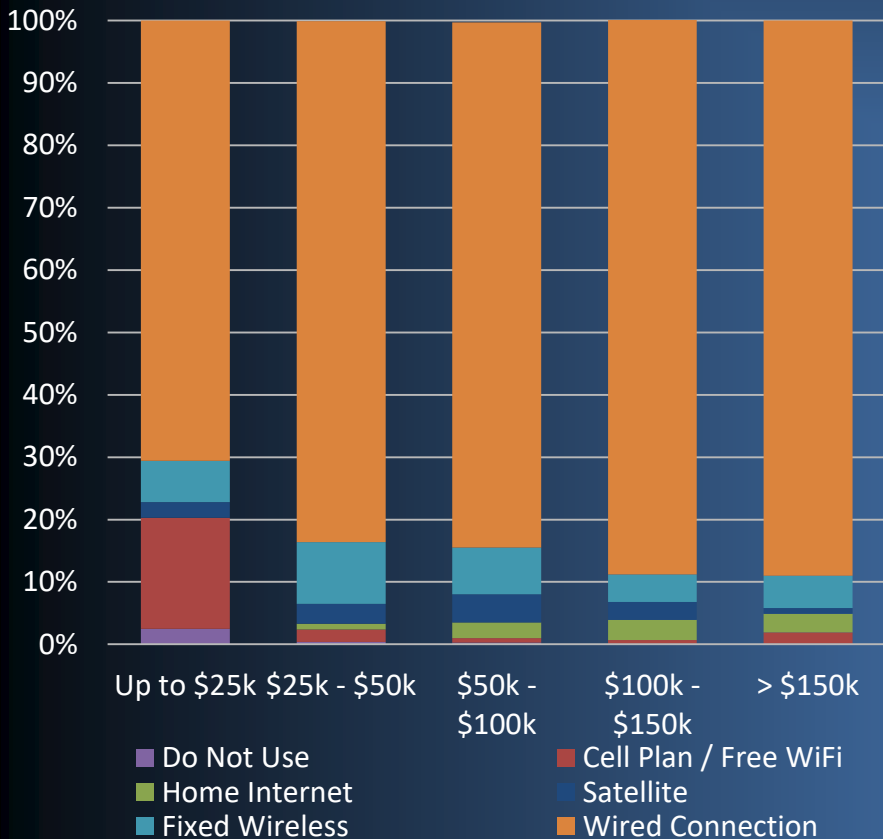
Incidence of Internet Households

- Wired Connection   - Fixed Wireless
- Home Internet   - Satellite
- No Subscription

2%
3%
6%
2%
87%

Internet Market Share
(Households)

Verizon 1%
Starlink 2%
PST 3%
Oasis 5%
AT&T 9%
T-Mobile 1%
HughesNet 1%
ViaSat 0%
Other Provider 2%
Suddenlink 76%

Reason for No Internet at Home

38%
59%
3% 0%

- Too Expensive   - Don't Need Internet
- No Computer   - Other Reason

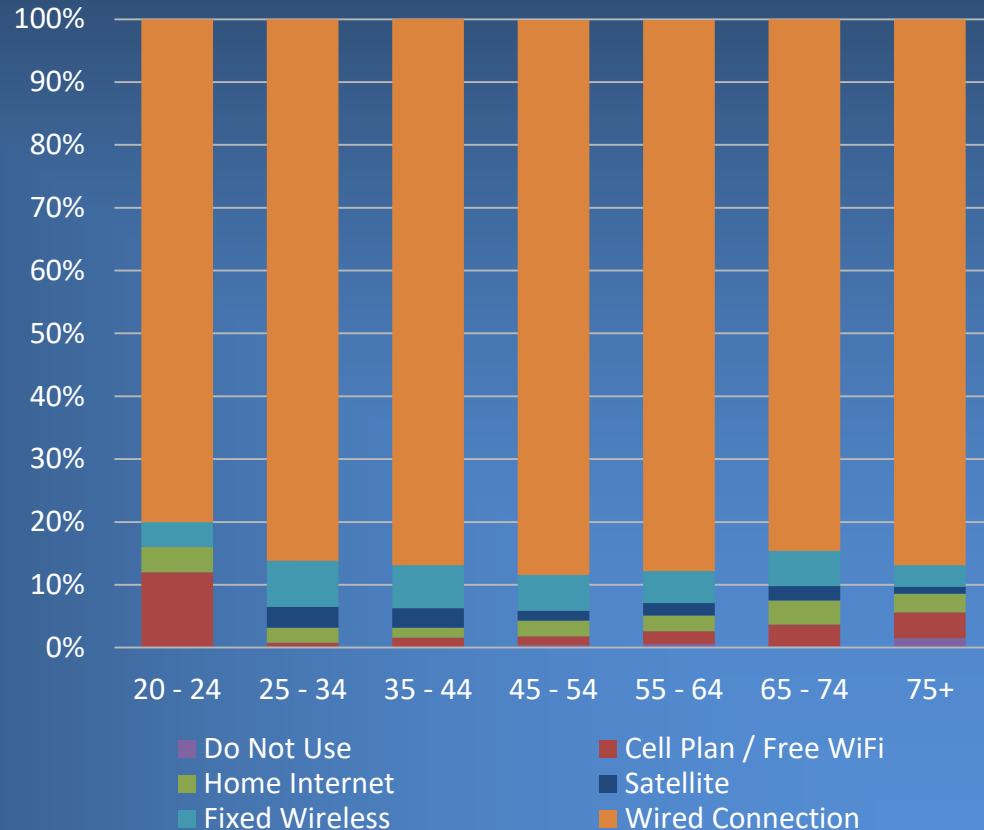# INTERNET ACCESS METHOD DEMOGRAPHICS

◈ Lower income households are less likely to have a wired Internet connection

◈ Internet access method is not significantly influenced by age
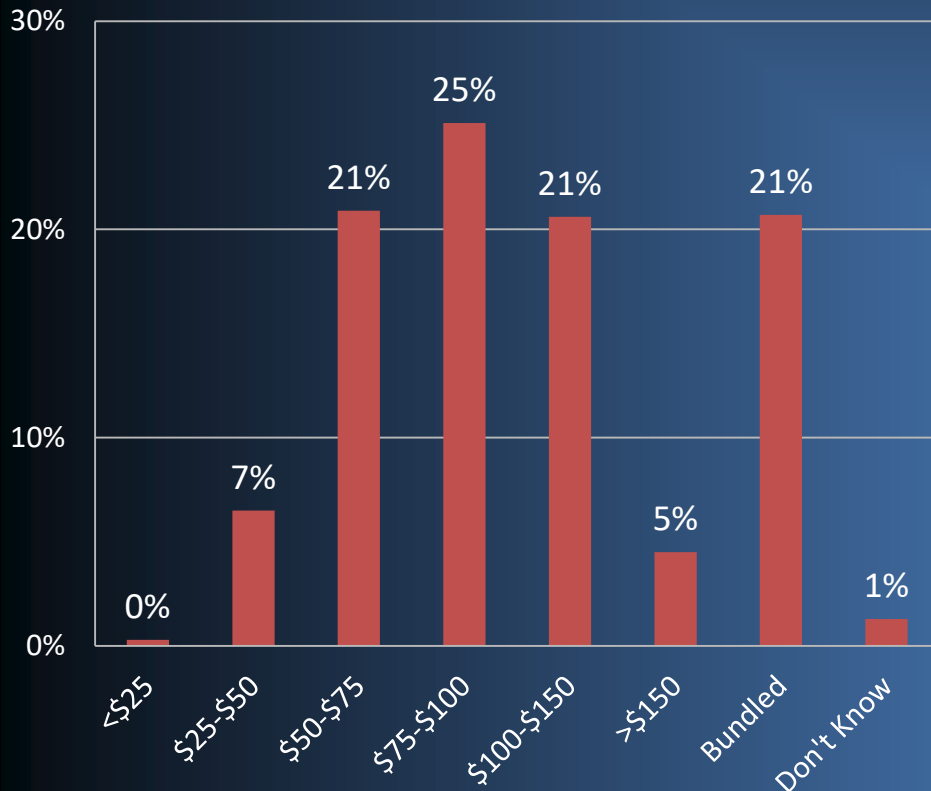
Internet Access Method by Income

Internet Access Method by Age

Legend:
- Do Not Use
- Home Internet
- Fixed Wireless
- Cell Plan / Free WiFi
- Satellite
- Wired Connection

Study conducted by Uptown Services, LLC

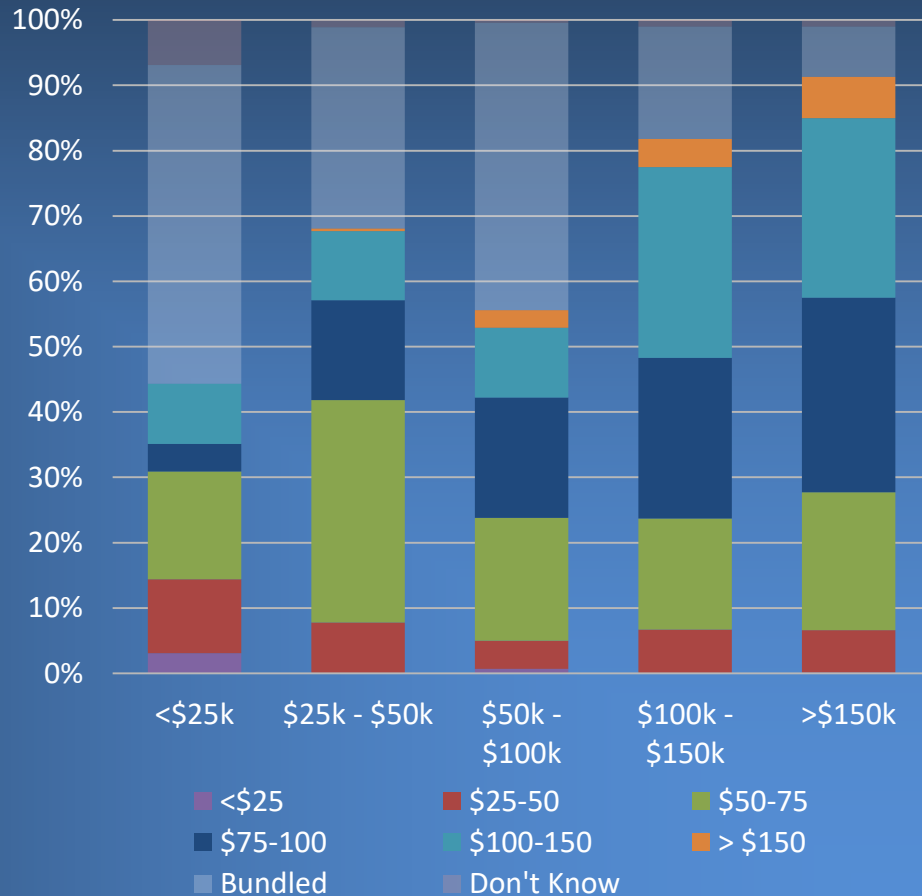# STATED INTERNET SPENDING

- Monthly spending averages $78 across all households
- In general, average spending increases with greater household income

Monthly Internet Spending

Category	Percentage
<$25	0%
$25-$50	7%
$50-$75	21%
$75-$100	25%
$100-$150	21%
>$150	5%
Bundled	21%
Don't Know	1%

Internet Spending by Income

Income categories: <$25k, $25k - $50k, $50k - $100k, $100k - $150k, >$150k

Legend: <$25, $25-50, $50-75, $75-100, $100-150, > $150, Bundled, Don't Know

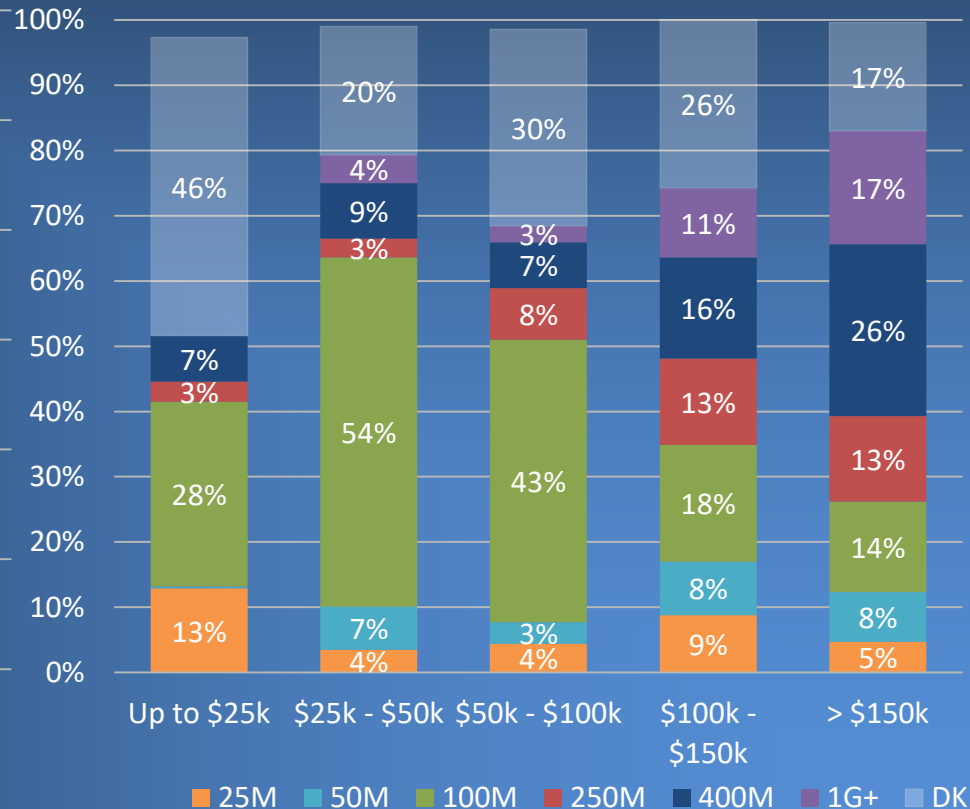Study conducted by Uptown Services, LLC

STATED DOWNLOAD SPEED

◈ 24% of households do not know what speed they subscribe to

◈ 38% of households _state_ they subscribe to > 100M

◈ Lower income households are more likely to subscribe to lower capacity Internet tiers
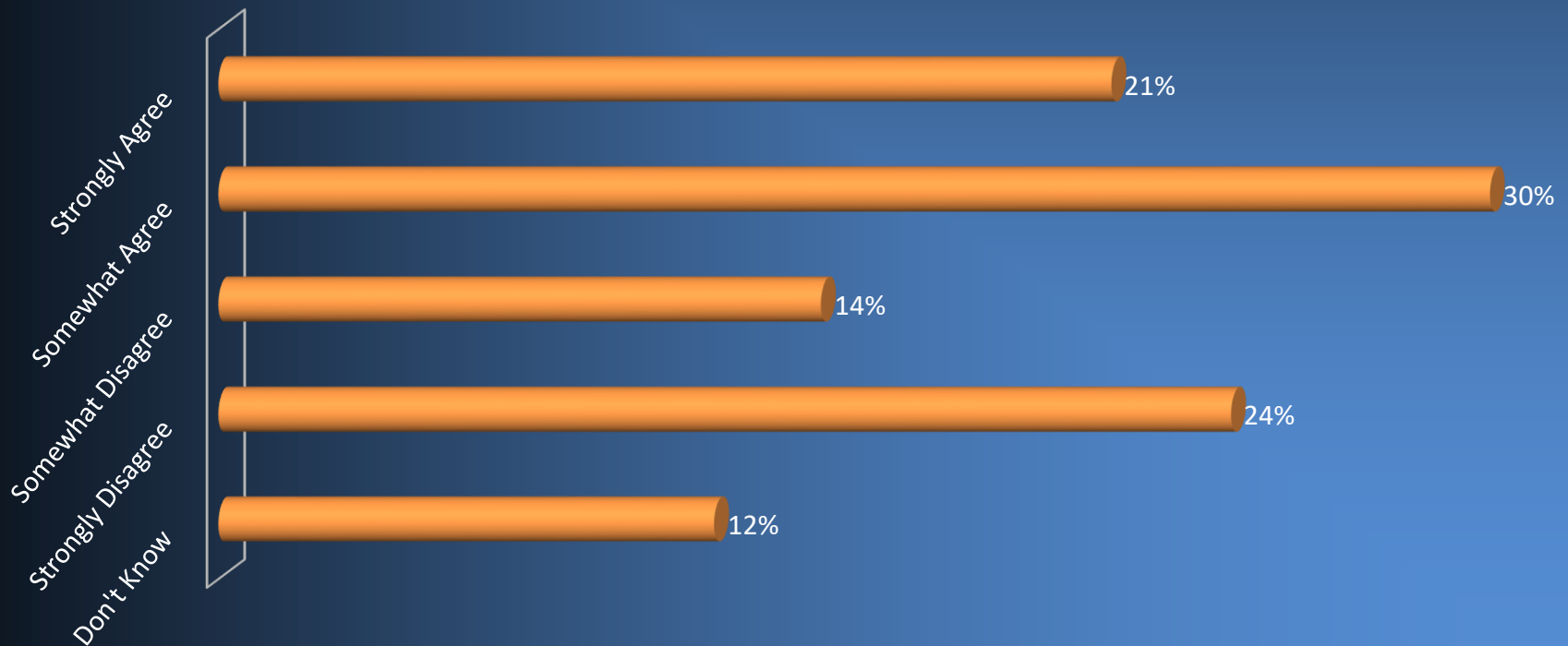

Stated Download Speed
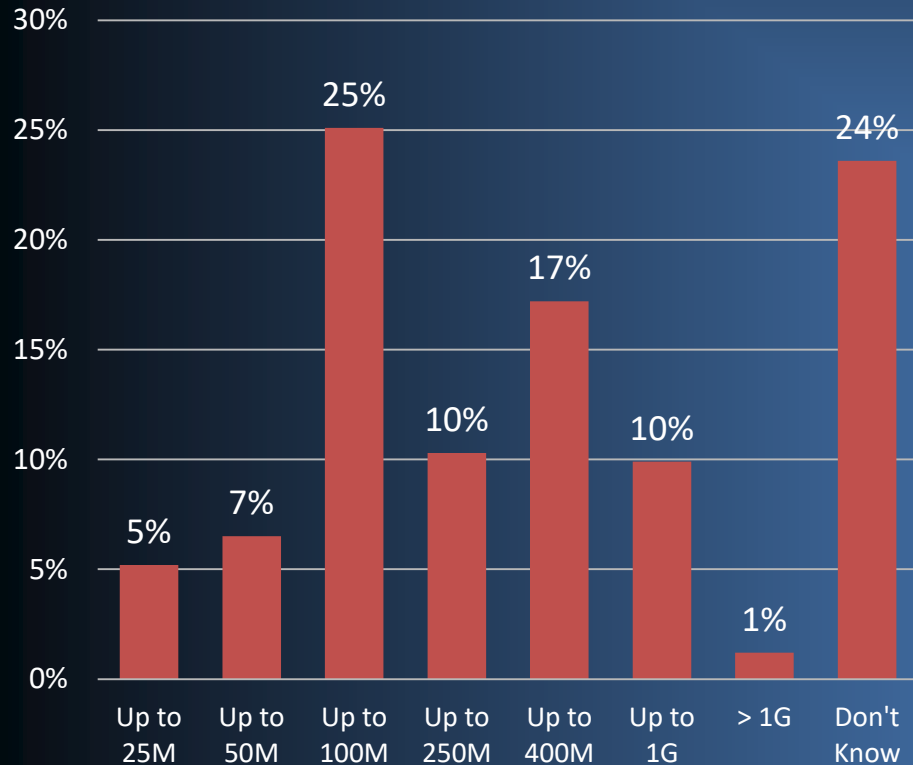
Internet Access Speed by Income
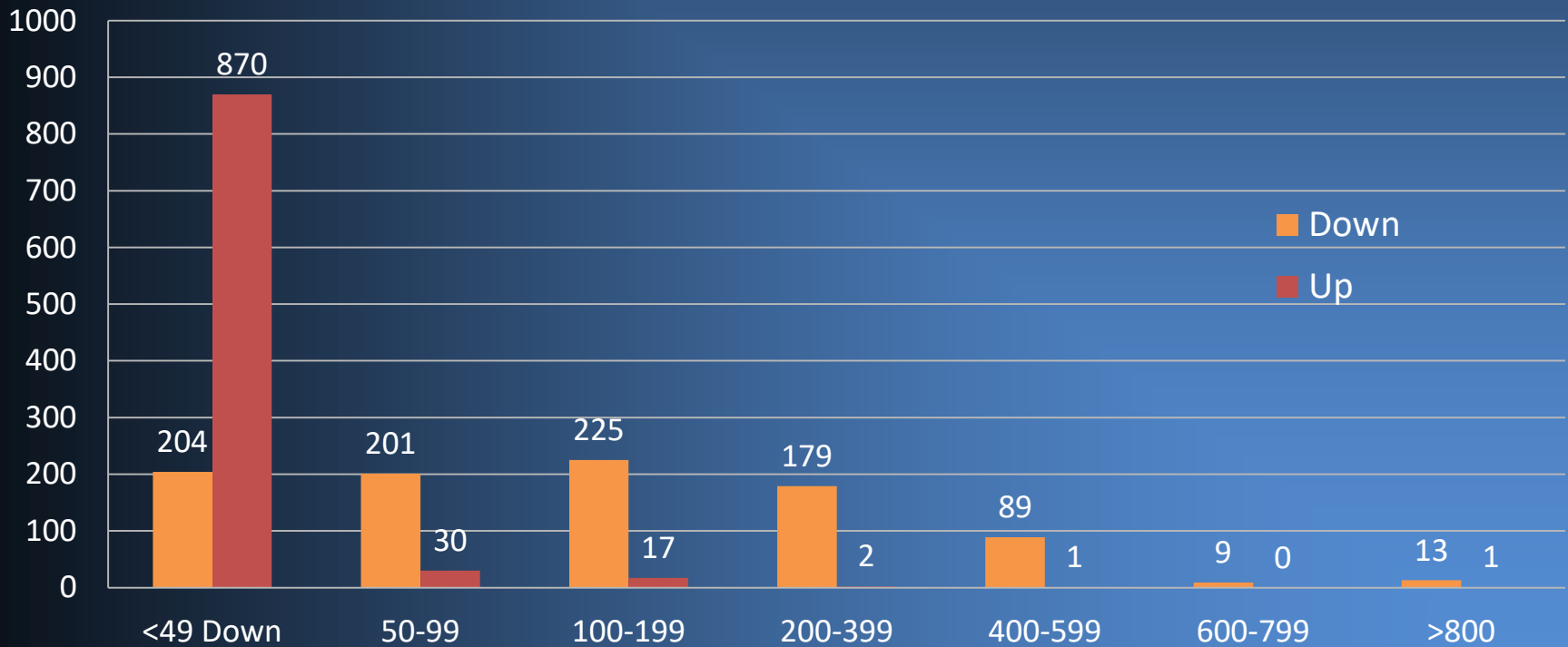
PERCEPTION OF RECEIVED VS. SUBSCRIBED SPEED

◈ Only 1 in 2 households strongly agree or somewhat agree that they are receiving the advertised download speed they are subscribing to...

Q6: "To what extent do you agree or disagree with the following statement: I am receiving the advertised download speed I am paying for on my home internet connection?"

Category	Percent
Strongly Agree	21%
Somewhat Agree	30%
Somewhat Disagree	14%
Strongly Disagree	24%
Don't Know	12%

◈ Speed test results identify the median download speed as 108Mbps and the median upload speed as 18Mbps.

Speed Test Results – Observed Median Download & Upload Speeds
(n = 920)

Legend: Down, Up

Categories and values:
- <49 Down: Down 204, Up 870
- 50-99: Down 201, Up 30
- 100-199: Down 225, Up 17
- 200-399: Down 179, Up 2
- 400-599: Down 89, Up 1
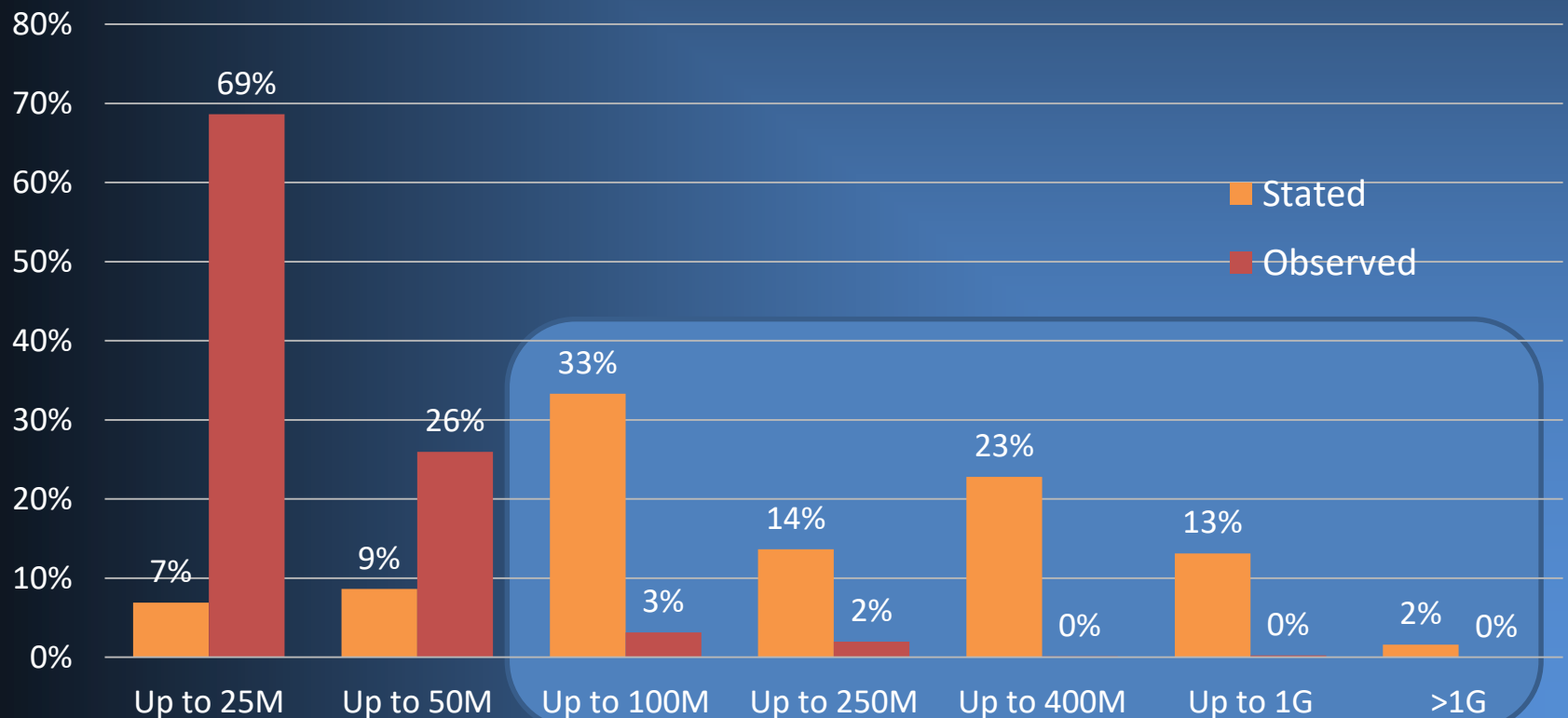- 600-799: Down 9, Up 0
- >800: Down 13, Up 1

STATED VERSUS OBSERVED DOWNLOAD SPEED

◈ Among those households who were able to state their subscribed Internet speed, 80% of households subscribing to a download tier greater than 50M are not receiving their perceived download speed

　　◈ Stated Above 50M: 85% of households

　　◈ Observed Above 50M: 5% of households

Stated versus Observed Download Speed
Stated: n = 2,527
Observed: n = 920

Legend: Stated (orange), Observed (red)

Category	Stated	Observed
Up to 25M	7%	69%
Up to 50M	9%	26%
Up to 100M	33%	3%
Up to 250M	14%	2%
Up to 400M	23%	0%
Up to 1G	13%	0%
>1G	2%	0%

◈ 46% of households that completed the speed test observed that the speed test outcome was lower than their subscribed speed…

Q36: "How does the download speed test result compare with the download speed you are subscribing to from your Internet provider?"

- 🟧 Test Result is Higher
- 🟥 Test Result is Lower
- 🟩 Result Matches Subscription
- 🟪 Don't Know
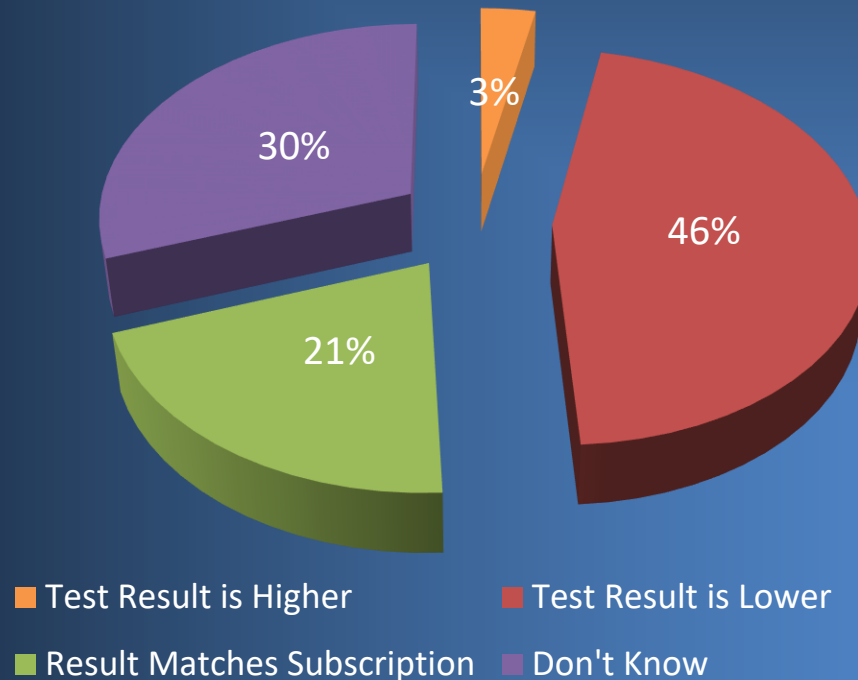
TASK 1: Broadband Quantitative Survey

Satisfaction & Attribute Importance

SATISFACTION WITH SPECIFIC INTERNET ATTRIBUTES

◈ Internet satisfaction levels are low compared to other markets, with customer service and price being the service attributes with lowest satisfaction levels.

◈ Across all service attributes, the percentage of households that are 'very satisfied' and rating the service a 9 or 10 is very low.
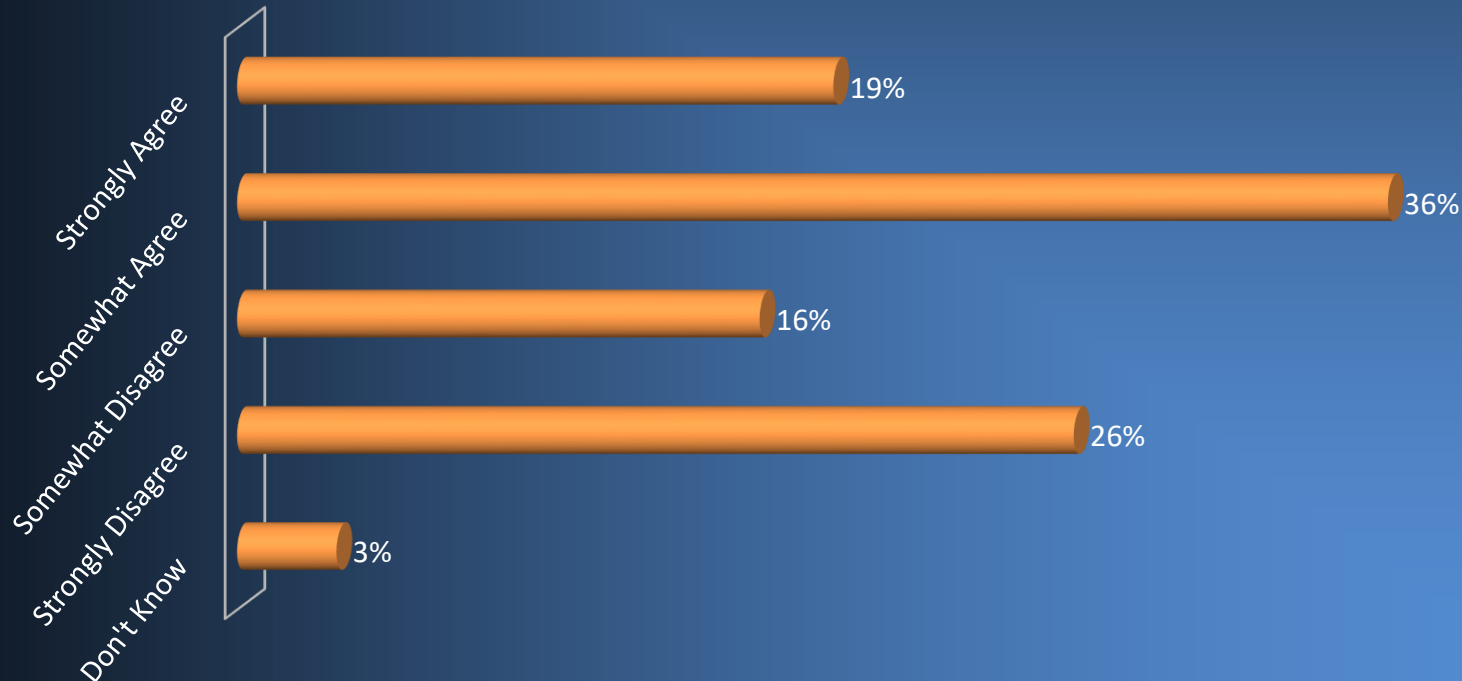
Satisfaction Rating by Internet Attribute
(Mean Rating on a 1-10 Scale)

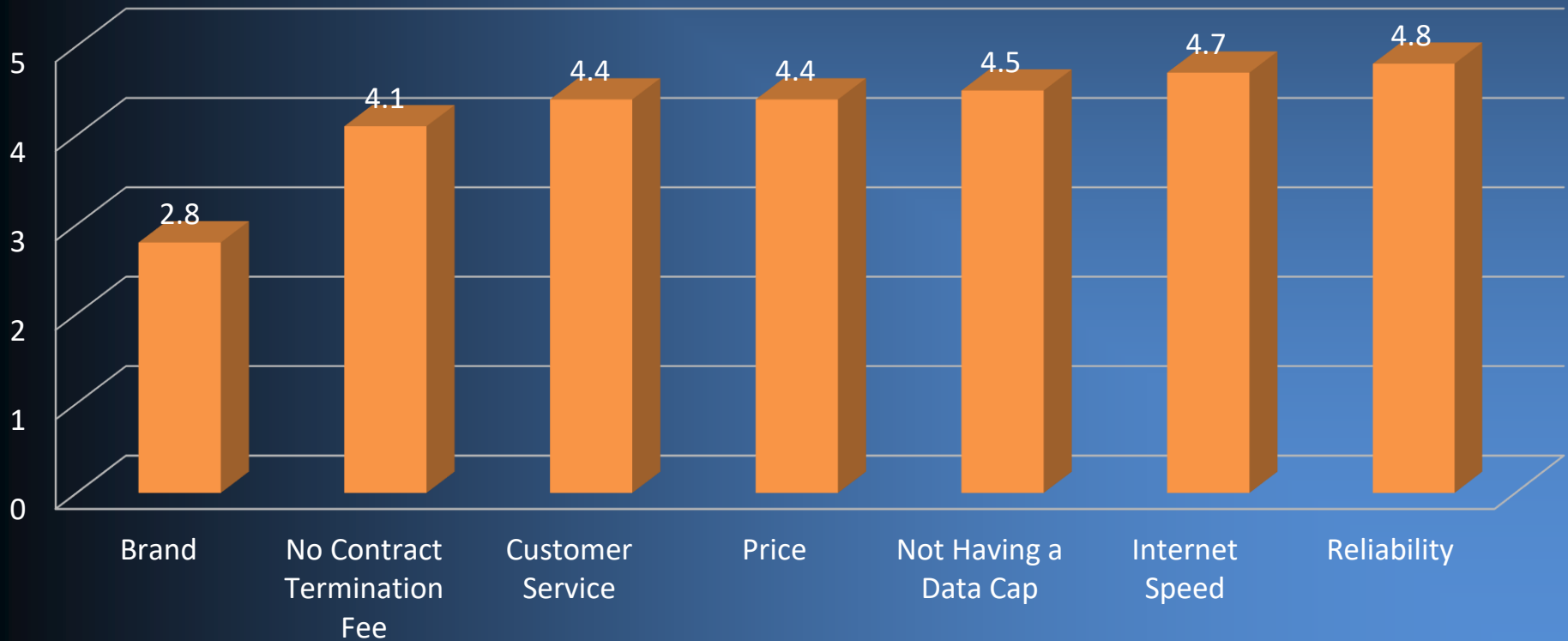| Attribute	Mean Rating	Percent Rating '9' or '10'
Service	4.1	10%
Price	4.4	8%
Reliability	4.8	11%
Speed Consistency	5.0	11%
Available Speed	5.7	15%
Overall	4.7	8%

◈ 42% of TDPUD households feel that at the present time they do not have the ability to get the Internet speed that they want…

Q12: "To what extent do you agree or disagree with the following statement: I am currently able to get the Internet speed I want for my home?"

Category	Percentage
Strongly Agree	19%
Somewhat Agree	36%
Somewhat Disagree	16%
Strongly Disagree	26%
Don't Know	3%

- Reliability and speed are the most important attributes
- Not having a data cap scored as more important than price

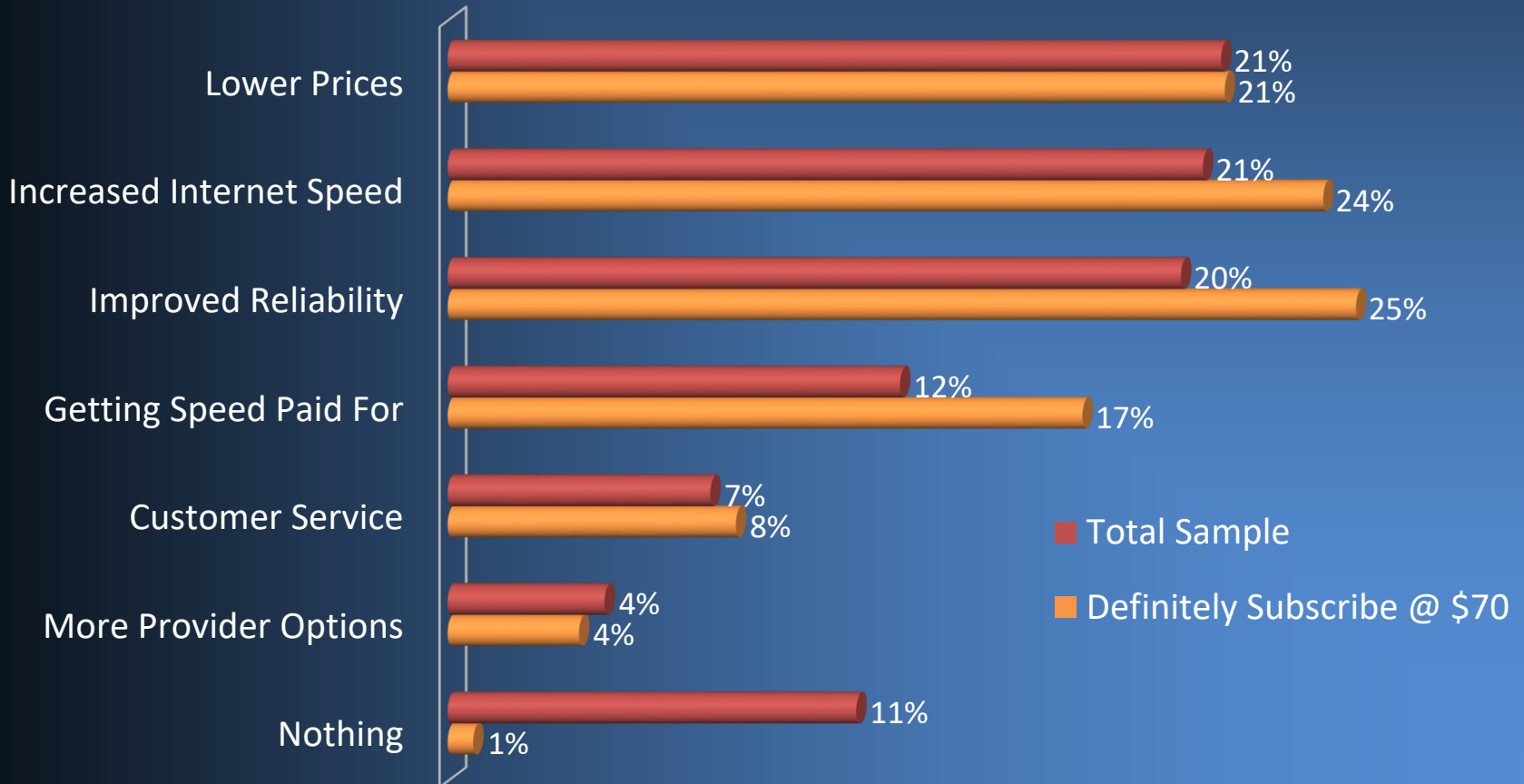**Importance Rating of Select Broadband Service Attributes**
(Mean Rating on a 1-5 Scale)

Brand	No Contract Termination Fee	Customer Service	Price	Not Having a Data Cap	Internet Speed	Reliability
2.8	4.1	4.4	4.4	4.5	4.7	4.8

BROADBAND AREAS FOR IMPROVEMENT

TDPUD residents see increased Internet speed and lower prices as the most important dimension for improving their broadband. Among likely subscribers, increased speed and improved reliability are seen as the most desired area for improvement...
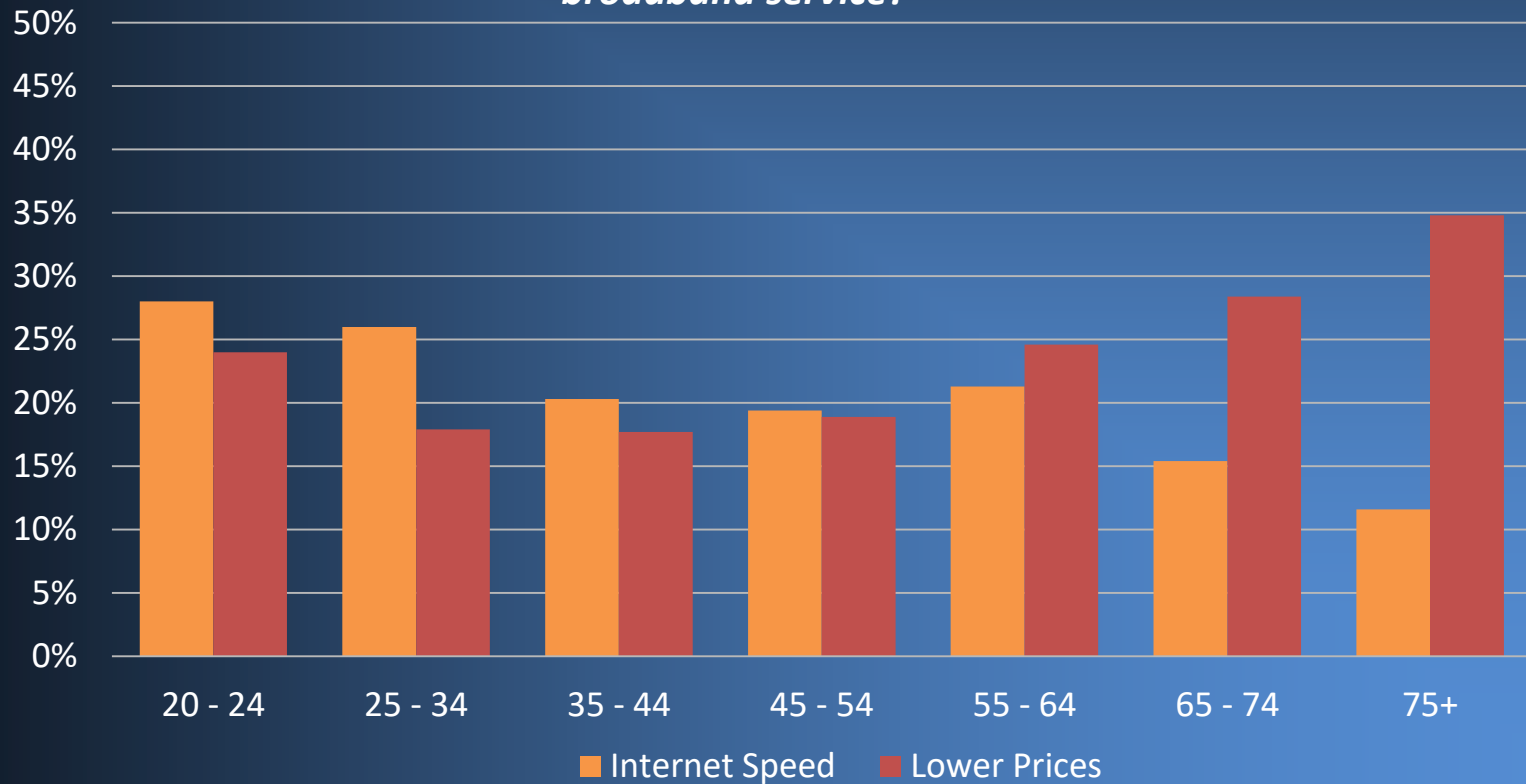
Q32: *"What would you like to see most improved with your current broadband service?"*

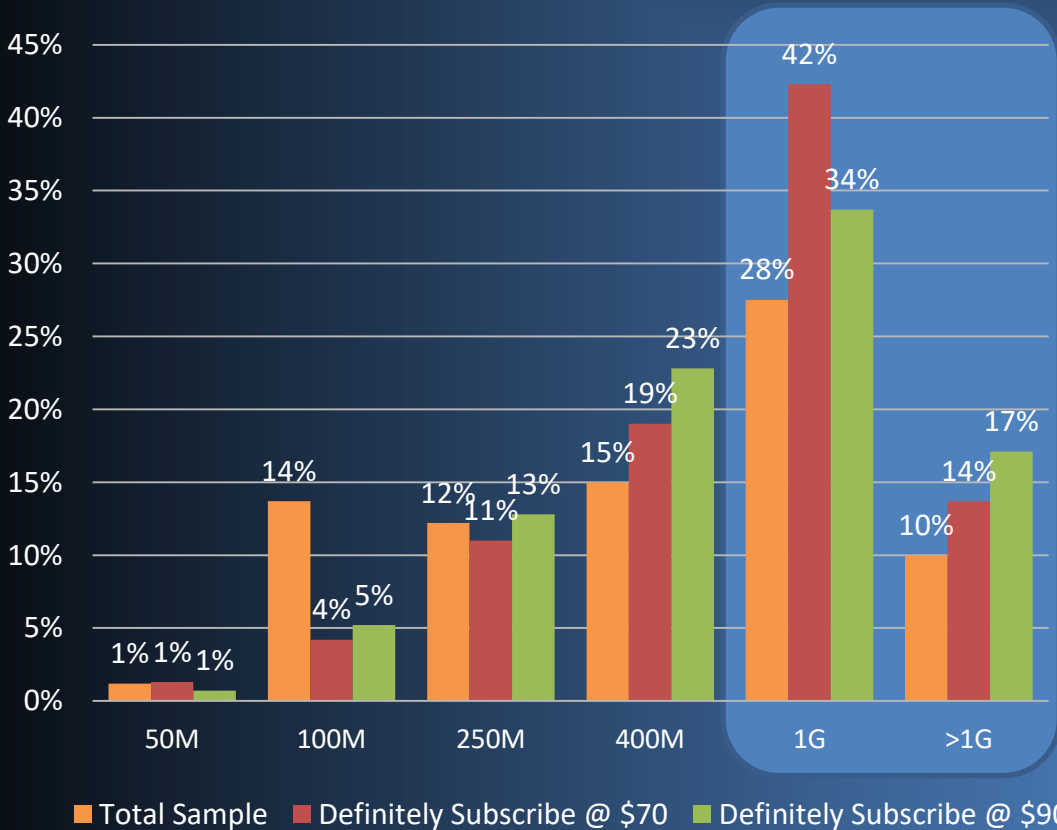| Category	Total Sample	Definitely Subscribe @ $70
Lower Prices	21%	21%
Increased Internet Speed	21%	24%
Improved Reliability	20%	25%
Getting Speed Paid For	12%	17%
Customer Service	7%	8%
More Provider Options	4%	4%
Nothing	11%	1%

TASK 1: Broadband Quantitative Survey

Digital Aptitude & Remote Working and Learning

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◈ 38% of households state their ideal Internet speed would be 1G or higher. This increases to 56%/51% among those who would definitely subscribe at $70/$90 per month for 1G

◈ One in two households perceive the upload speed as very important
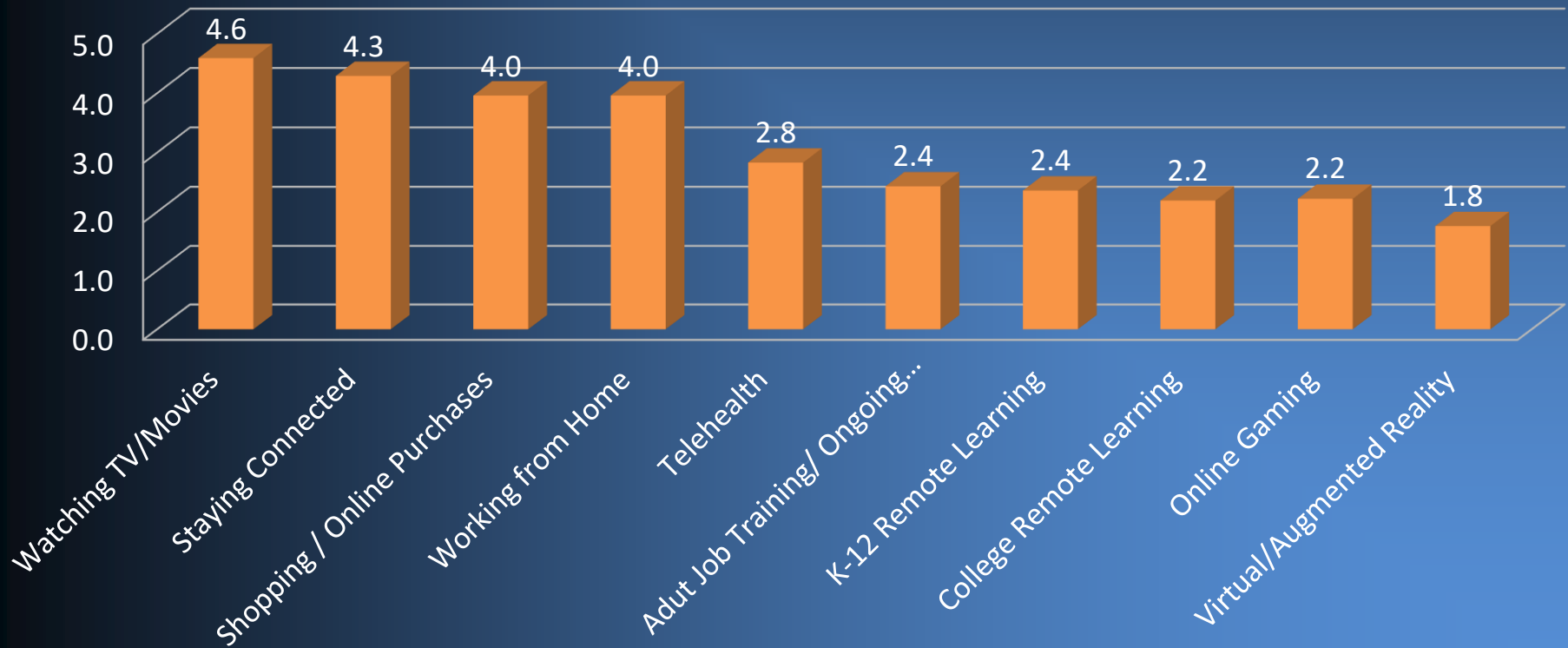
Q13: Ideal Download Speed

Speed	Total Sample	Definitely Subscribe @ $70	Definitely Subscribe @ $90
50M	1%	1%	1%
100M	14%	4%	5%
250M	12%	11%	13%
400M	15%	19%	23%
1G	28%	42%	34%
>1G	10%	14%	17%

■ Total Sample ■ Definitely Subscribe @ $70 ■ Definitely Subscribe @ $90

Q14: "How important is the <u>upload</u> speed on your home Internet connection?"

Very Important	51%
Somewhat Important	41%
Somewhat Unimportant	4%
Very Unimportant	4%
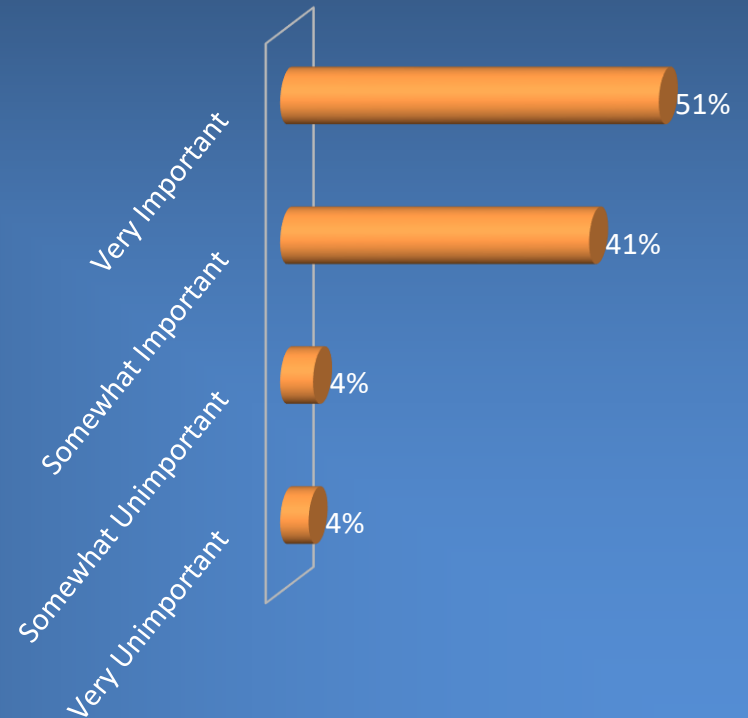
Social connection and entertainment rate higher in importance than work-at-home and online learning applications despite the impacts of COVID-19...

Importance Rating of Select Broadband Applications/Uses in the Home
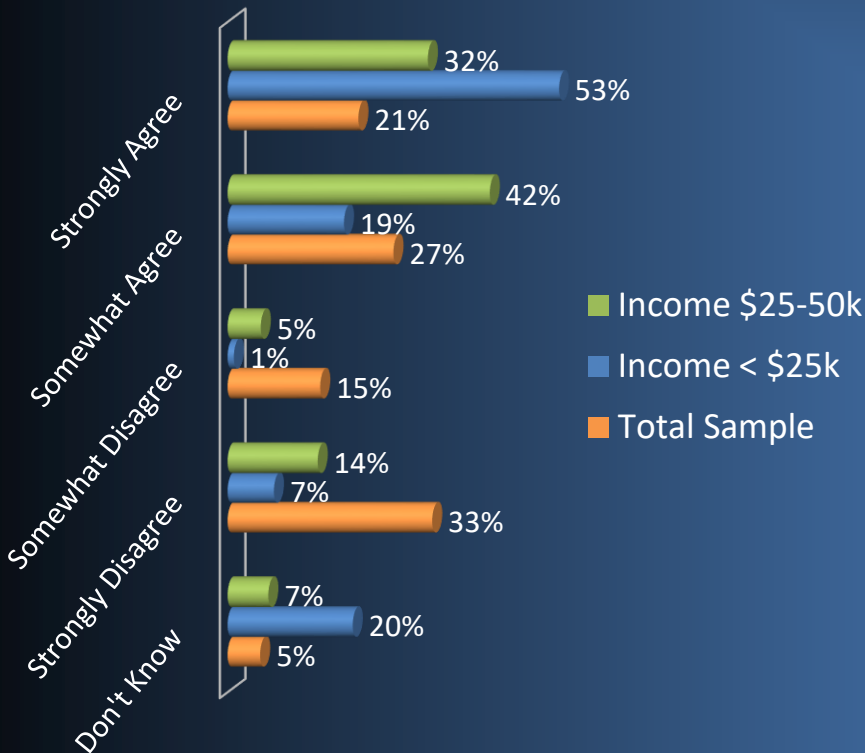*(Mean Rating on a 1-5 Scale)*

Application/Use	Rating
Watching TV/Movies	4.6
Staying Connected	4.3
Shopping / Online Purchases	4.0
Working from Home	4.0
Telehealth	2.8
Adut Job Training/ Ongoing...	2.4
K-12 Remote Learning	2.4
College Remote Learning	2.2
Online Gaming	2.2
Virtual/Augmented Reality	1.8

TASK 1: Broadband Quantitative Survey

## Affordable Connectivity

◈ 48% of households strongly agree or somewhat agree that they are subscribing to a lower Internet tier in order to save money.

◈ Only 7% of households state that their Internet provider offers an income-based subsidy, although both Suddenlink and AT&T do so.

Q8: "I subscribe to a lower speed Internet service than I would like to in order to save money?"

Strongly Agree
- 32%
- 53%
- 21%

Somewhat Agree
- 42%
- 19%
- 27%

Somewhat Disagree
- 5%
- 1%
- 15%

Strongly Disagree
- 14%
- 7%
- 33%

Don't Know
- 7%
- 20%
- 5%

🟩 Income $25-50k
🟦 Income < $25k
🟧 Total Sample

Q10: "Does your Internet provider offer a discounted Internet service for households who qualify due to lower income?"

- 7%
- 15%
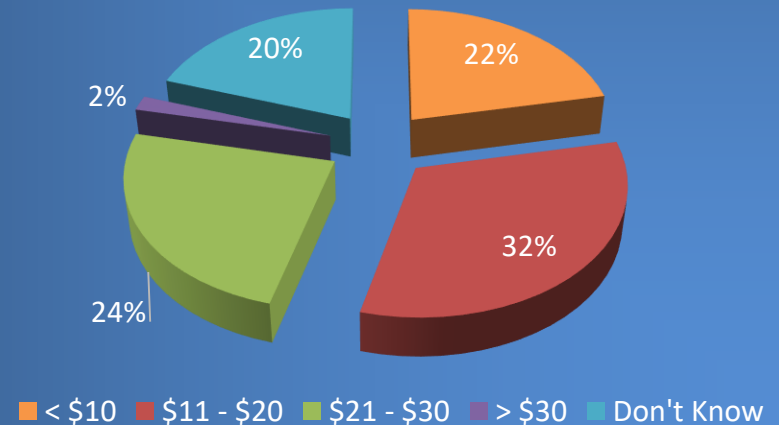- 78%

🟧 Yes 🟥 No 🟩 Don't Know
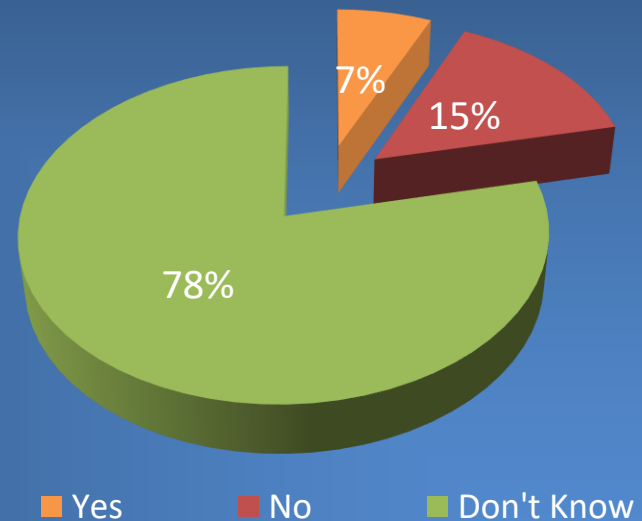
◈ Only 1% of TDPUD households state that they are receiving a subsidized internet service based on their level of household income

◈ Among households receiving a discount, the stated level of discount varies. Both Suddenlink and AT&T participate in the ACP program that reflects a $30/month discount

Q9: "Is your household receiving an Internet discount based on your income?"

1% | 1%

Yes | No | Don't Know

98%
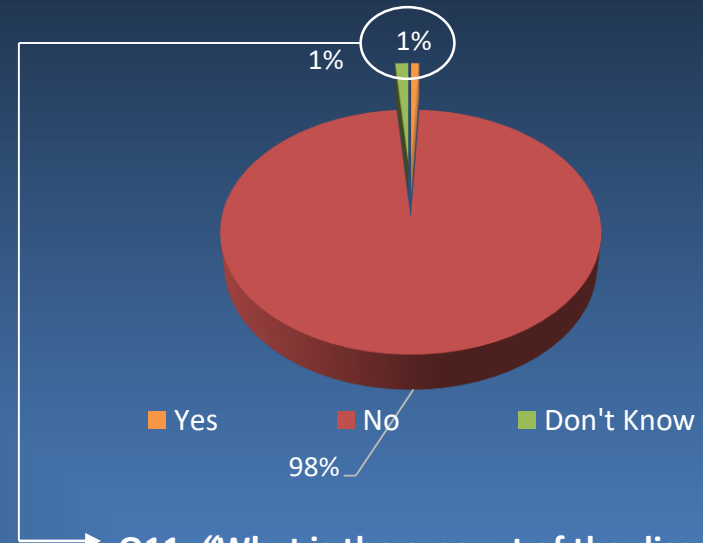
Q11: "What is the amount of the discount?"

20% | 22%

2%

24% | 32%

■ < $10 ■ $11 - $20 ■ $21 - $30 ■ > $30 ■ Don't Know

The Affordable Connectivity Program (ACP) is a newly funded federal program to subsidize Internet service among low-income households to narrow the digital divide...

|	
Program Overview	• $14.2B in total funding • Qualifying households receive a $30 monthly benefit towards Internet service • Connected device reimbursement of $100 if provider charges between $10-$50 for the device • No set end date • Participation qualifies the service provider to receive BEAD grant funding
Household Participation Requirements	• Household income at or below 200% of federal poverty limit (e.g. household size of 3 earning $44k or less) • Participation in national school lunch program • Participate in the FCC Lifeline program
Service Provider Participation Requirements	• Eligible Telecommunications Carriers (ETCs) offering residential Internet service • Requires FCC approval and USAC election notification • The $30 discount must be available on all Internet tiers offered by the provider • No credit check and no disconnects for non-pay until 90 days past due

Speed tier designs and pricing will depend upon the deployed technology(ies). The quantitative survey evaluated household purchase intent taking into consideration a range of strategy options:

◈ Price elasticity of demand for 1G Internet tested at $70 and $90/month using a cell design so each participant was presented with one price point

◈ ACP-eligible households were presented with 1G Internet including the $30 ACP discount (still using the Cell A and B design)

◈ Multi-Gig tier options were presented to participants that stated they would 'definitely' or 'probably' subscribe to the 1G tier

Internet Tier Download / Upload	Monthly Price: Standard	Monthly Price: ACP Eligible
1G / 1G	Cell A: $70 Cell B: $90	Cell A: $40 Cell B: $60
2G / 2G	Cell A: $110 Cell B: $120	NA
4G / 4G	$150	NA

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- Based on federal income eligibility limits combined with survey responses regarding household size and income, we estimate that approximately 6-10% of TDPUD households qualify for ACP. The survey measurement of 6% eligibility is understated due to lower sample representation of low income households
- Eligibility set at 200% of Federal Poverty Level:
  - HH of 1: Income up to $27,180
  - HH of 2: Income up to $36,620
  - HH of 3: Income up to $46,060
  - HH of 4: Income up to $55,500
  - HH of >4: Add $9,440 per person

Household Size
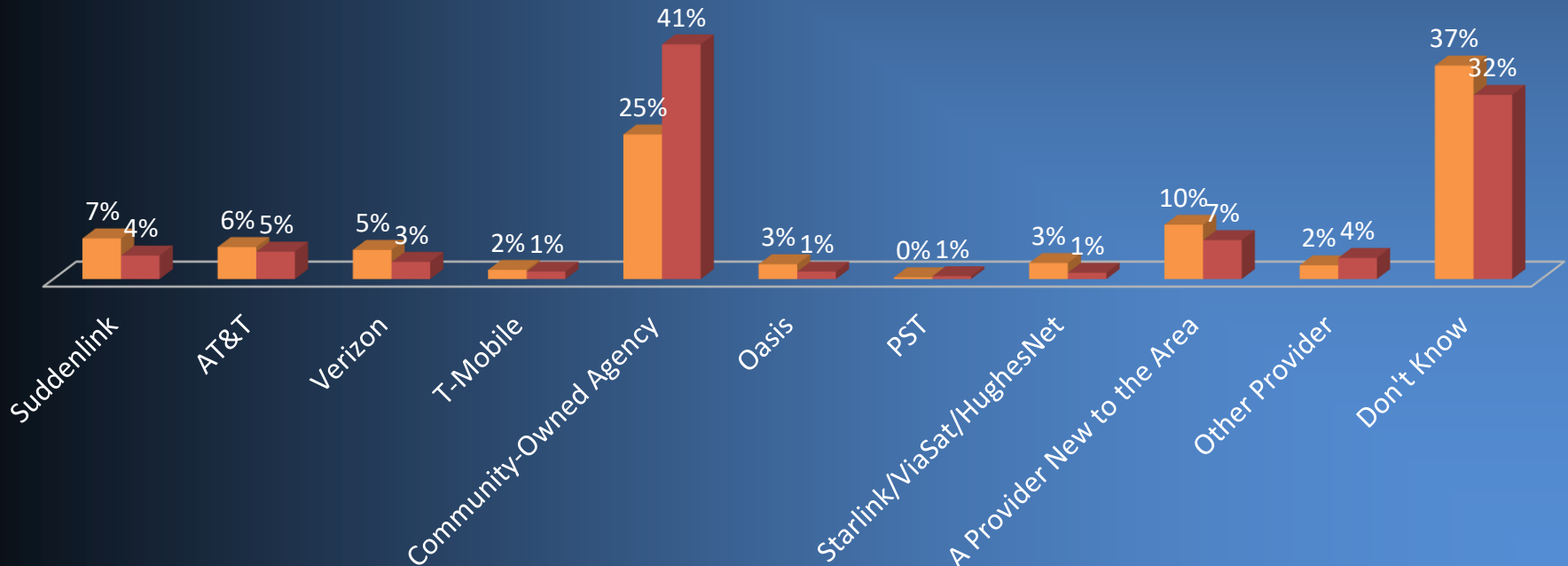*(Survey Data)*
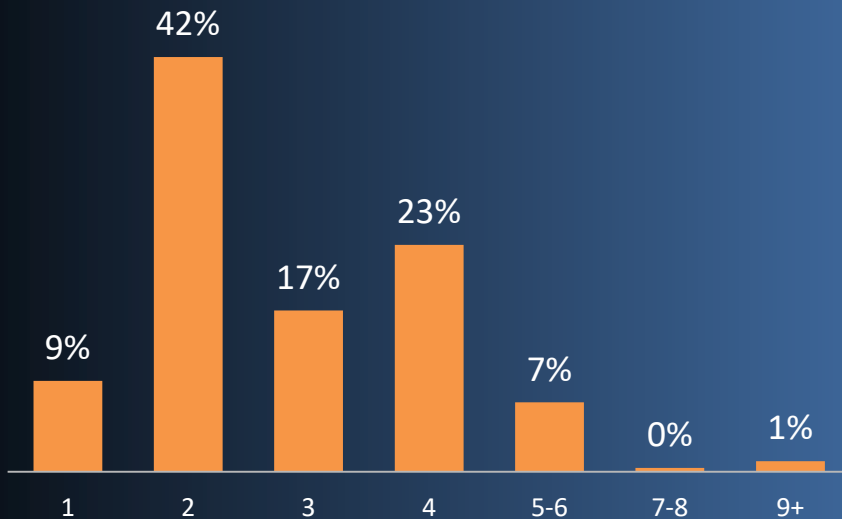
ACP Eligibility
(Survey Data)
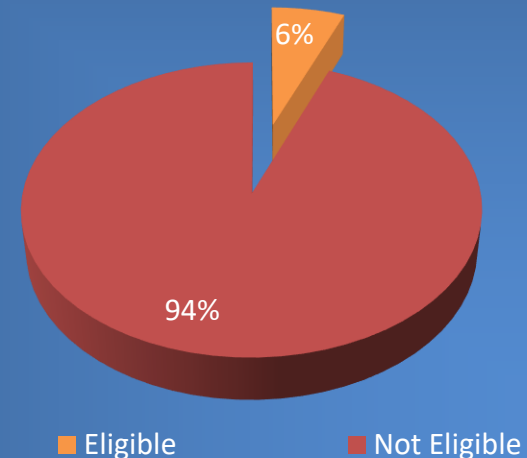
TASK 1: Broadband Quantitative Survey

Broadband Market Share Potential

◈ 25% of all respondents, when given the choice, would prefer to receive high speed Internet from 'a community-owned local agency.'

◈ Among those who would definitely subscribe, the preference increases to 41%.

Q33: *"Among the following list of potential providers, who would you prefer to receive broadband service from?"*
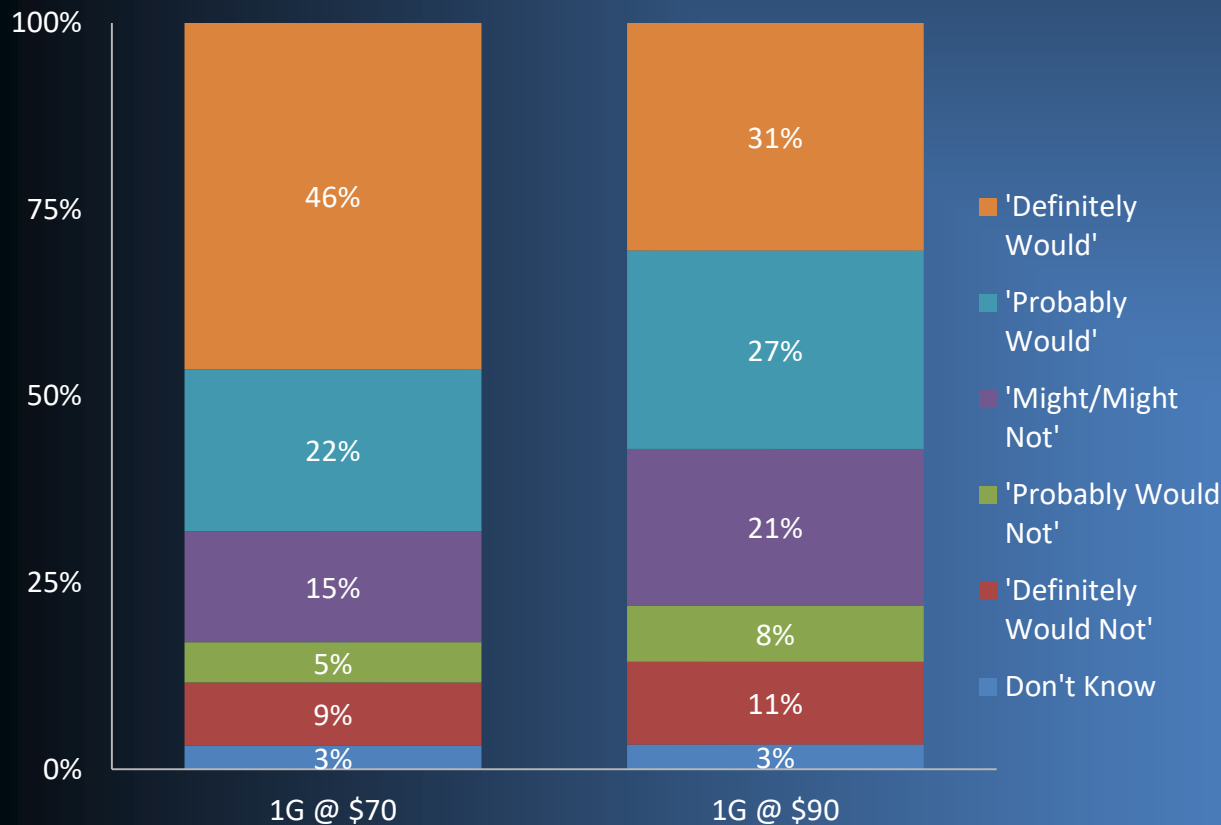

Legend: ■ Total Sample ■ Definitely Subscribe @ $70

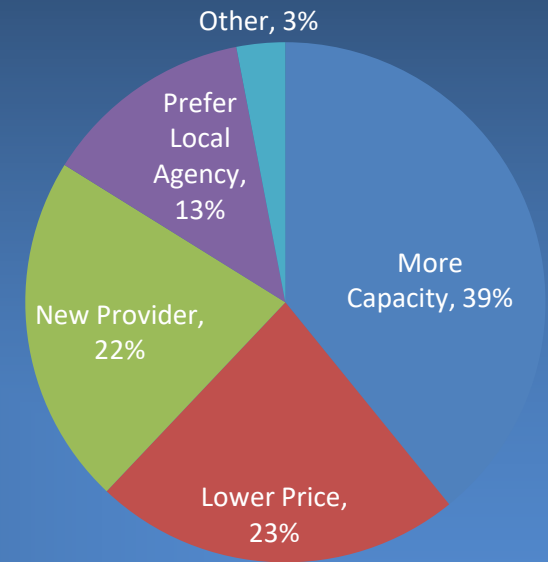| Provider	Total Sample	Definitely Subscribe @ $70
Suddenlink	7%	4%
AT&T	6%	5%
Verizon	5%	3%
T-Mobile	2%	1%
Community-Owned Agency	25%	41%
Oasis	3%	1%
PST	0%	1%
Starlink/ViaSat/HughesNet	3%	1%
A Provider New to the Area	10%	7%
Other Provider	2%	4%
Don't Know	37%	32%

At a $70 price for 1G, 68% of respondents indicated they would definitely or probably switch their Internet service to a fiber system installed by the City. This metric drops to 58% at the $90 price point…

Q23/Q24: *Stated purchase intent for:*
- *Internet at $70/mo. for 1Gbps*
- *Internet at $90/mo. for 1Gbps*

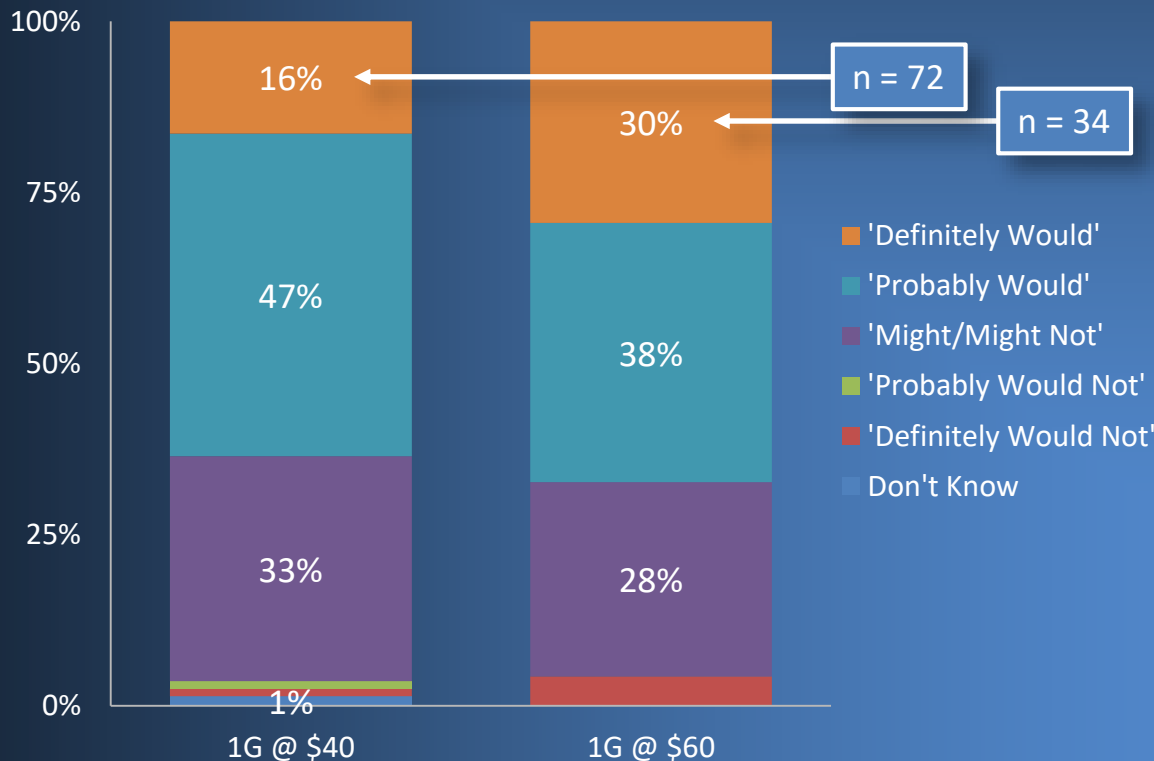**Primary Reason to Switch**
(Definitely or Probably Response)

Stacked bar chart — 1G @ $70: Definitely Would 46%, Probably Would 22%, Might/Might Not 15%, Probably Would Not 5%, Definitely Would Not 9%, Don't Know 3%.
1G @ $90: Definitely Would 31%, Probably Would 27%, Might/Might Not 21%, Probably Would Not 8%, Definitely Would Not 11%, Don't Know 3%.

Pie chart — Primary Reason to Switch: More Capacity 39%, Lower Price 23%, New Provider 22%, Prefer Local Agency 13%, Other 3%.

◈ 63-68% of respondents likely eligible to participate in the Affordable Connectivity Program indicated they would definitely or probably subscribe at reduced pricing of $40 and $60 respectively.

◈ With so few households ACP eligible, the small sample sizes (Cell A: n=72 and Cell B: n= 34) can impact results

Q30/Q31: *Stated purchase intent for:*
   - ACP Eligible Internet at $40/mo. for 1Gbps
   - ACP Eligible Internet at $60/mo. for 1Gbps

Legend:
- 'Definitely Would'
- 'Probably Would'
- 'Might/Might Not'
- 'Probably Would Not'
- 'Definitely Would Not'
- Don't Know

1G @ $40: 16%, 47%, 33%, 1% (n = 72)
1G @ $60: 30%, 38%, 28% (n = 34)

◈ Uptown uses a 'Likert Scale' with Overstatement Adjustment
  ❖ Conservative research techniques from the Packaged Goods sector
  ❖ Clearly specify purchase intent vs. "interest" and removes overstatement bias

◈ Example: "How likely would you be to subscribe?"
  ❖ Definitely Would   21.5%   x 70% = 15.0%
  ❖ Probably Would   35.6%   x 30% = 10.7%
  ❖ Might/Might Not   20.0%   x 10% =   2.0%
   **27.7%** = Penetration Estimate

◈ The price elasticity of demand is elastic at the tested price range as the change in demand exceeds the change in price, resulting in greater forecasted annual revenue at the lower price point:
  ❖ e_d = Δ in demand / Δ in price = 28.8%/22.2% = 1.3

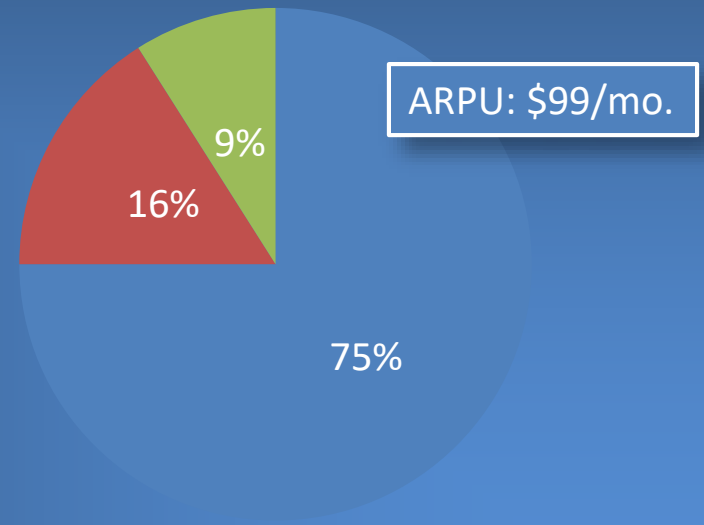| Survey Cell	Broadband Service	Forecasted Take Rate	Residential Subscribers *(15,000 serviceable premises)*	Monthly ARPU *(average revenue per user)*	Annual Revenue
A	1G Internet @ $70	40.5%	6,075	$82/month	$5.978M
B	1G Internet @ $90	31.4%	4,710	$99/month	$5.595M

UPTOWN
SERVICES, LLC

Depending on the price of the 1Gbps tier, about 1 in 5 households that would definitely or probably subscribe would opt for a multi-gig tier at the tested price points. The resulting Average Revenue Per User (ARPU) is $82-$99 per month depending upon the pricing strategy deployed...

Most Likely Subscribed Tier at Stated Price Points
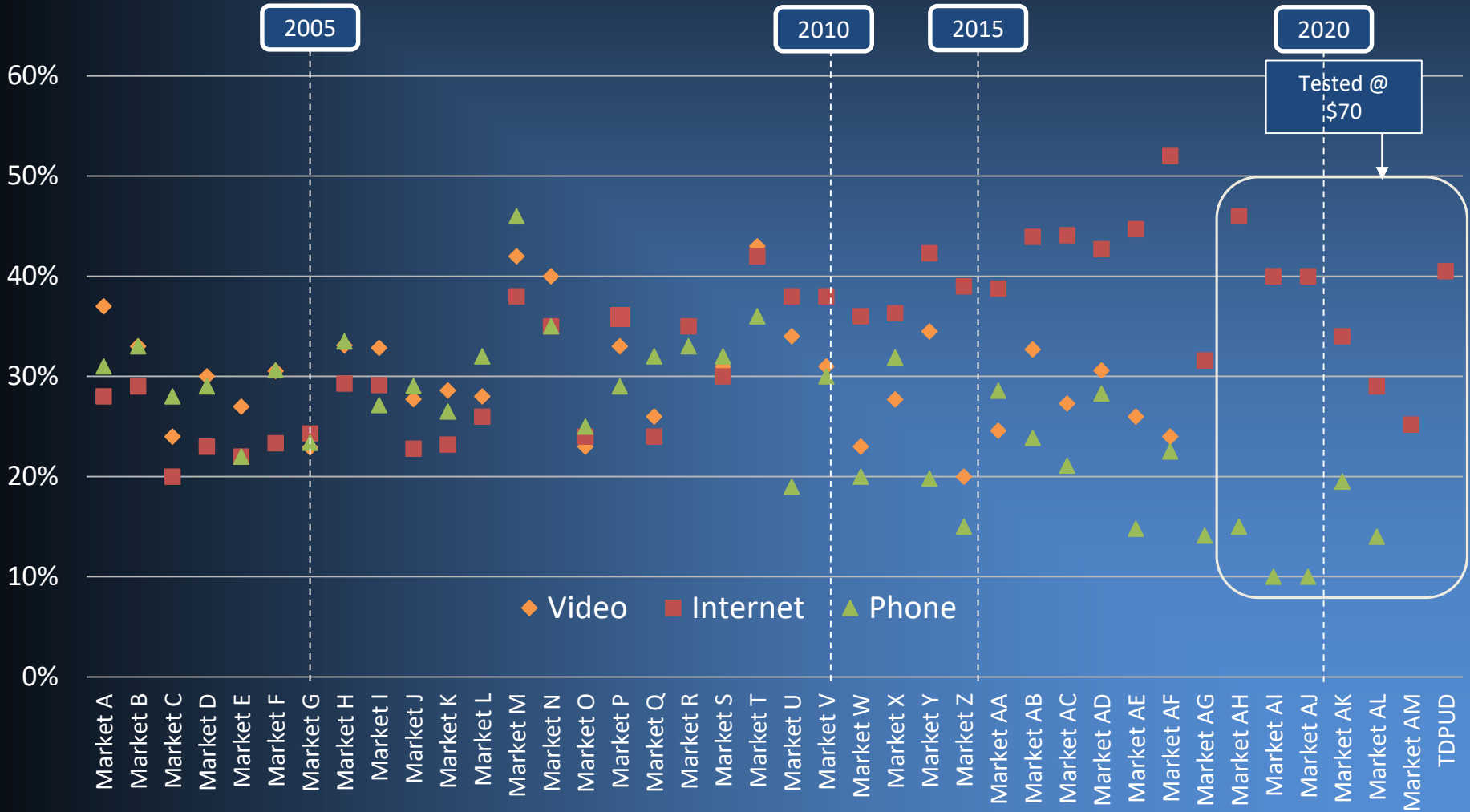*(If 1G Tier Priced at $70/mo.)*

ARPU: $82/mo.

7%
16%
77%
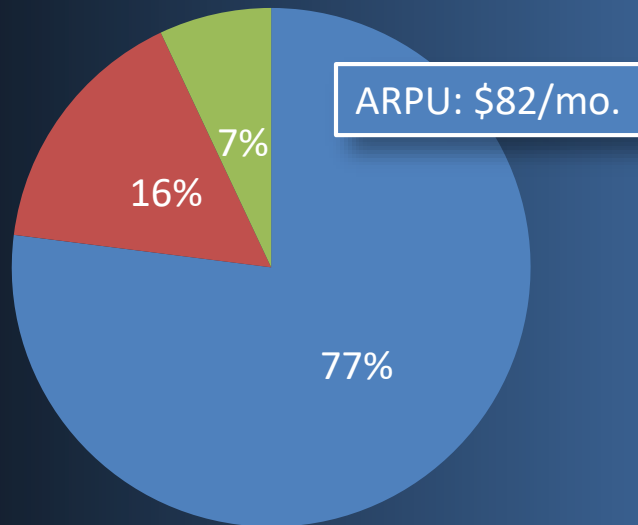
■ 1G @ $70 ■ 2G @ $110 ■ 4G @ $150

Most Likely Subscribed Tier at Stated Price Points
(If 1G Tier Priced at $90/mo.)

ARPU: $99/mo.

9%
16%
75%

■ 1G @ $90 ■ 2G @ $120 ■ 4G @ $150

UPTOWN SERVICES, LLC

Current Demand & Use	• 98% of households use Internet at home with 87% using a wired connection. Optimum (Suddenlink) is the dominant provider.
Demographic Factors	• Lower income households are less likely to have a wired Internet connection • Internet access method is not significantly influenced by age • Lower income households are more likely to subscribe to lower capacity Internet tiers
Satisfaction	• Overall Internet satisfaction score is 4.7 on a 1-10 scale. The percentage of very satisfied households (rating 9 or 10) is just 8% overall due to dissatisfaction with price and customer service.
Market Gaps	• 42% of TDPUD households feel that at the present time they do not have the ability to get the Internet speed that they want • 80% of households subscribing to a download tier greater than 50M are not receiving their perceived download speed • Immediately after completing a speed test, 46% of households observed that the speed test outcome was lower than their subscribed speed
Affordability	• 48% of households strongly agree or somewhat agree that they are subscribing to a lower Internet tier in order to save money • We estimate that approximately 6-10% of TDPUD households qualify for ACP
Potential Demand & Use	• With price elasticity at 1.3, the $70 price point is expected to maximize revenue and contribution and deliver a 40% take rate. This take rate benchmarks high compared to other studies. • 38% of households state their ideal Internet speed would be 1G or higher. This increases to 56%/51% among those who would definitely subscribe at $70/$90 per month for 1G • 25% of all respondents would prefer to receive high speed Internet from 'a community-owned local agency'

Task 2 - Assessment of TDPUD Utility Assets

- Assessment of District fiber, communications and utility assets
  - Electric poles
  - Spare conduits
  - Tower sites
  - Existing fiber system
  - Planned fiber deployment

- Assessment of last mile technologies
  - Broadband capacity requirements forecast
  - Broadband technology overview
  - Electric utility application analysis

- ◈ Electric poles
  - ◈ Primary Distribution – 4,647
  - ◈ Secondary Distribution – 1,298
  - ◈ Trees – 1,369
- ◈ Spare conduits
  - ◈ Broadband Pathways – 500,000 feet
  - ◈ Primary Electric Pathway – 100,000 feet
  - ◈ Secondary Electric Pathways – 20,000 feet
  - ◈ Abandoned Pipelines – 1,000s of feet in need of proofing
- ◈ Radio transmitters / sites
  - ◈ Water SCADA Comms - 54
  - ◈ Water AMI - 27
  - ◈ Point to Point Network Link - 8
  - ◈ DMR Two-Way Radio - 2
  - ◈ Analog Two-Way Radio - 1
- ◈ Fiber system
  - ◈ Existing network – 291,000 feet
    - ◈ Backbone – 250,000 feet
    - ◈ Lateral – 41,000 feet
  - ◈ Planned expansion – 151,000 feet
    - ◈ Backbone – 120,000 feet
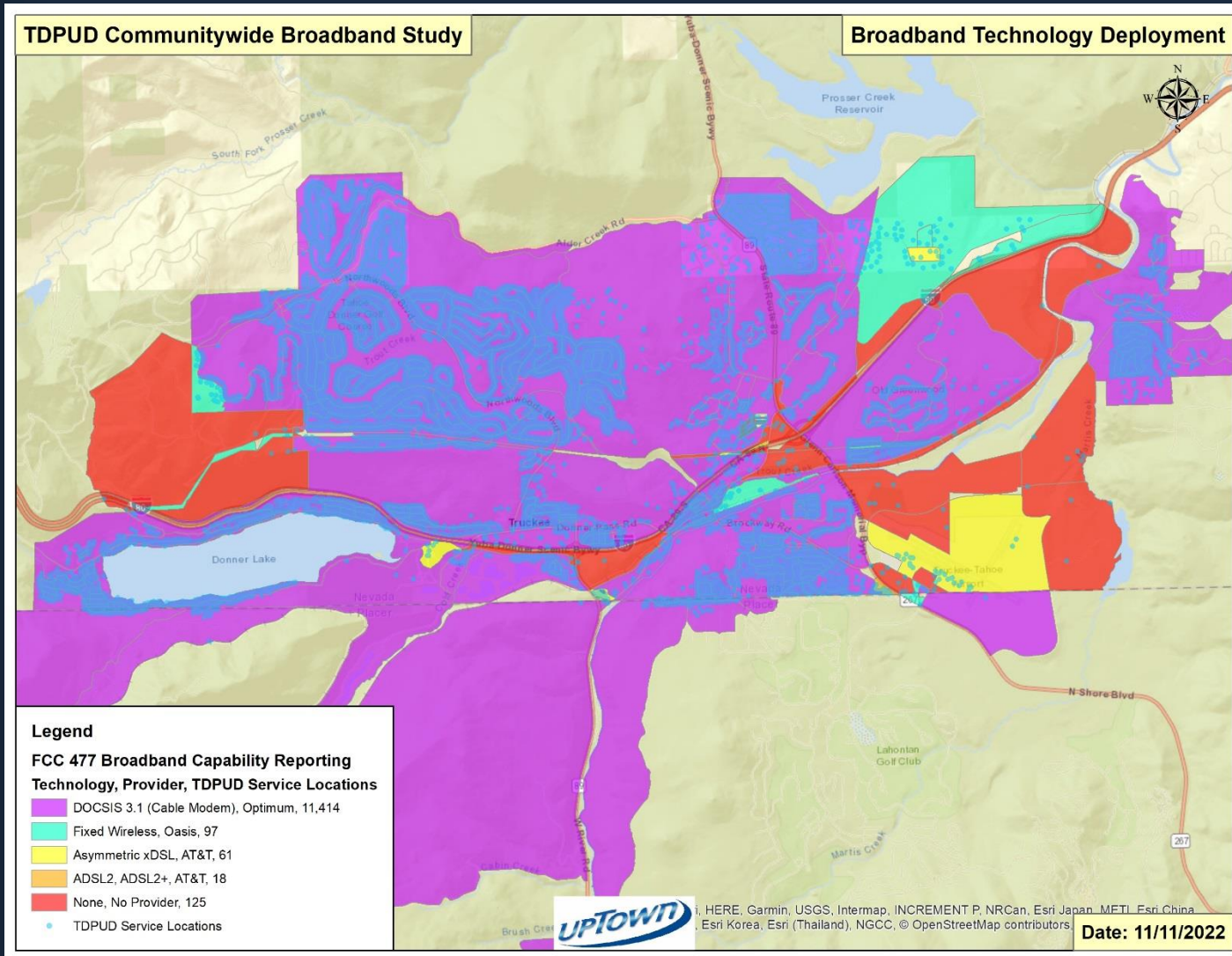   - ◈ Lateral – 31,000 feet

DISTRICT INFRASTRUCTURE ASSESSMENT

- ◈ **Electric poles**
  - ◈ 80% of all poles expected to require replacement to support a new FTTP attachment
  - ◈ Average cost of $20,000 per primary distribution pole
  - ◈ Average cost of $10,000 per secondary distribution pole
  - ◈ Pole replacements expected to exceed $84M
  - ◈ Pole replacement cost ≈ $125 per foot

- ◈ **Spare conduits**
  - ◈ 1,410 services fed from underground primary electric network
  - ◈ 1,092 services fed from primary lines with spare conduit
  - ◈ 318 services fed from primary lines with no spare conduit
  - ◈ Underground structures need to be installed throughout areas with spare conduits
  - ◈ Cost implications discussed in Task 3

- ◈ **Radio transmitters / sites**
  - ◈ Significant wireless site infrastructure in place throughout service area
  - ◈ Combination of water tanks, free standing towers and poles in use for utility applications
  - ◈ Sites should be able to accommodate a minimal antenna array and radio/fiber equipment
  - ◈ Most primary sites connected to TDPUD fiber system

- ◈ **Fiber system**
  - ◈ Fiber network is comprised of high-count cables (96, 144 and 216) on main runs
  - ◈ System should have enough capacity to connect multiple FTTH and/or fixed wireless sites
  - ◈ Connecting FTTH neighborhoods may require additional feeder fiber capacity
  - ◈ Future backbone fiber deployment should be augmented if FTTH is pursued

Task 2 - Last Mile Technologies and Utility Applications

◈ **Broadband capacity requirements**

  ◈ Gigabit capability is the benchmark for any new wireline broadband system

  ◈ Multi-Gig is also in demand from a growing segment of the market (residential and commercial)

  ◈ 10Gig and multi-10Gig capability will be required within 10 years

◈ **100% fiber network offers only pathway to multi-10Gig capability**

  ◈ Passive Optical Network (PON) standards continue to evolve

  ◈ GPON – 2.4Gig downstream / 1.2Gig upstream has been the primary option for FTTP until 2019

  ◈ XGS-PON – 10Gig symmetrical platform now being deployed by FTTP operators

  ◈ NG-PON2 – multi-10Gig symmetrical capability compatible with GPON and XGS-PON

◈ **Macro-cell fixed wireless**

  ◈ Platforms based on licensed spectrum have higher power, but require provider provided CPE

  ◈ Unlicensed platforms operate at lower power, but can be compatible with standard Wi-Fi devices

  ◈ Most WISPs struggle to provide speeds greater than 50Mbps

  ◈ Newly introduced platform boasts user radios capable of supporting 800Mbps

◈ **Micro-cell fixed wireless**

  ◈ "5G" technology uses licensed spectrum and fiber fed access points to offer 1Gig service

  ◈ Up to 4Gig speeds possible under ideal conditions and optimal spectrum usage

  ◈ Access points are limited to 1,000 foot radius or less to achieve building and foliage penetration

  ◈ Feeding access points with fiber would virtually result in a "fiber to the curb" buildout

◈ TDPUD has comprehensive plan for electric and water technology integration

- ◈ Advanced SCADA systems for electric and water
- ◈ Advanced metering infrastructure (AMI) for electric and water

◈ Future fiber deployment planned

- ◈ Current fiber plan calls for expansion of the existing fiber network
- ◈ Expansion designed to support fiber-based connections for strategic assets
- ◈ Any future commercial broadband network could be used to support electric and water applications

◈ Future utility applications that could be supported by broadband deployment

- ◈ General SCADA system expansion
- ◈ Distribution / grid automation for active monitoring and control of key assets
- ◈ Monitoring and controlling distributed generation assets (micro-grids)
- ◈ Increased backhaul capacity for water and electric AMI collectors
- ◈ Near real time monitoring of electric and water meters
- ◈ Monitoring and control of demand side management devices

Task 3 – Targeted Technology Deployment

TDPUD Communitywide Broadband Study — **Broadband Technology Deployment**

Legend

FCC 477 Broadband Capability Reporting

Technology, Provider, TDPUD Service Locations

- DOCSIS 3.1 (Cable Modem), Optimum, 11,414
- Fixed Wireless, Oasis, 97
- Asymmetric xDSL, AT&T, 61
- ADSL2, ADSL2+, AT&T, 18
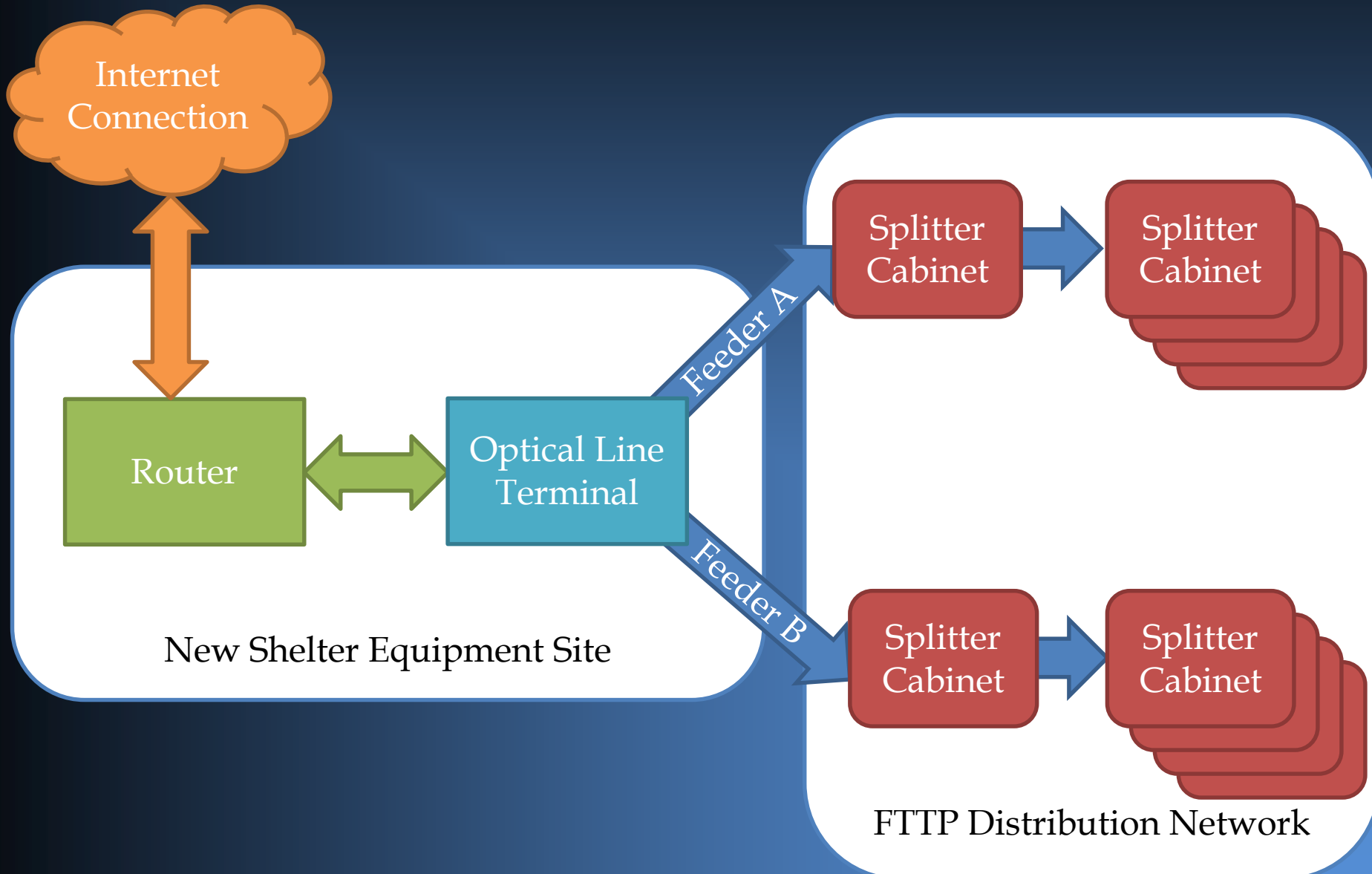- None, No Provider, 125
- • TDPUD Service Locations

Date: 11/11/2022

- Broadband technology deployment
  - Data sourced from California Interactive Broadband Map (broadbandmap.ca.gov)
  - Census block level reporting from service providers
  - Reporting the maximum advertised download speed and technology in use
- Providers
  - Optimum has deployed DOCSIS 3.1 cable modem technology capable of 1Gig download
  - AT&T is relying on copper-based DSL technology with most downloads less than 10Mbps
  - Oasis Broadband uses fixed wireless technology to deliver downloads 50Mbps or less
- Coverage
  - Optimum covers nearly all census blocks covering 11,414 TDPUD service locations
  - Oasis is the best service option for 97 service locations where Optimum did not report serving
  - AT&T is the best option for 79 service locations where neither Optimum nor Oasis reported serving
  - 125 service locations were in census blocks with no reported service provider
- Summary
  - 11,511 service locations are served according to the State of California Broadband Office
  - 204 service location are underserved according to the State of California Broadband Office
  - See market research report for test results from actual broadband subscribers
  - Actual test results demonstrate that advertised speeds are overstated

◈ **TDPUD aerial outside plant environment is untenable for FTTP construction**

- ◈ Make ready (pole replacement) costs drive the cost of aerial construction beyond feasible levels
- ◈ Other Uptown projects are encountered make ready costs in the range of $500 - $1,000 per pole
- ◈ TDPUD is projecting $14,253 per pole for pole replacements which translates to $124 per path foot
- ◈ The cost of pole replacements alone will equate to $7,564 per service location passed

◈ **New underground construction is generally cost prohibitive for FTTP**

- ◈ Soil conditions are variable
- ◈ Terrain is challenging in many areas
- ◈ Broad-gauge estimates for conduit placement are very high ($100 per foot)

◈ **Underground drops**

- ◈ Underground drops are pervasive in aerial system
- ◈ Burying drops to these homes will significantly increase installation costs compared to aerial

◈ **Spare conduit offers great value for FTTP construction**

- ◈ Most underground service locations (1,092 out of 1,410) are passed by some form of spare conduit
- ◈ Vaults, pedestals and handholes will need to be installed in areas with spare conduit
- ◈ Conduit systems will then need to be rodded and roped prior to pulling fiber
- ◈ Some limited path creation may be required depending on the final network designs

◈ **Uptown will complete sample designs to quantify construction costs**

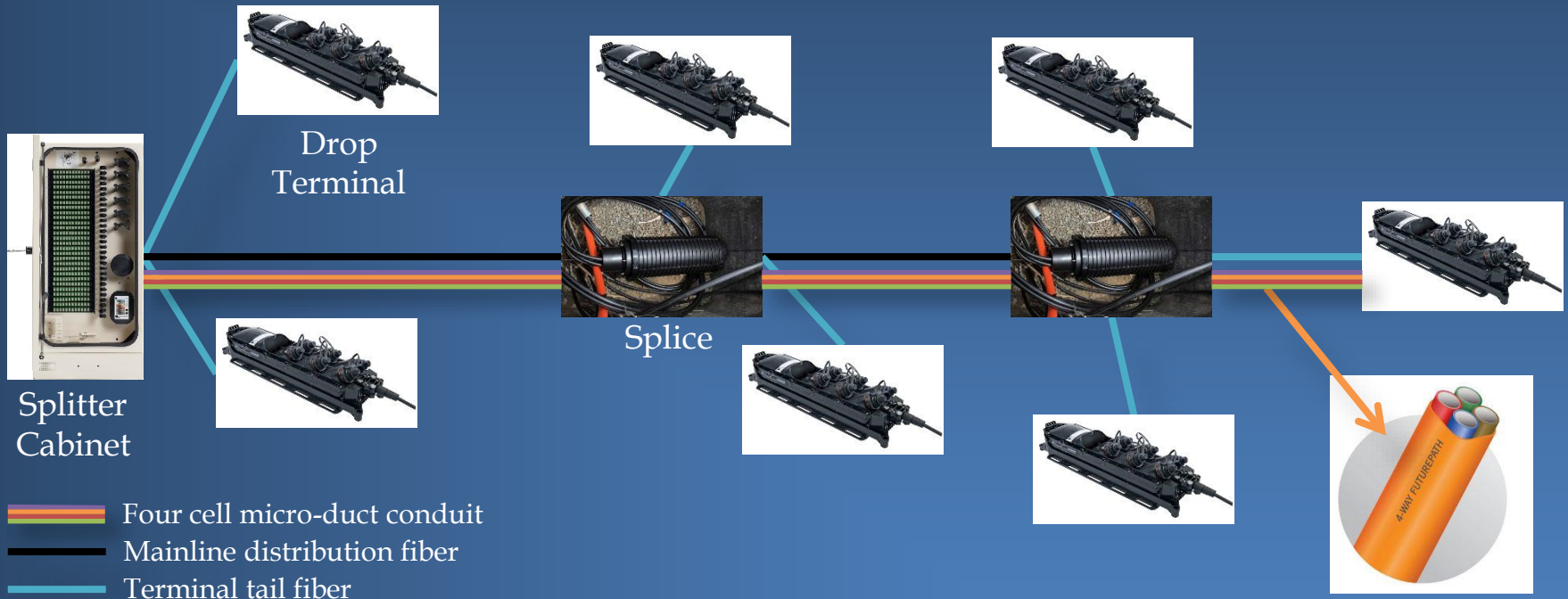# Task 3 - Fiber to the Home Reference Architecture

Internet Connection

Router

Optical Line Terminal

New Shelter Equipment Site

Feeder A

Feeder B

Splitter Cabinet

Splitter Cabinet

Splitter Cabinet

Splitter Cabinet

FTTP Distribution Network

- Outside World – Content
  - Two physically diverse Internet backbone connections desired
  - Video content would come in over one or both Internet connections
  - Phone would also route over one or both Internet connections
- Network operations center(s)
  - Uptown assumes that TDPUD would deploy at least two FTTP equipment sites
  - Sites ideally be at least 12'x20' stand alone shelters with standby power and redundant HVAC
  - Sites would house system routers (one each) and the FTTP optical line terminals for the areas served
  - Sites would be located on the primary fiber backbone to enable connections outside of Truckee
- Core Network – Layer 3
  - Core network safely routes traffic to and from the outside world
  - Border Gateway Protocol (BGP) routers connect to the Internet
  - BGP routers deployed in pairs
  - Typically installed on backbone network in physically diverse locations
  - Each router connects to at least two Internet backbone providers
- Optical Line Terminals (OLTs)
  - An OLT combines all digital content onto PON ports
  - Typically requires environmentally controlled space
  - One Chassis can serve up to 1,024 connected ONTs (subscribers)
  - OLTs typically connect upstream via multiple 10G uplinks

◈ Feeder network

  ◈ Feeder connects distribution network to serving OLTs

  ◈ Typically one feeder fiber per 32 passings (PON port)

  ◈ ≈ 400 feeder fibers would be required to service 12,000 passings

  ◈ All feeder will route in and out of the serving site

◈ Splitter cabinet

  ◈ Splitter cabinets deployed at the neighborhood level

  ◈ Cabinets serve as the transition point from the feeder network to the distribution network

  ◈ Splitters are housed in the cabinet

  ◈ One fiber per home / business passed (passing) terminated on the field side of the cabinet

◈ Distribution network

  ◈ Distribution cables sized to accommodate 100% adoption with spares

  ◈ Drop terminals are connected to distribution fibers to serve four to 12 subscribers

  ◈ Drop terminals are connectorized to reduce splicing during the install process

◈ Service drops

  ◈ Service drops are installed after a subscriber signs up for service

  ◈ Service drops are installed in the same manner as other communications drops (underground or aerial)

  ◈ Drops transition to inside wiring on the side of the dwelling

  ◈ Optical network terminals (ONTs) are installed inside

Drop Terminal

Splitter Cabinet

Splice

— Four cell micro-duct conduit
— Mainline distribution fiber
— Terminal tail fiber

- ❖ Splitter Cabinet
  - Small cabinet mounted on vault lid
  - Approximately one cabinet for every 250 homes
  - Connects backbone and distribution systems

- ❖ Underground Distribution System
  - Four cell micro-duct installed vault to vault
  - Use of micro-duct minimizes vault and handhole sizing
  - Distribution and drop fibers installed in micro-ducts

- ❖ Mainline Distribution Fiber
  - High count micro-fiber installed throughout neighborhood
  - Cable sized to serve 100% of homes

- ❖ Terminal Tails
  - Terminal have built-in fiber cable tail, cut to length
  - Terminal tails connect to mainline distribution cable

- ❖ Splice Points
  - Tails fusion spliced to distribution cable using splice points
  - Splice points installed in 24x36x24 vaults in right of way

Right of Way

Drop Terminal

Drop Fiber

Private Property

Living Unit

Test Access Point

Indoor Fiber

Optical Network Terminal

Wi-Fi →
- Smart Phones
- Smart TVs
- PCs
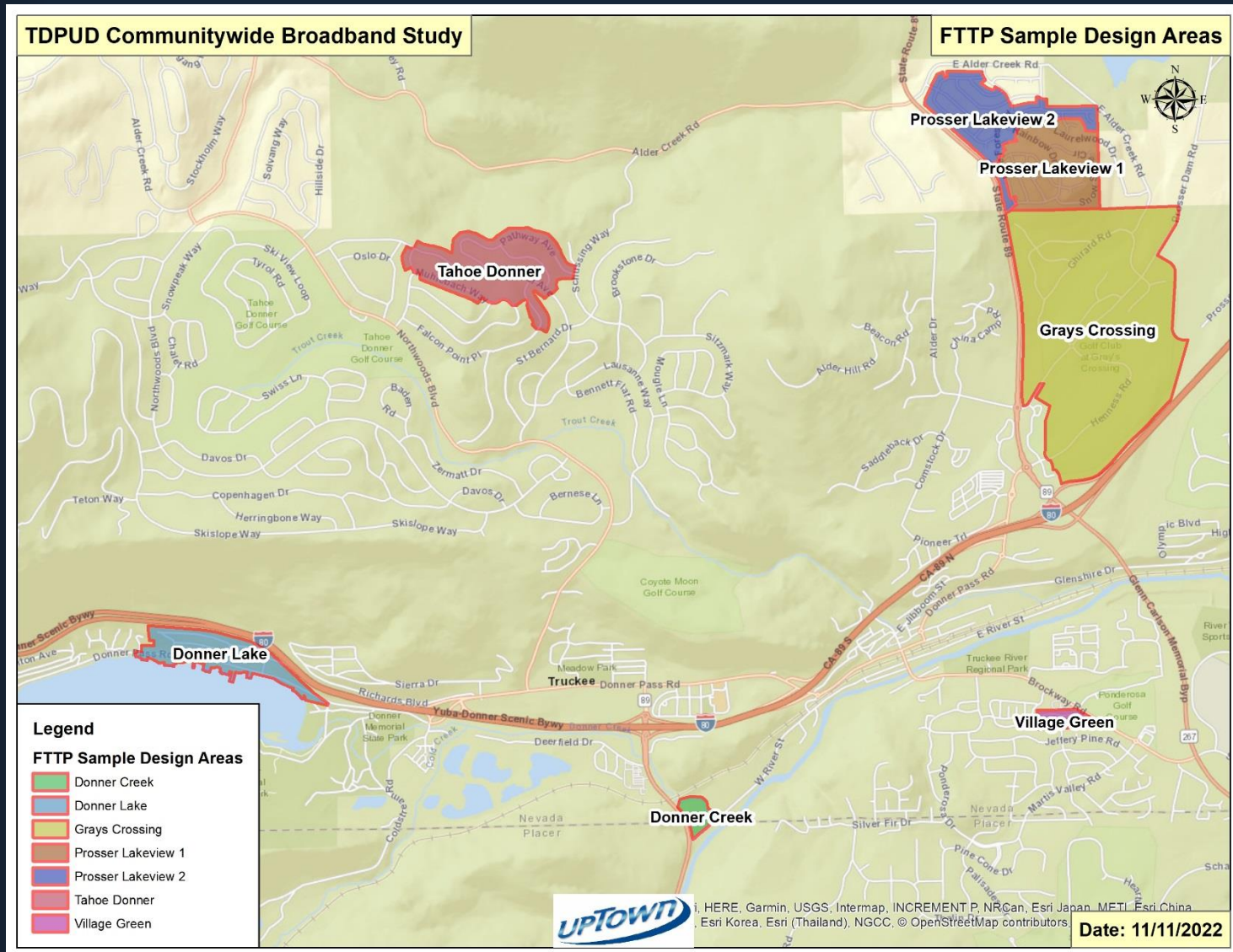- Home Routers

Ethernet →

Phone → Landline phone

◈ **Drop Terminal**
- Drop terminals connect service drops to the distribution network
- One terminal serves between two and eight homes
- Mounted in grade level handhole in public right of way

◈ **Drop Fiber**
- Drops only installed after subscriber orders service
- Drop conduit installed from terminal handhole to premises
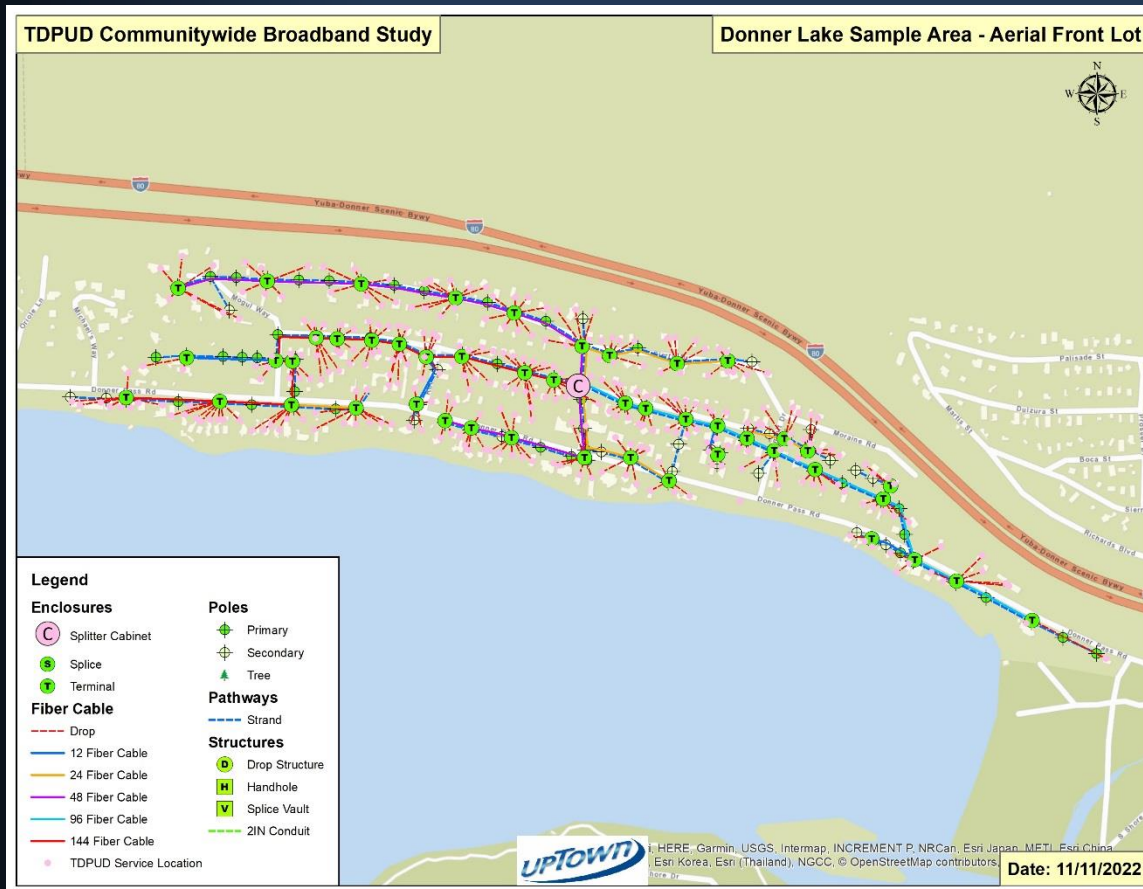- Fiber drop pushed or pulled in shallow drop conduit

◈ **Test Access Point (TAP)**
- TAP mounted on dwelling
- TAP provides demarcation between outside and inside fiber (bulkhead)

◈ **Optical Network Terminal (ONT)**
- ONT installed indoors
- ONT converts optical signal to standard formats
- Internet, phone and video streaming supported

Task 3 - Fiber to the Home Sample Designs

- Aerial construction
  - $4.00 per foot for strand placement in communications zone
  - $2.50 per foot for lashing each cable to the strand

- Make ready
  - 80% of all poles will be replaced
  - $20,000 replacement cost per primary pole
  - $10,000 replacement cost per secondary pole

- New underground path creation
  - $100.00 per foot composite for conduit placement (100% boring)
  - $0.75 per foot for 2in HDPE conduits
  - Per structure adder for all vaults and handholes
  - Structure sizing minimized with no use of pedestals

- Fiber placement
  - $2.50 per foot labor to install fiber cable in conduit system
  - Fiber material costs based on recent quote

- Technical services
  - $35 per fusion splice
  - $350 - $450 closure prep for terminals, splice points and feeder taps

- Material pricing assumptions
  - Fiber, terminal and structure pricing based on recent vendor bids
  - Labor estimates based on prior Pacific Northwest projects / bids

TDPUD Communitywide Broadband Study — **Donner Lake Sample Area - Aerial Front Lot**

Date: 11/11/2022

Design Metric	Value
New Aerial Plant Miles	7.2
New Underground Plant Miles	0.0
% Aerial	100%
% UG	0%
Passings	280
Passings per Mile of Plant	39
Materials Cost per Passing	$334
Labor Cost per Passing	$1,080
Total Cost per Passing	**$1,415**
Total Materials (no drops)	$93,595
Total Labor (no drops)	$302,533
Total Cost	**$396,128**

* - Does not include engineering, fixed equipment, subscriber capital and installation costs.

TDPUD Communitywide Broadband Study — Tahoe Donner Sample Area - Aerial Front Lot

Date: 11/11/2022
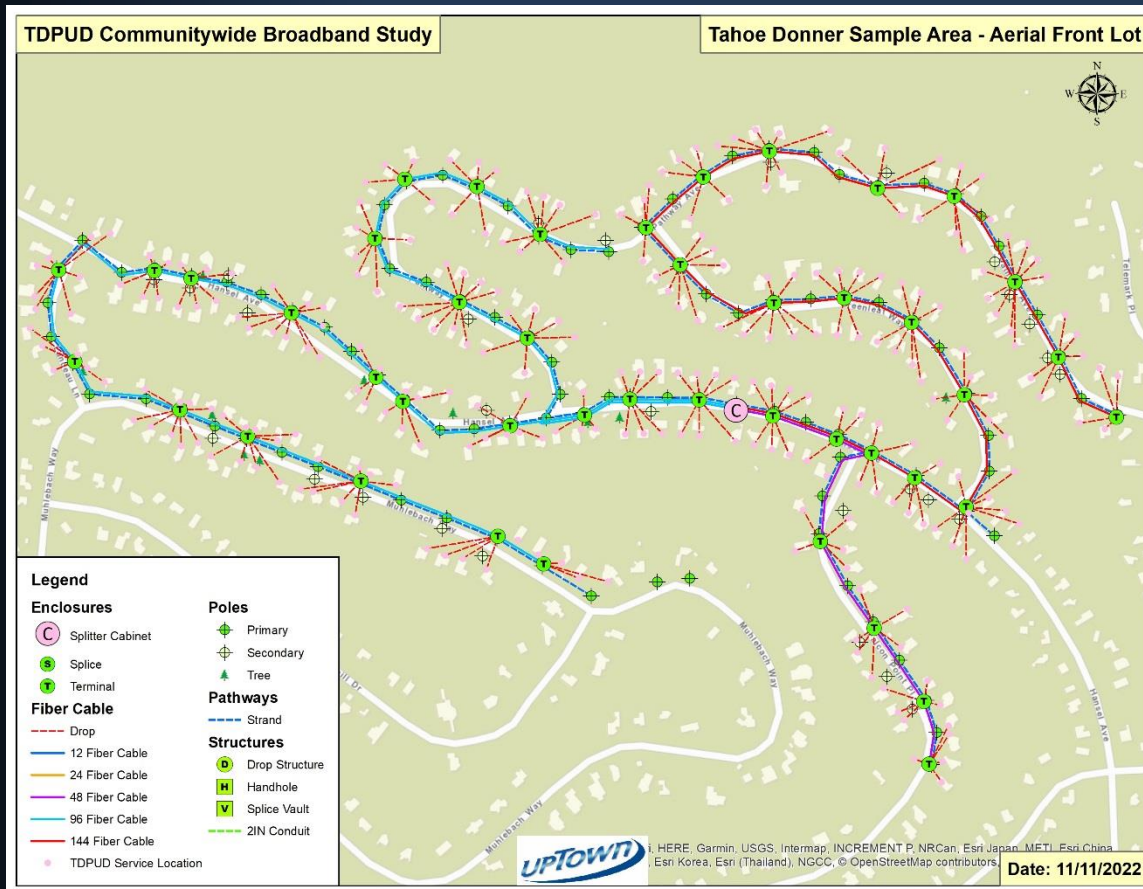
Design Metric	Value
New Aerial Plant Miles	8.1
New Underground Plant Miles	0.0
% Aerial	100%
% UG	0%
Passings	268
Passings per Mile of Plant	33
Materials Cost per Passing	$359
Labor Cost per Passing	$1,057
Total Cost per Passing	**$1,417**
Total Materials (no drops)	$96,345
Total Labor (no drops)	$283,393
Total Cost	**$379,738**

* - Does not include engineering, fixed equipment, subscriber capital and installation costs.
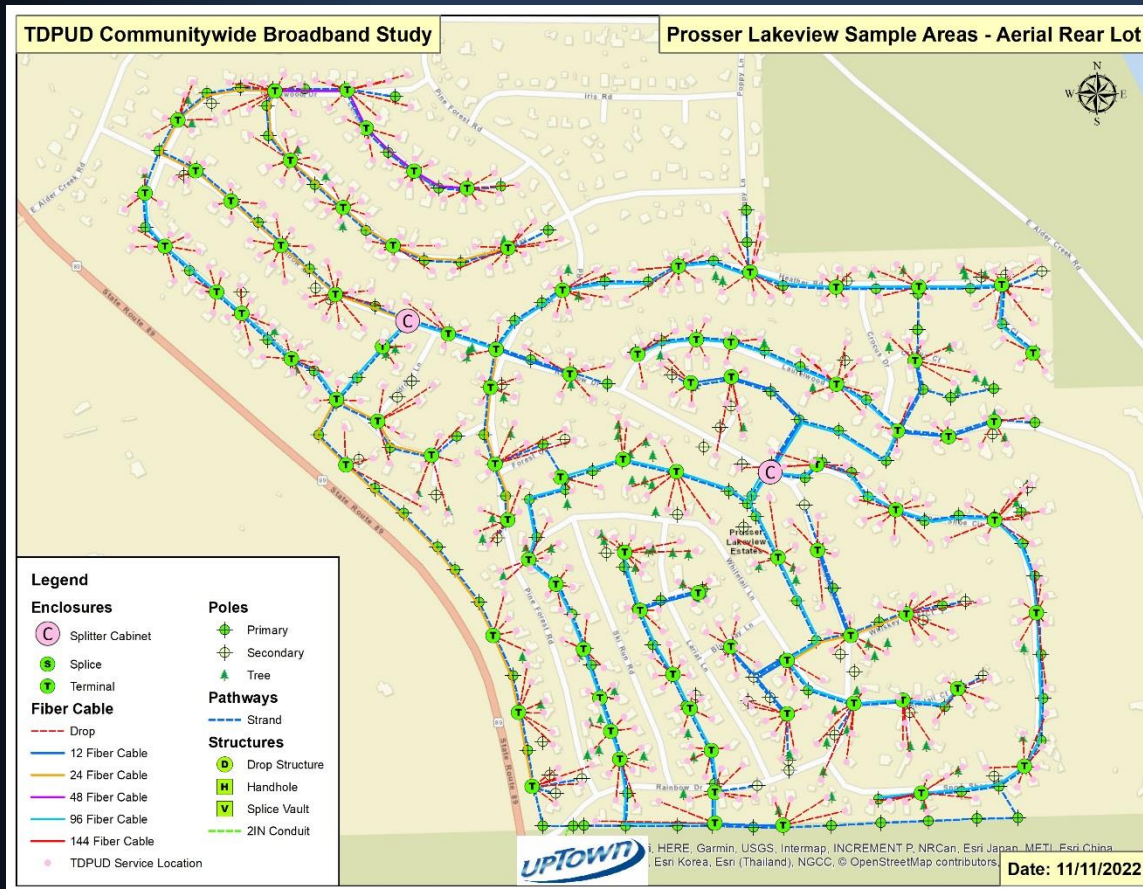
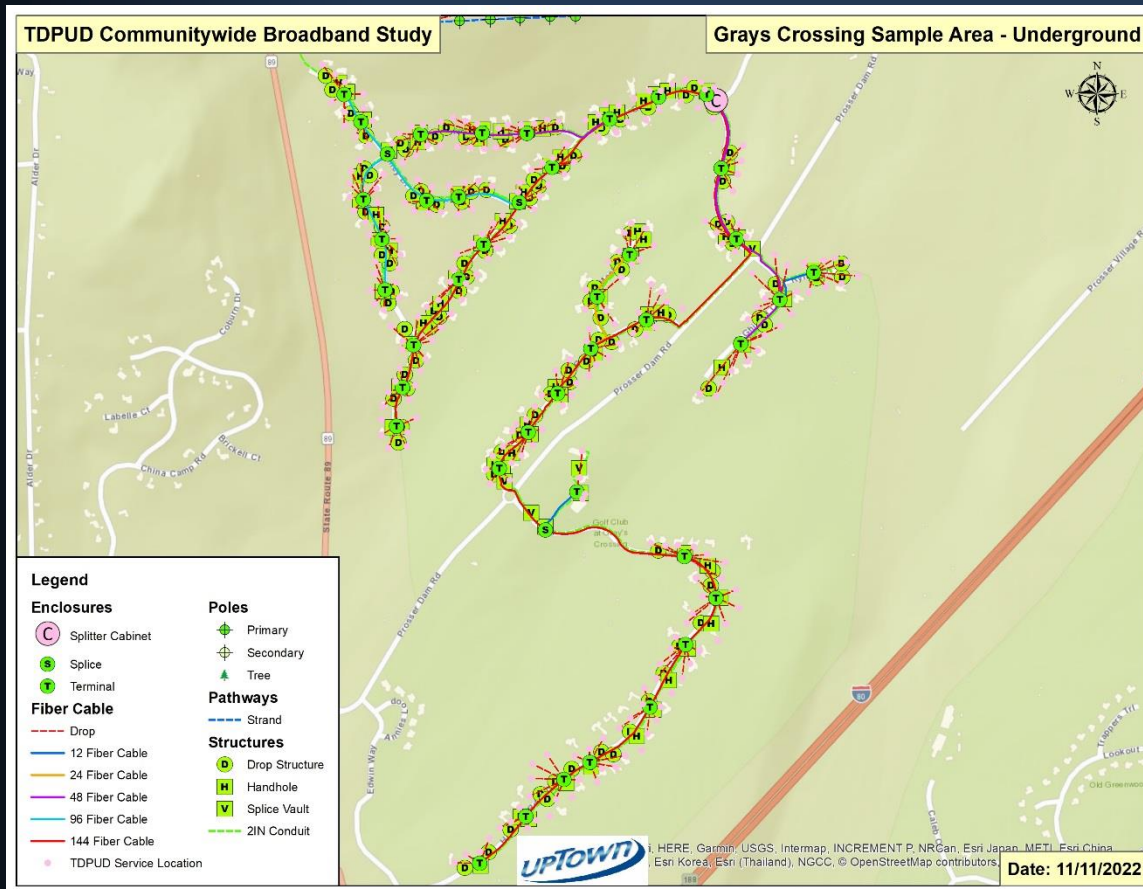| Design Metric	Value
New Aerial Plant Miles	15.5
New Underground Plant Miles	0.0
% Aerial	100%
% UG	0%
Passings	485
Passings per Mile of Plant	31
Materials Cost per Passing	$312
Labor Cost per Passing	$986
Total Cost per Passing	**$1,298**
Total Materials (no drops)	$151,363
Total Labor (no drops)	$478,093
Total Cost	**$629,456**

* - Does not include engineering, fixed equipment, subscriber capital and installation costs.

Design Metric	Value
New Aerial Plant Miles	0.0
New Underground Plant Miles	5.8
% Aerial	0
% UG	100%
Passings	278
Passings per Mile of Plant	48
Materials Cost per Passing	$278
Labor Cost per Passing	$746
Total Cost per Passing	**$1,024**
Total Materials (no drops)	$77,310
Total Labor (no drops)	$207,488
Total Cost	**$284,797**

* - Does not include engineering, fixed equipment, subscriber capital and installation costs.

TDPUD Communitywide Broadband Study — **Grays Crossing Sample Area - Underground**

Date: 11/11/2022
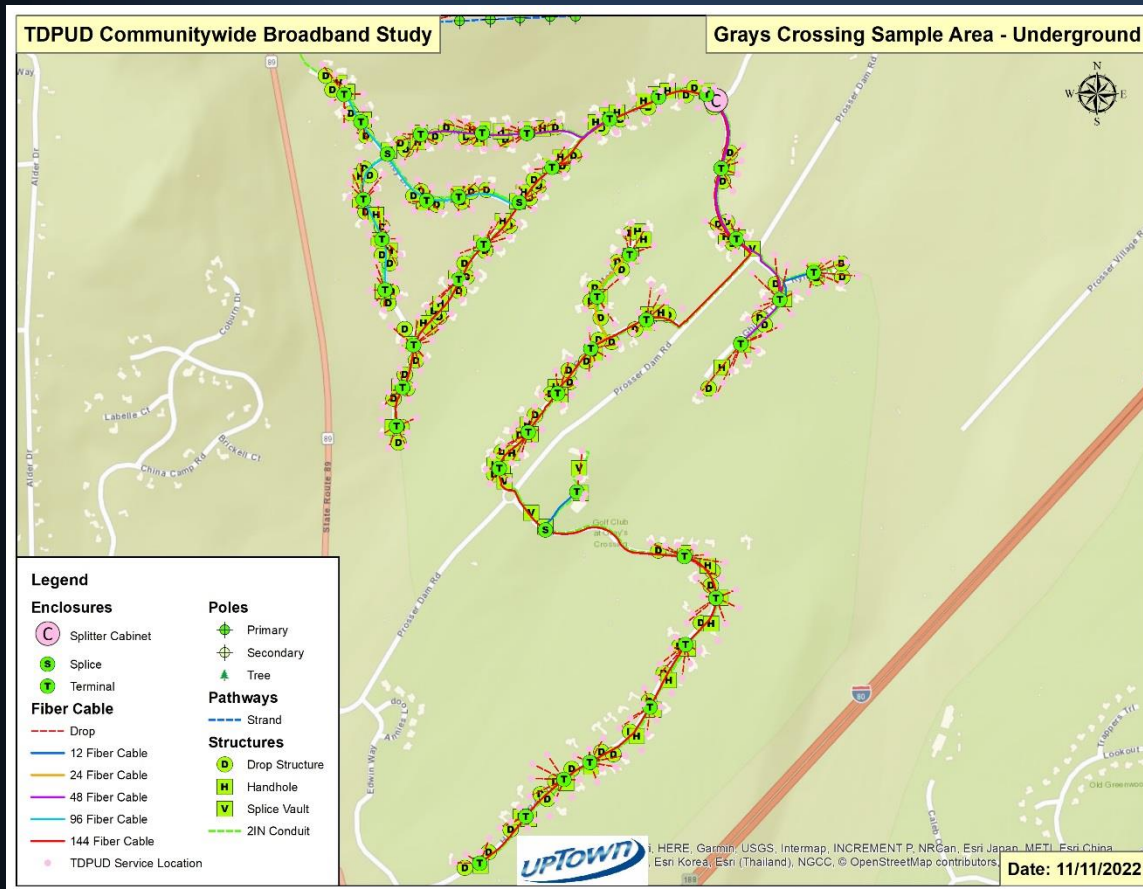
Design Metric	Value
New Aerial Plant Miles	-
New Underground Plant Miles	5.8
% Aerial	0%
% UG	100%
Passings	278
Passings per Mile of Plant	48
Materials Cost per Passing	$1,039
Labor Cost per Passing	$12,944
Total Cost per Passing	**$13,983**
Total Materials (no drops)	$288,716
Total Labor (no drops)	$3,598,444
Total Cost	**$3,887,160**

* - Does not include engineering, fixed equipment, subscriber capital and installation costs.

TDPUD Communitywide Broadband Study — Village Green Sample Area - Underground

Date: 11/11/2022

Design Metric	Value
New Aerial Plant Miles	0.0
New Underground Plant Miles	1.1
% Aerial	0%
% UG	100%
Passings	106
Passings per Mile of Plant	96
Materials Cost per Passing	$571
Labor Cost per Passing	$6,639
Total Cost per Passing	**$7,210**
Total Materials (no drops)	$60,514
Total Labor (no drops)	$703,769
Total Cost	**$764,283**

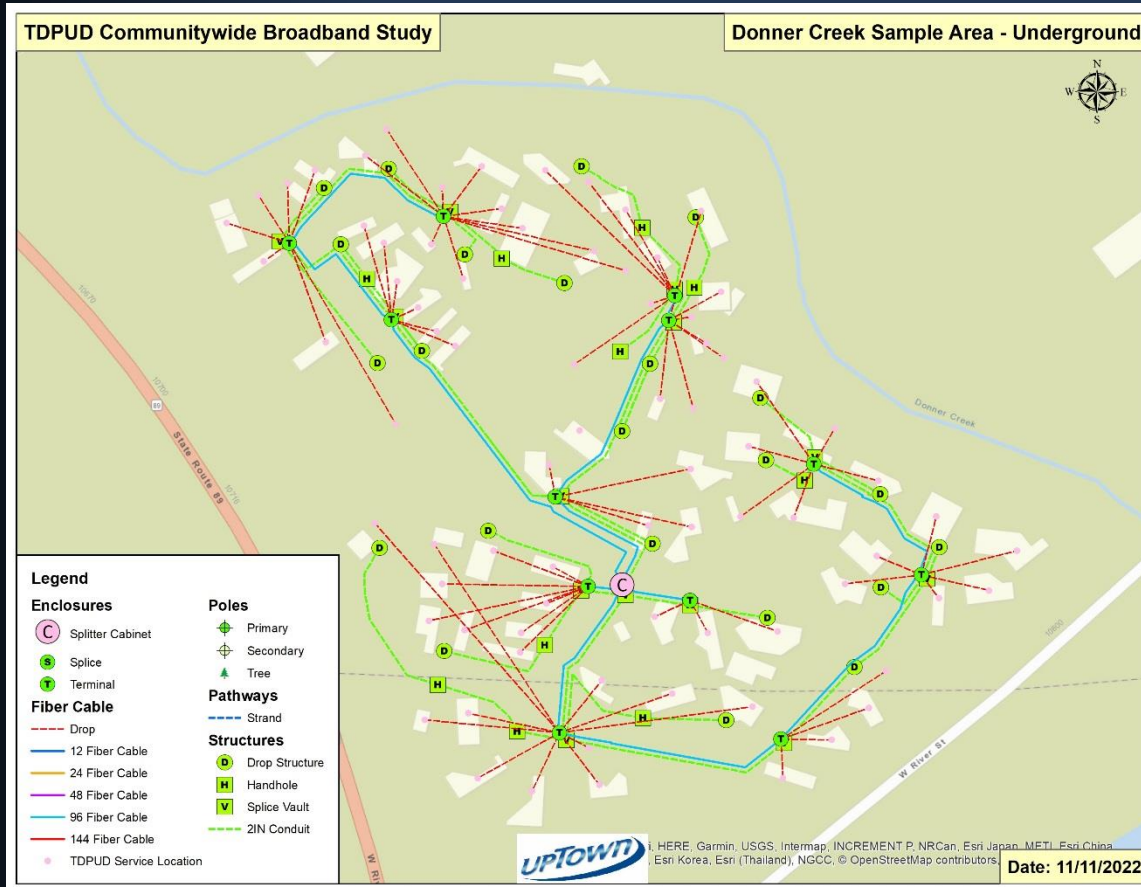* - Does not include engineering, fixed equipment, subscriber capital and installation costs.

Design Metric	Value
New Aerial Plant Miles	-
New Underground Plant Miles	0.7
% Aerial	0%
% UG	100%
Passings	79
Passings per Mile of Plant	110
Materials Cost per Passing	$672.07
Labor Cost per Passing	$6,333.55
Total Cost per Passing	**$7,005.62**
Total Materials (no drops)	$53,093.70
Total Labor (no drops)	$500,350.19
Total Cost	**$553,443.89**

* - Does not include engineering, fixed equipment, subscriber capital and installation costs.

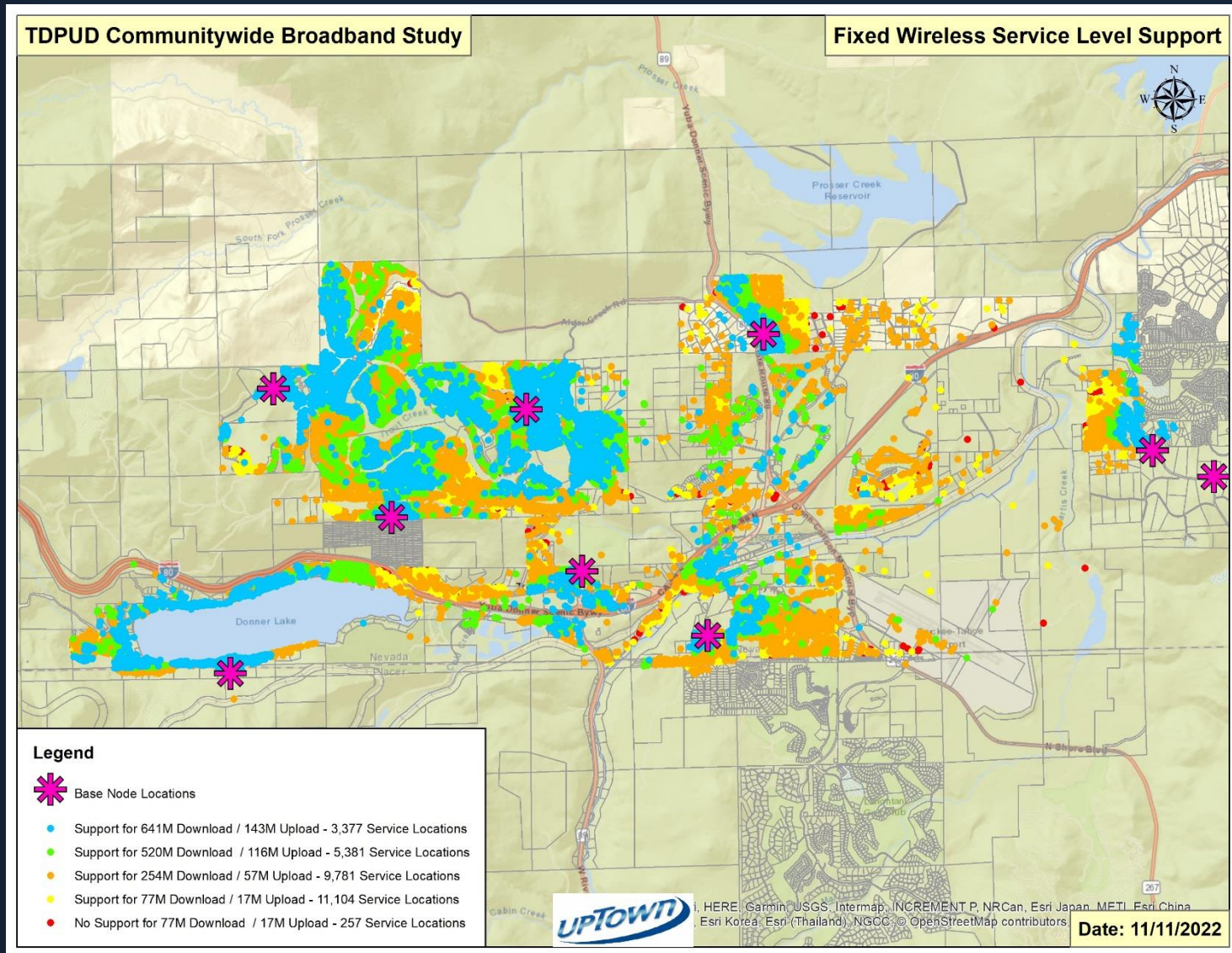| Sample Design Area	New OH Miles	New UG Miles	Passings	Passings per New Mile of Plant	Weight	Materials per Passing	Labor per Passing	Total per Passing
Tahoe Donner	8.1	-	268	33	51.0%	$359	$1,057	$1,417
Donner Lake	7.2	-	280	39	20.0%	$334	$1,080	$1,415
Prosser Lakeview	15.5	-	485	31	18.0%	$312	$986	$1,298
Village Green	-	1.1	106	96	3.5%	$571	$6,639	$7,210
Donner Creek	-	0.7	79	110	3.5%	$672	$6,334	$7,006
Grays Crossing	-	-	278	48	2.5%	$278	$746	$1,024
Grays New Conduit	-	5.8	278	48	1.5%	$1,039	$12,944	$13,983
Overall	30.9	7.6	1,774	46	100%	$372	$1,600	$1,972

- ❖ Sample design area weightings based on staff OSP analysis
- ❖ Last mile OSP capital budget required to pass 13,397 service points = $26.4M
- ❖ Does not include capital budget for backbone and feeder systems
- ❖ Does not include make ready, engineering and subscriber installation costs

Capital Budget Item	Total Capital	Notes
System Design and OSP Engineering	$525K	150 miles @ $3,500 per
Aerial Make Ready	$84.7M	4,756 poles @ $14,253 per
Construction Management	$1.2M	150 miles @ $8,000 per
FTTP Outside Plant Construction	$26.4M	13,397 passings @ $1,972 per
Backbone and Feeder Network	$2.6M	10% adder for FTTP last mile
Equipment Sites	$1.0M	Two new equipment sites
Total	$116.4M	$8,689 per Service Point

❖ Full system design and OSP engineering required to generate final capital budget
❖ Does not include subscriber drops or equipment
❖ Does not include retail service provider equipment and systems

Task 3 - Fixed Wireless Technology

◈ **Traditional fixed wireless deployment approach**
  ◈ Macro-cellular system that serves hundreds of subscribers from a single tower site
  ◈ Line of site requirements to achieve best throughput
  ◈ Susceptible to obstructions between tower and service location (trees, buildings, terrain, etc.)
  ◈ Predominantly license-free spectrum
  ◈ Service levels typically in the range of 50Mbps

◈ **5G micro-cellular platform**
  ◈ New technology enabling 1Gig speeds under ideal conditions
  ◈ Requires system access points to be within 1,000 feet of service location for maximum throughput
  ◈ System access points must be fed with fiber optic connection to achieve maximum throughput
  ◈ Licensed 5G frequency range makes building and tree penetration challenging

◈ **Hybrid fixed wireless approaches are emerging - Tarana**
  ◈ License-free and lightly licensed systems being offered
  ◈ One base station can deliver 9.6Gbps aggregate throughput to 1,024 subscribers within a one-mile radius
  ◈ Current subscriber radios have 800Mbps downstream capability
  ◈ 3GHz option offers higher power and better penetration of obstructions than license-free alternative

◈ **Implications for TDPUD**
  ◈ 5G would require virtually the same amount of last mile fiber as a FTTP deployment
  ◈ Traditional macro-cellular is already in use by Oasis with limited effect
  ◈ Tarana system is ground-breaking new technology that is worth a closer look

◈ **Tarana G1 strategy for TDPUD**
  ◈ Deploy four sector base nodes at nine TDPUD wireless sites to achieve broad coverage
  ◈ Complete signal propagation studies from a minimal number of sites
  ◈ Evaluate received signal strength at all service locations from nine primary wireless sites
  ◈ Add additional base nodes at TDPUD wireless sites to optimize coverage and signal throughput

TDPUD Communitywide Broadband Study

Fixed Wireless Service Level Support

Legend

✳ Base Node Locations

- Support for 641M Download / 143M Upload - 3,377 Service Locations
- Support for 520M Download / 116M Upload - 5,381 Service Locations
- Support for 254M Download / 57M Upload - 9,781 Service Locations
- Support for 77M Download / 17M Upload - 11,104 Service Locations
- No Support for 77M Download / 17M Upload - 257 Service Locations

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Date: 11/11/2022

◈ Tarana reference architecture

   ◈ One base station sector supports up to 256 subscribers with 2.4Gbps

   ◈ Up to four base station sectors at each site connected to 10Gbps switch

   ◈ New fiber switch deployed at each site

   ◈ Total cost per existing wireless site to add Tarana estimated to be $100K - $150K

   ◈ Approximate cost per passing of $120

   ◈ Typical subscriber install estimated to be $1,000 materials and labor

◈ Frequency use

   ◈ 3GHz range is optimal for trees and non-line of site connections

   ◈ 3GHz range is administered by Google via the Spectrum Access Service (SAS)

   ◈ Operators request bands in the 3GHz from SAS and pay per connected subscriber for use

   ◈ Monthly per subscriber fees range from $2.25 to $3.00

◈ Nine base nodes provides strong coverage

   ◈ 641 / 143 - 30% coverage across all TDPUD service locations

   ◈ 520 / 116 - 47% coverage across all TDPUD service locations

   ◈ 254 / 57 - 86% coverage across all TDPUD service locations

   ◈ 77 / 17 - 98% coverage across all TDPUD service locations

   ◈ < 77 / 17 - 2% coverage across all TDPUD service locations

◈ **FTTP will be very expensive**

  ◈ Aerial make ready costs exceed anything Uptown has seen in the past 25 years

  ◈ Underground construction costs are extremely high as well

  ◈ Neighborhoods with spare conduit have high potential for further analysis

◈ **Wireless has promise comparatively speaking**

  ◈ 5G deployment will face the same cost hurdles as FTTP

  ◈ Traditional macro-cellular will not have the capability to support service levels over 100Mbps

  ◈ Tarana platform offers a fresh approach that could complement a limited FTTP deployment

◈ **Next steps as part of detailed feasibility study**

  ◈ Fine tune aerial make ready costs

  ◈ Fine tune underground construction costs

  ◈ Define throughput objectives for wireless service offering(s) – speeds and % coverage

  ◈ Add base node sites to Tarana plan to achieve throughput objectives

  ◈ Complete outside plant designs for areas with spare conduit

  ◈ Complete wireless system design

  ◈ Complete revised fiber backbone required to support FTTP and wireless designs

  ◈ Develop detailed capital budgets

TASK 4: Potential Funding Sources

The American Rescue Plan Act of 2021 (ARPA) is a federal grant program available to public sector entities that includes funds for the construction of broadband infrastructure, along with numerous other programs...

Program Overview	• Total program funds of $350B were allocated to various governmental jurisdictions:
	   • States: $195B
	   • Counties: $65B
	   • Cities: $45B
	   • Tribal Governments/Territories/Other Local Government: $44B
	• Funds investment in broadband infrastructure (build or upgrade)
	• Funding starts March 3, 2021. Funds must be "obligated" by December 31, 2024
	• Program rules issued by Department of the Treasury with Final Rule effective April 1, 2022

Eligible Use of Funds	• Necessary investment: Service area is eligible if there is an **identified need for additional broadband infrastructure investment** (e.g. lack of reliable 100M symmetrical speed) using data methods from speed tests, federal or state maps, interviews and surveys. • Minimum level of service: Minimum speed of 100Mbps symmetrical • Labor standards: Local hiring, prevailing wages, and safety and training standards • Affordability: Service provider participation in qualifying affordability plan
Project Prioritization	• Priority given to projects that provide last mile connections using wireline technology • Construction contracts should reflect prevailing wages and robust labor standards • Project ownership, operation, or affiliation with local governments or cooperatives • Avoid service areas under existing funding commitments via federal or state grants

BROADBAND EQUITY, ACCESS & DEPLOYMENT PROGRAM

The Broadband Equity, Access, and Deployment Program (BEAD) is a federal grant program that includes funds broadband deployment, mapping, and adoption projects...

Program Overview	• $42.5B in total funding to be allocated at the state level • Planning and project prioritization through state broadband offices which are tasked with developing 5 year action plans • Program oversight at the state level with federal implementation and support via the National Telecommunication and Information Administration (NTIA) • The 50 US states and territories are eligible grantees that can award BEAD grant funds to 'subgrantees' including coops, 3P partnerships, PUDs, and private firms, local governments, etc.
Eligible Use of Funds	• Last mile infrastructure projects must target un- or underserved areas where 80% or more of households do not have access to a minimum of 100Mbps/20Mbps. • State broadband offices are expected to begin accepting applications during the first half of 2023
Likely Guidelines	• While up to each state, we expect alignment with ARPA rules for determining eligible service areas • Funding recipients will be required to collect and maintain data to help the NTIA assess the programs' impact, evaluate targets, promote accountability and coordinate with other federal and state programs • Criteria to assess grant recipients' plans to ensure that service providers maintain or exceed thresholds for reliability, quality of service, sustainability, upgradability and other required service characteristics • Criteria to ensure that funding is deployed in a way that maximizes the creation of "good paying jobs.

The ReConnect Program provides loans, grants, and loan/grant combinations to bring high speed Internet to rural areas, including infrastructure projects…

Program Overview	• The program is funded through funding rounds with Round 4 closing on November 2, 2022
	• Program oversight at the U.S. Department of Agriculture (USDA). Round 4 funds up to:
	   • $150M in loans
	   • $300M in loan/grant combinations
	   • $700M in grants
	• Eligible grantees include both public and private sector entities

Eligible Use of Funds	• Eligible service areas must be both a) Rural*, and b) 50% or more of households must lack sufficient access to broadband, defined as "fixed terrestrial broadband service at 100 Mbps downstream and 20 Mbps upstream • For a 100% grant (with no loan), the applicant must demonstrate that at least 90 percent of homes in the proposed service area do not have sufficient access to broadband • Program funds can be used for the construction or improvement of facilities capable of delivering 100 Mbps symmetrical service to every premises in the proposed service area at the same time
Other Guidelines	• Awardees will be required to participate in the federal ACP program • Projects funded by a 100% grant require a 25% match

*Service areas cannot be located in a city, town, or incorporated area with a population greater than 20,000, or an urbanized area adjacent to a city or town with a population greater than 50,000.

The Local Agency Technical Assistance program provides a total of $50M in grants for planning work that will support high speed Internet infrastructure projects within California…

Program Overview	• The Local Agency Technical Assistance grants support tribes and local agencies in their efforts to expand broadband service to unserved and underserved Californians • Program created via Senate Bill 156 with oversight by the California Public Utilities Commission • Eligible grantees include either local government agencies, counties, public utility districts, and tribes within California
Eligible Use of Funds	• Technical assistance grants will reimburse pre-construction expenses for projects that support developing broadband service • Application scoring will be most favorable to projects targeting unserved and underserved households or businesses, which means one or more households or businesses that are not currently served by a wireline connection that reliably delivers at least 25 Mbps download and 3 Mbps upload speed.

Other Guidelines	• Examples of expenses that may be reimbursed:
	  • Consultant or staff time for environmental studies, network design, engineering studies, needs assessments, and broadband strategic plans
	  • Costs incurred in forming a joint powers authority for bringing broadband to communities in need.

In July 2021, Senate Bill 156 provided $6B in state funding for equitable access to high-speed broadband to unserved and underserved populations in California…

Program Overview	• The funding allocation provides $3.25B for middle mile open access projects and $2B (via Federal Funding Account) for last mile infrastructure projects (California Advanced Services Fund) • Program oversight at the California Public Utilities Commission • Program funds source is ARPA federal dollars
Eligible Use of Funds	• Eligible Areas are those unserved by a wireline provider that can reliably provide 25/3 Mbps service • CPUC must allocate at least half of the $2 billion for last-mile projects in rural counties. Each county, whether rural or urban, will receive an initial allocation of $5 million in funding. Remaining funds will be allocated based on the county's proportionate share of households without access to at least 100Mbps Internet.
Other Guidelines	• Funds must be encumbered by 2025 and expended by 2027 • CPUC plans to publish priority project areas composed of unserved locations.

The CASF program was created in 2007 and modified by Senate Bill 156 to allow the CPUC to receive funds of up to $150M annually for the program. The fund covers 5 different uses – one of which is broadband infrastructure…

Program Overview	• Priority and 100% grant funding available for areas with no Internet connectivity. Areas with Internet connectivity eligible for 60% grant funding, with potential for increased funding in low income areas or inaccessible locations • Program oversight at the California Public Utilities Commission
Eligible Use of Funds	• Funds may be used for middle-mile and last-mile projects. Middle-mile projects must be Open Access for the lifetime of the infrastructure to qualify. • Grant eligibility includes requirements regarding pricing (fixed for 5 years), speeds (minimum of 100M/20M), affordability (ACP participation), and avoidance of data caps.
Other Guidelines	• Eligible entities include public utility districts • As of the end of 2021, there have been 108 infrastructure projects funded with a total of $348M and averaging $4,112 per household.

1. Long Term Bond

    ◈ Single round of financing via 20-year tax exempt revenue or GO bond

    ◈ 3 years interest of capitalized interest

    ◈ 1.5% issuance cost

2. Working Capital Loan

    ◈ 10 year term

    ◈ Interest accumulates over first 5 years with Year 6 balloon payment

    ◈ Level payments begin in Year 6 and complete in Year 10

3. Wholesale fees paid by the ISP under wholesale partnership models

    ◈ Monthly fee per connected end user, or

    ◈ Monthly fee per connection and per serviceable premises

4. Equity

    ◈ Either upfront or ongoing annual general fund contributions

    ◈ Equity can fund construction capex requirement and/or working capital requirement

5. Local Improvement District

    ◈ Monthly fee assessed to all residential premises as they become serviceable

    ◈ Assessed for full 20 years

6. Private Philanthropy

7. Customer-funded installation (either upfront or amortized into monthly recurring fee)

TASK 5: Potential Business Structures

Overview

Ultimately, the value of a broadband infrastructure project to the community depends upon balancing the tradeoffs between the project costs/risks versus the specific improvements to broadband that can be realized…

Investment Goal: Maximize impact of the infrastructure investment while minimizing financial and operational risk

◈ **Value to the community** becomes a function of
  ◈ Last-mile capacity deployed and available to each end user
  ◈ End user prices and savings compared to incumbents
  ◈ Services terms compared to incumbents (e.g. data caps, contract termination fees, etc.)
  ◈ Support of future uses/applications to serve the community

◈ **Minimizing risk** becomes a function of the characteristics/differences between business models
  ◈ Total investment required and associated debt service levels over time
  ◈ Predictability and robustness of the anticipated revenue stream
  ◈ Differences in revenue versus operating expenses (operating cash flow)
  ◈ Avoiding any need for secondary financing (sufficient minimum cumulative cash over the life of the project)

TDPUD IDENTIFIED BUSINESS MODEL OPTIONS

TDPUD staff identified four potential business models for ownership and operation of the broadband system within the RFP. These models differ regarding the allocation of ownership, funding, and system operation between the District and the partner entity. Options 2 and 3 are the same model but with different funding sources…

1. Open Access Partnership - TDPUD Owned but Not Operated

   ◈ TDPUD would finance and contract to build the network and invite other service providers to contract to deliver services over the network

2. Public/Private Partnership – Private Operator Ownership and Operated

   ◈ TDPUD would typically share some funding of the project or provide other contributions and rely on a private sector partner for operation

3. Co-Op/ISP – Member Ownership and Private Partner Operated

   ◈ TDPUD would assist with securing financing via grant funding and/or Local Improvement District long-term financing

4. Ownership Model - TDPUD Owned and Operated Network

   ◈ TDPUD would build and operate the network. This model has two subset options whereby TDPUD performs all operating functions, or an option where an 'operating partner' performs some functions (essentially long-term outsourcing)

SUMMARY OF BUSINESS MODEL OPTIONS

	WHOLESALE		RETAIL	
	① Open Access	②③ Public-Private Partnership*	④ Partner Operates	④ TDPUD Operates
Ownership	TDPUD	TDPUD & ISP Partner	TDPUD	
Funding Responsible	District funds capex for broadband infrastructure (e.g. fiber backbone for wireless backhaul or last-mile connectivity)		District funds capex for broadband infrastructure, working capital, and <u>some</u> operating expenses	District funds capex for broadband infrastructure, working capital, and <u>all</u> operating expenses
Potential Funding Sources	Equity: TDPUD equity, ISP partner equity Debt Financing: GO bond, revenue bond Federal/State Grants: BEAD, ARPA Other: Local Improvement District			Equity: TDPUD equity Debt Financing: GO bond, revenue bond Other: Local Improvement District
Operating Role of District	Partner is the service provider. The District only co-brands & maintains backbone/backhaul infrastructure		District is service provider. Partner provides customer care, help desk, outside plant maintenance/outage response, and network management/administration.	District is service provider and performs all operating functions
District Revenue Source	All revenue retained by the Partner. The District compensated with monthly fee per passing and/or connected end-user.		All revenue retained by the District. Partner compensated with monthly fee per connected end-user.	All revenue retained by the District

*Commonly abbreviated as PPP or 3P.

Under the wholesale models, the Retail Service Provider (RSP) performs all operating functions downstream from the network backbone demarcation point. Under the Operating Partner model, those functions that can leverage operating partner staffing and expertise are outsourced…

Function	Operational Responsibility	Wholesale 3P	Retail (Partner Operates)	Retail (TDPUD Operates)
Network Assets	Backbone and Backhaul Assets	District	District	District
	Network Electronics	RSP		
	Fiber Drop (FTTP only)	RSP		
	Modem/Receiver and Inside Wiring	RSP		
Network Admin & Maintenance	Network Administration		ISP	
	Backbone and Backhaul Assets	District	District	
	Electronics	RSP		
	Outage Response	District	ISP	
Bandwidth	Backbone Interconnection	RSP		
Software	OSS/BSS		District	
	OSP Management	District & RSP		
Marketing & Promotion	Advertising, Sales, Branding	RSP or 3rd Party		
	Community Engagement	District & RSP		
	End User Pricing	RSP		
Customer Operations	Help Desk, Service Calls, Billing	RSP or 3rd Party	ISP	
	Customer Installs and Disconnects	RSP	District	

While financial terms vary, typical remuneration structures implemented for municipal broadband system partnerships reflect the following…

Business Model	① Open Access	②③ Public-Private Partnership*	④ Partner Operates	④ TDPUD Operates
Wholesale Fees *Paid by Service Provider*	Two Models: A) Premise passed fee (e.g. $6/month) & connected premise fee (e.g. $17/month) - or - B) Connected premises fee only (e.g. $35-40/month) Fees apply whether business or residential connection		Not Applicable	
Outsourcing Fees *Paid by Network Owner*	Not Applicable		Monthly fee per connected premises (e.g. $10-$25 depending on term and operating scope)	Not Applicable

While the advantages of the Wholesale Model center around lower investment and organizational load, the Retail Model can provide greater value to the community through more control of the service offering and customer service experience…

|	①②③ Wholesale Model Advantages	④ Retail Model Advantages
Total Capex Required	Capex requirement varies but is typically no greater then 80% of the Retail Model. Some 3P partnerships have been 100% funded by the private sector operator.	
Operating Expense	Opex requirement varies but is typically no greater than 10-20% of the Retail Model.	
Revenue		Revenue drops under the Wholesale Model to typically 25-35% of the annual revenue under the Retail Model.
Penetration Rate		Due to higher end user price levels compared to Retail models and typically lower brand preference, penetration is lower.
Staffing Required	Minimal staffing of 1-2 FTEs compared to typically 10+ dedicated FTE under the Retail Model.	
End User Value		Typical price range for 1G is $60-$70 which is typically $10-20 less than monthly Wholesale Model end user rates.
End User Terms		Typically no data cap and no contracts with termination fees (residential segment) under the Retail Model.
Other Risks		The Retail Model avoids risk of RSP default or bankruptcy, or RSP failure to complete build-out.

TASK 5: Potential Business Structures

3P Wholesale Partnership Examples

◈ Background

   ◈ City of 5,500 households in eastern Idaho. The city is not the electric provider.

   ◈ Started fiber infrastructure investment in 2011 after failed ARRA grant application.

   ◈ Began installing middle-mile fiber to connect city facilities

   ◈ Launched residential service in 2017

◈ Business Model is Open Access

   ◈ City Role: Fund and construct Fiber-to-the-Curb (FTTC)

   ◈ ISP Role: Provides Internet service and customer support

   ◈ Customer Role: Customer self-funds installation (fiber drop and equipment) and pays monthly 'maintenance' fee to the City

◈ Current Retail Service Providers (RSPs) and 1G price levels are:

   ◈ Sumo Fiber – 1G is $25.00/month

   ◈ Advanced Stream – 1G is $14.59/month

   ◈ QWK.net – 1G is $49.88/month

   ◈ FyberCom – 1G is $9.99/month

   ◈ DirectCom – 1G is $109.95/month

◈ RSP Internet terms are user-friendly with no data caps, contracts, or short-term promotional pricing

◈ Phased build-out targeting areas with highest neighborhood-level demand

   ◈ Residents can register for fiber service via a sign-up page on the city's website (see next slide)

   ◈ Upon reaching sufficient registered demand, a Local Improvement District (LID) is created to provide funding for FTTC construction of the neighborhood

   ◈ Residents and businesses can opt into the LID during and up to 30 days after construction (see slide)

   ◈ The LID structure allows for amortization of the install costs, but post-construction connections are still possible with full payment up front.

   ◈ This approach is inherently slow. Ammon is still constructing and has opened LIDs #5 and #6.

◈ Sources of Funding

   ◈ City: Initial investment of $1M that was set aside for the grant match and savings of $69k annually by eliminating lease fees paid to incumbents. No debt.

   ◈ Customer:

      ◈ Installation: Average cost is $3,200-$3,600. The LID payment averages $23/month paid for 20 years

      ◈ Operations/Maintenance Fee: Monthly payment to the City of $16.50

      ◈ Internet Service: Monthly fee paid to ISP varies by provider and service tier

   ◈ Typical total monthly fee per household (participating in the LID): $50-$65 for 1Gbps
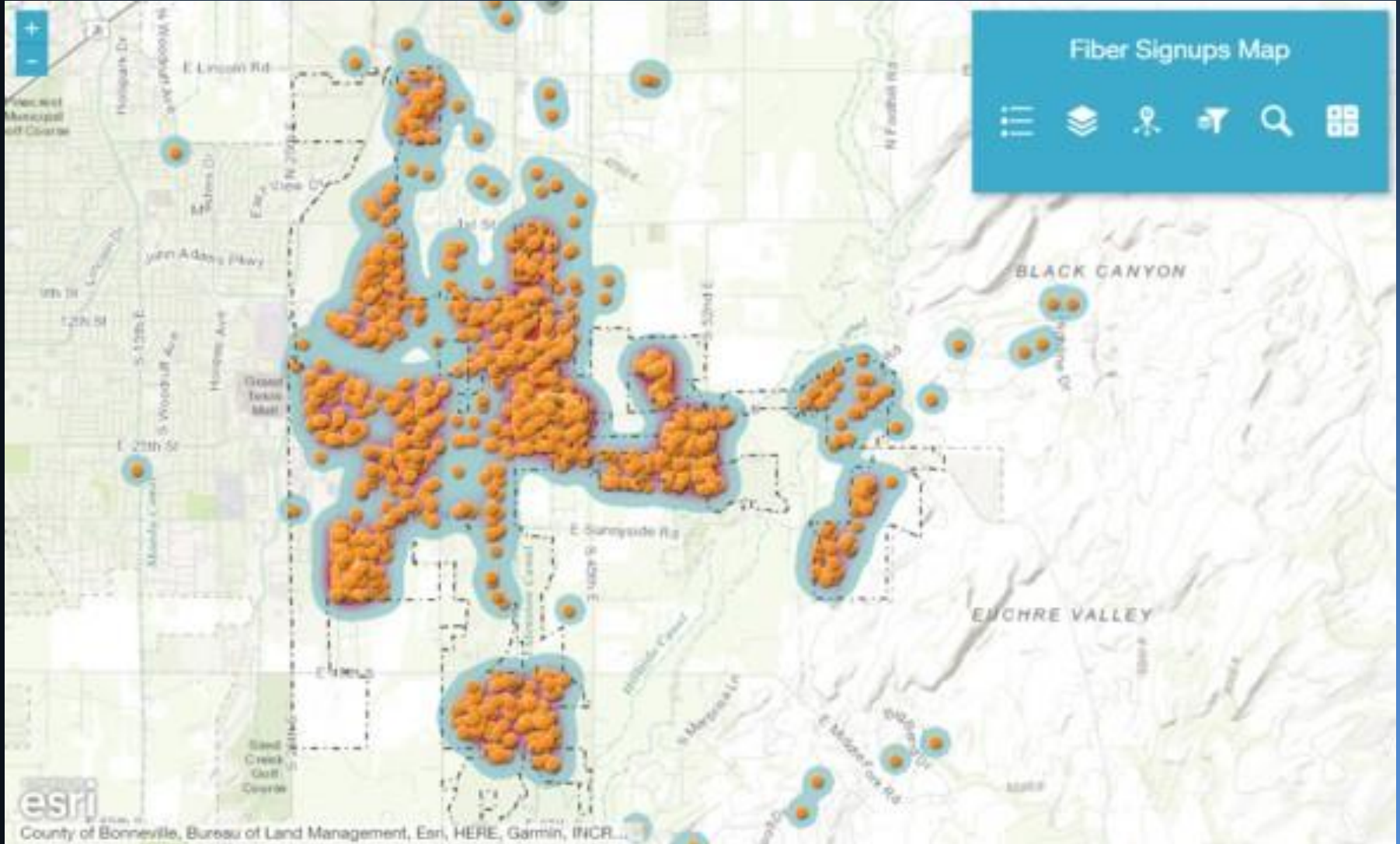
CITY OF AMMON
BONNEVILLE COUNTY, IDAHO

FIBER OPTIC LOCAL IMPROVEMENT DISTRICT NO. 5 OPT-IN CERTIFICATE

This Fiber Optic Local Improvement District No. 5 Opt-In Certificate (this "**Certificate**") is made by the undersigned property owner(s) ("**Owner**") for the benefit of the City of Ammon, Bonneville County, Idaho (the "**City**") and prospective Fiber Optic Local Improvement District No. 5 for Ammon, Idaho ("**Fiber LID No. 5**"). This Certificate is effective as of the date Owner executes this Certificate.

WHEREAS, the City anticipates adopting within one (1) year, an ordinance creating Fiber LID No. 5 for the purpose of financing the costs and expenses of design, acquisition, construction and installation of certain fiber optic system improvements and related appurtenances within Fiber LID No. 5 (collectively, the "**Improvements**"); and

WHEREAS, once created, Fiber LID No. 5 shall constitute a local improvement district organized and operating pursuant to chapter 17, Title 50, Idaho Code (the "**LID Code**"); and

WHEREAS, the City has determined that property owners desiring to receive installation of a fiber optic line to their property, and thereby be benefited by the Improvements, must affirmatively opt-in to incurring the related assessment necessary to pay for the same; and

WHEREAS, in order for the Improvements to be cost-effective, a sufficient number of City residents desiring connection to the City fiber optic system must exist in a particular geographical area before the requisite economies of scale can be leveraged to support the expansion; and

WHERAS, the City has not yet determined the boundaries for Fiber LID No. 5 and the completion of this Certificate will assist the City in determining the geographic area to be included in Fiber LID No. 5; and

WHEREAS, Owner acknowledges that Owner's execution of this Certificate is voluntary; and

WHEREAS, subject to the provisions of the LID Code and City's completion of all necessary procedural and other actions thereunder, Owner by execution of this Certificate authorizes the (a) installation of a fiber optic line to Owner's property and (b) the assessment of Owner's property pursuant to the LID Code.

NOW THEREFORE, Owner hereby certifies as follows:

1. That Owner is the owner of that certain real property identified below and has the power and authority to execute this Certificate.

2. That Owner desires to be benefitted by the Improvements and hereby grants the City permission to install a fiber optic drop cable at the address listed below and to access Owner's property for installation and future maintenance of Owner's fiber optic line.

3. That Owner, subject to the provisions of the LID Code and City's completion of all necessary procedural and other actions thereunder, acknowledges and agrees that the City may assess Owner's property pursuant to the LID Code to pay Owner's share of the cost of the Improvements.

4. That Owner acknowledges and understands that there are a number of legal and practical steps that the City must complete before Owner's property can receive a fiber optic line, and therefore that Owner's execution of this Certificate does not guarantee that the City Council of the City will be able to create Fiber LID No. 5, that the boundary of Fiber LID No. 5 will include Owner's property, or that the Improvements will be constructed and installed.

DATED:_____.

OWNER (if two owners, both signatures are desired, but only one owner's signature is required by law):

Signature:_____   Signature:_____

Print Name:_____   Print Name:_____

Address:_____

Phone:_____   Email:_____

- Background
  - Virtual Wireless Network Operator launched in 2012. Sprint and T-Mobile are their host networks.
  - Owned by parent Tucows
- FTTP Services
  - Residential: 1G/1G: $89/month + Modem ($200 purchase or $9/mo. lease) + Up to $200 install fee
  - Commercial: Custom pricing for 1G/1G service depending on SLA, static IPs, etc.
- Retail Service Provider for 9 municipal FTTP systems since 2015. Note that while Ting is serving smaller markets, they are not rural:
  - Charlottesville, VA (18k households)
  - Westminster, MD (7k households)
  - Holly Springs, NC (8k households)
  - Sandpoint, ID (4k households)
  - Centennial, CO (36k households)
  - Solana Beach, CA (6k households)
  - Fuquay-Varina, NC (12k households)
  - Wake Forest, NC (16k households)
  - Fullerton, CA (45k households)

- ◆ City Role
  - ◆ Design, construction, and maintenance of the fiber network. City retains title to the network.
  - ◆ 24/7 availability for unscheduled maintenance with 4 hour on-site response timeframe
- ◆ Network Point of Demarcation
  - ◆ Residential: Exterior wall closest to public ROW
  - ◆ Commercial: Patch panel in telecom closet
- ◆ Services
  - ◆ Triple Play with Ting providing data service (up to 1Gbps) and 'arranging' for voice and video
  - ◆ Retail rates are at the sole discretion of Ting
- ◆ Financial Terms
  - ◆ Premise Passed Fee: $6/month
  - ◆ Connected Premise Fee: $17/month
  - ◆ Fees apply whether business or residential connection
  - ◆ ARPU Adjustment: The Connected Premise Fee will increase by $1 for every 10% increase in Ting's realized ARPU (compared to baselined ARPU at 1,500 subscribers)

- Ting is exclusive provider for Phase 1
  - 'Open Access', but with initial period of exclusivity for Ting for data service. Exclusivity protection lasts until either:
    - Two years after the launch of each deployment phase service area, or
    - Penetration reaches 20% and/or Ting achieves 3,000 end user customers (of 7,200 HHs)
- Ting operates under 2 roles: Network Operator and Services Provider
  - As Network operator it is the active wholesaler to unaffiliated Service providers that it will be competing with. The City has no active role with RSPs other than Ting.
  - Ting will individually negotiate wholesale agreements with each additional RSP. Agreements must be non-discriminatory but terms can vary across these agreements.
  - As Network Operator Ting will install and maintain all premise inside wiring and CPE, including the ONT. The ONT will be outdoor vs. indoor.
- Other Terms
  - 10 Year Term with 2 ten year renewal periods
  - City must renew if actual wholesale revenues exceed debt service by 10% or more
  - Termination for Convenience: City can terminate with 6 months notice

- City Role
  - Provide access to "excess fibers" beyond what Huntsville Utilities requires
  - FTTP system design, subject to review and approval by Google Fiber
  - Obtain all required permits
  - Construction, and maintenance of the fiber network. City retains title to the network.
- Network Point of Demarcation
  - Dark fiber ports originating at a colocation structure
  - Dark fiber ports terminating at a Multiport Service Terminal or Network Access Point
- Services
  - Not specified in Fiber Network Agreement
- Financial Terms
  - Premise Passed Fee: $5/month per MST port
  - Premise Passed Fee: $100/month per NAP port
  - Backbone Fiber Strands: $3,500/month each
  - Fees apply whether business or residential connection

◈ Construction Timeframes & Milestone Targets

  ◈ Completion of Phase 1 is due 6 months after design acceptance

  ◈ All construction completed 3 years from Phase 1 design acceptance

  ◈ Targeted total premises passed of 105,000 premises upon network completion

  ◈ Missed milestone penalties

    ◈ If fewer than 95k premises passed at network completion, 1% of the total lease fee will be credited for each <u>day</u> of delay

    ◈ If fewer than 75k premises passed at network completion, Google may terminate agreement

◈ Google Fiber (GF) can terminate the Fiber Lease Agreement under multiple conditions

  ◈ If the City cannot correct design deficiencies within 30 days of GF submitting revisions

  ◈ If the City cannot provide a video franchise agreement within 3 months of the Lease Agreement, or the video franchise is revoked during the Lease Agreement term

  ◈ If the City fails to construct and deliver Phase 1 of the network on time

  ◈ If the City fails to construct the complete network on time

TASK 5: Potential Business Structures

Personnel Plan
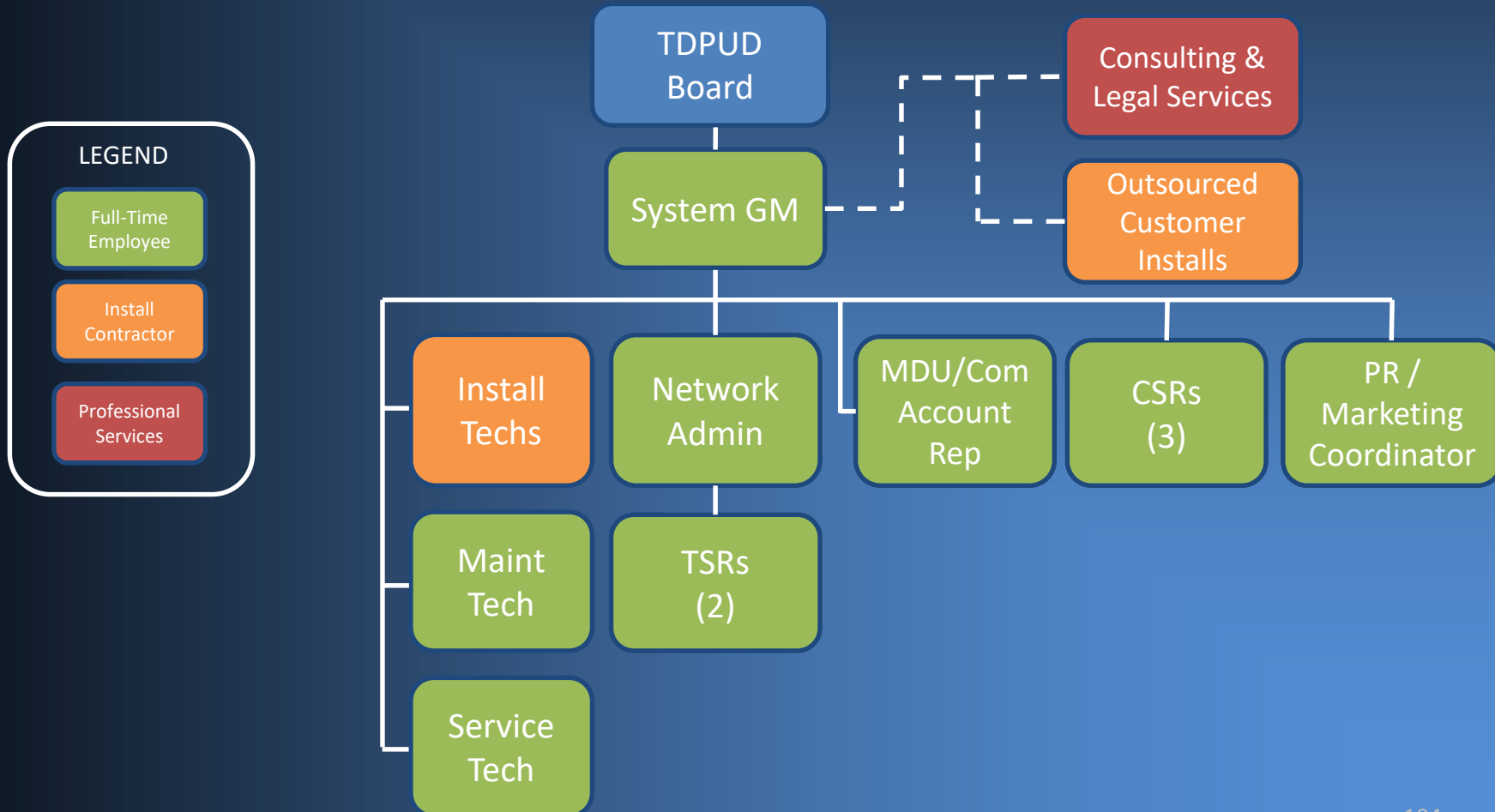
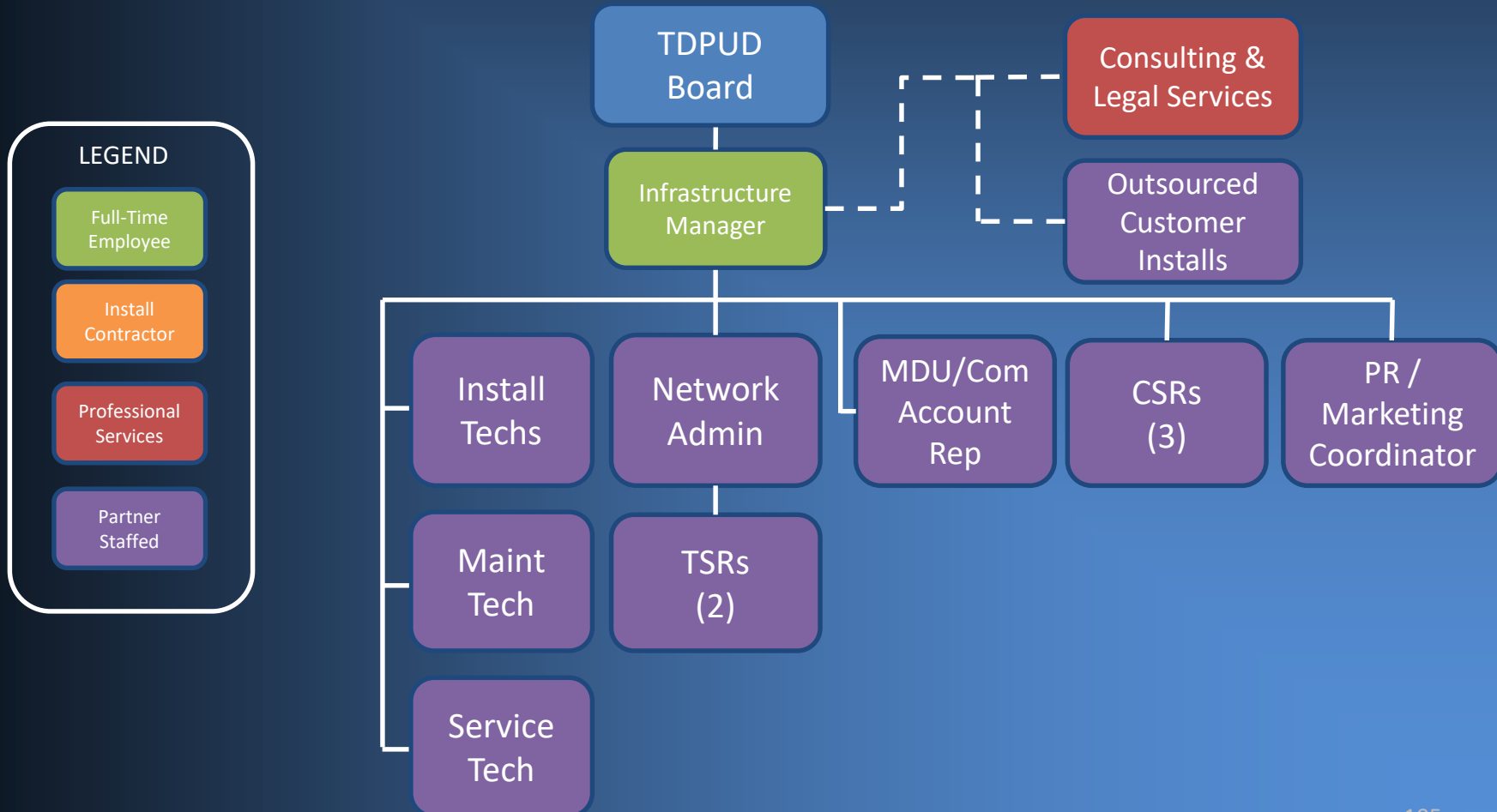| Position	Role	Staffing Entity	Compen-sation	Location
System GM	Lead manager responsible for all broadband operations and enterprise results	Varies by Business Model	Exempt FTE	Onsite - desk space needed
Marketing Coordinator	Develop and implement direct marketing and fulfillment materials, and manage advertising campaigns.			
Commercial Account Rep	Direct sales to business accounts and installation coordination and MDU ROE agreements.			
Network Engineer	Secondary responsible for all broadband electronics and systems			
Customer Service Reps	Phone and email support for work order creation, trouble tickets, billing (Tier 1)		Non-Exempt Hourly	
Technical Service Reps	Help desk support (Tier 2)			
Install Techs	Complete pre and premise installs	Install Contractor	Per Job	Contractor leased garage
Maintenance Techs	Resolve outage and maintain outside plant assets	Varies by Business Model	Non-Exempt Hourly	City garage /operations center
Service Techs	Complete service calls requiring a truck roll			

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Contractor services should be utilized in the early years to complete some start-up tasks and avoid short term hiring:
- Legal: Bond counsel and legal start-up tasks
- Consulting: Implementation support (12-18 months)
- Installs: Outsourced for 3 years and then internally staffed after install volume normalizes
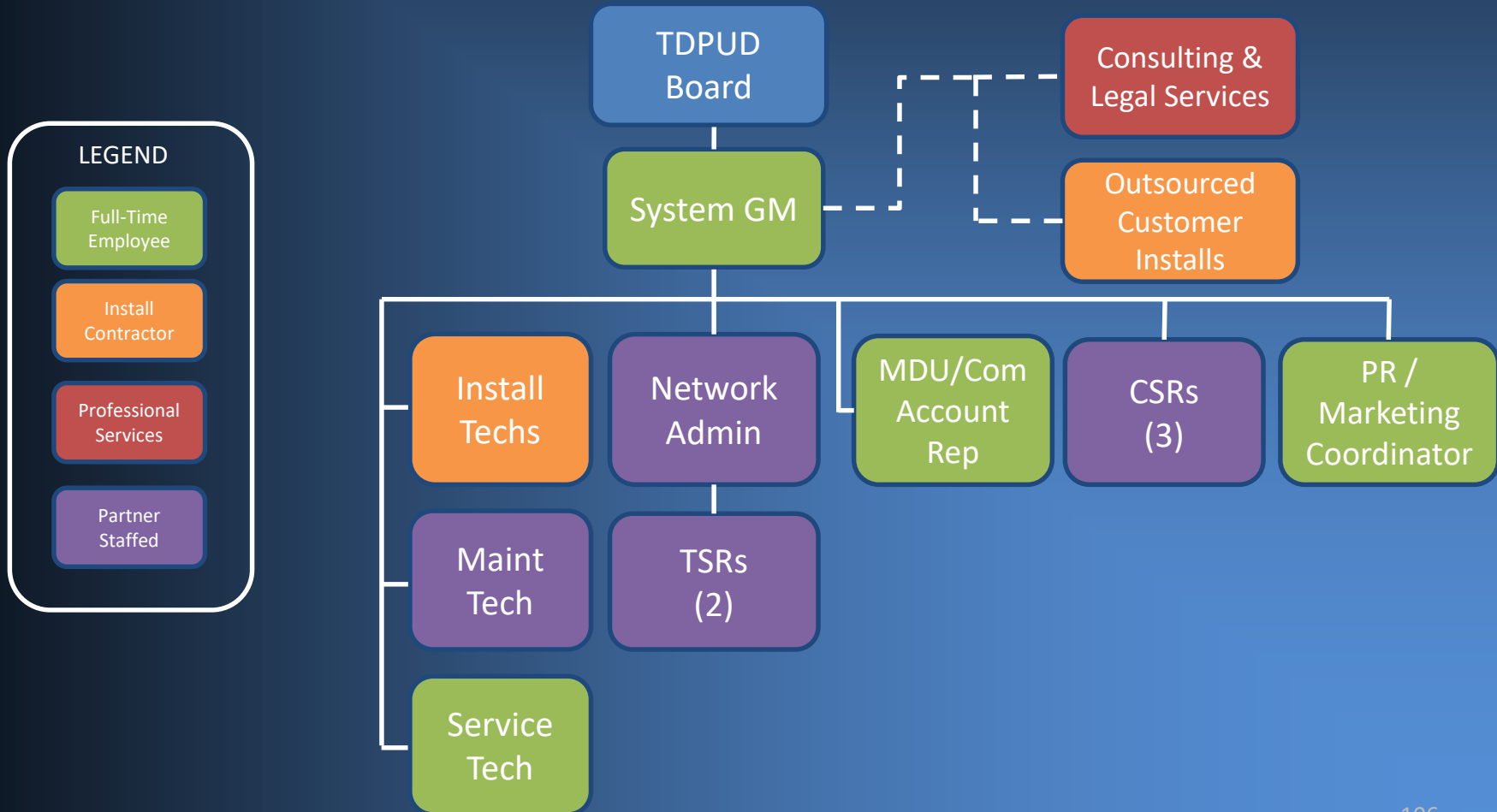

LEGEND
- Full-Time Employee
- Install Contractor
- Professional Services

TDPUD Board

Consulting & Legal Services

System GM

Outsourced Customer Installs

Install Techs

Network Admin

MDU/Com Account Rep

CSRs (3)

PR / Marketing Coordinator

Maint Tech

TSRs (2)

Service Tech

All three variations of wholesale models eliminate the need for TDPUD to staff functions involving the day-to-day operation of the broadband investment. Instead, a single, dedicated FTE to oversee technical, financial, and administrative aspects of the network investment and partnership would be required. Non-dedicated FTE support would also be required for GIS-related infrastructure management and cooperative marketing efforts with the partner...

LEGEND

- Full-Time Employee
- Install Contractor
- Professional Services
- Partner Staffed

TDPUD Board

Consulting & Legal Services

Infrastructure Manager

Outsourced Customer Installs

- Install Techs
- Network Admin
- MDU/Com Account Rep
- CSRs (3)
- PR / Marketing Coordinator
- Maint Tech
- TSRs (2)
- Service Tech

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By moving from a fully insourced TDPUD retail model to a partner model where some staff functions are long-term outsourced to an operating partner without ownership interest, initial dedicated headcount levels can be reduced by about 7 FTEs…

LEGEND
- Full-Time Employee
- Install Contractor
- Professional Services
- Partner Staffed

TDPUD Board

System GM

Consulting & Legal Services

Outsourced Customer Installs

- Install Techs
- Network Admin
- MDU/Com Account Rep
- CSRs (3)
- PR / Marketing Coordinator
- Maint Tech
- TSRs (2)
- Service Tech

TASK 5: Potential Business Structures

Operating Partnership Model Benefits

Uptown has clients in Utah and Colorado that have negotiated with an existing municipal broadband operator to support the operation of the new system…

Ownership Role of the District	• District funds capex for the network build, working capital, and all operating expenses • District is 100% owner of the FTTP system.
Operating Role of the District	• District is the service provider and performs some administrative functions (e.g. billing), general management, and on-site account support.
Operating Role of the Partner	• Customer Operations: Partner ISP provides customer care, customer installs and provisioning, service truck rolls, and network maintenance. • Data Network Services: Partner ISP provides network configuration/administration, hardware/software platform, bandwidth , system monitoring.
Services Revenue	• All revenue retained by the District • Partner compensated with monthly fee per connected end-user.
Partnership Terms	• Initial term commitment of 5 years with renewal options • Monthly fee per connected premises (household or business) of $X per month

EXAMPLE BENEFITS OF OPERATING PARTNERSHIP

In exchange for the ongoing monthly fee to be paid to the Operating Partner, the following reductions in TDPUD's capital and operating expenses can significantly reduce the initial financing required…

Operating Expense	• Staffing requirement reduced to 2 full-time employees • Bandwidth aggregation to realize scale savings via higher capacity circuit • Delay of broadband specific operations support and billing (OSS/BSS) software initial and annual maintenance fees
Capital Expense	• Generator/UPS is not required • Core switch/router of $200k is not required • Internet service back-office platform of $100k is not required • Testing equipment of $50k is not required • Splicing trailer of $25k is not required • Field technician tools of $23k is not required • Service van ($45k) and bucket truck ($90k) is not required

TASK 6: Service Provider Partnership RFI

- ❖ Issued to 20 ISPs including national incumbents, fiber backbone operators, regional wireline providers, and regional wireless providers

- ❖ Services Sought

  - ❖ Internet service of at least 1Gbps symmetrical

  - ❖ Complete community build-out (no 'redlining')

  - ❖ Affordable, value-oriented pricing

  - ❖ Participation in the federal ACP program

  - ❖ Favorable end user terms (e.g. data caps are discouraged)

  - ❖ Local operations center presence within or proximate to the community

- ❖ Requested Information

  - ❖ Provider background information including similar reference projects and organizational, technical, operational and financial capabilities.

  - ❖ General, non-binding proposed technical architecture, end user service(s), operational plan, and funding options

- ❖ Preliminary in nature without specific business model, funding, or financial terms included. Any future RFQ should include these and any potential funding or asset contribution(s) by TDPUD to the project.

We received responses from two alternative providers, both with fiber experience. However, only one proposal was responsive due to a submission error…

	Oasis	Omsoft
Overview	• Privately-held ISP serving Lake Tahoe areas since 2002 • Primarily fixed wireless but some FTTP deployed	• Privately-held ISP in Davis, CA since 1996 • Supports Open Access
Financial Strength	• 2021 revenues of $1.8M and net income of $130K • Assets of $300K	• 2022 revenues of $1.2M and net income of $200K
Similar Projects	• Have been supporting 10 fiber deployments for up to 6 years	• Two fiber projects in Yolo County
Operational	• Management team of 10 FTE • Operations in Truckee and Colfax, CA • Outsourced call center in Central America • End user pricing from $39 (200M) to $89 (1G)	
Technical	• Upgrading wireless technology to 750M symmetrical (next 18 months) • Open to fiber technology options depending upon budget, including fiber and wireless	• Not provided (proposal submission cut off after page 2)
Funding	• Rough estimation of $27M for Truckee fiber build • Experience with grant funding and SBA loans • Should consider CASF as funding source	

We received responses from both incumbent providers. Neither response provided significant detail at this time…

	Optimum (Altice USA)	AT&T
Similar Projects	• No similar projects referenced in their response	• FirstNet: National wireless system supporting public safety in partnership with the federal government • CALNET: AT&T is providing fiber and wireless connectivity services to California local and state agencies
Operational	• Currently participating in the ACP program with a free (after $30 discount) 300M offering • Altice is willing to collaborate with TDPUD regarding the ACP program and broadband affordability initiatives	• Will provide residential and commercial services via fiber up to multi-Gig speeds. No proposed pricing in their response. • For low-income households, participating in ACP with a free (after $30 discount) 100M offering • AT&T would provide all operational functions • AT&T and TDPUD would cooperate to enable expedited, batched permitting
Technical	• Altice states that currently deployed DOCSIS3.1 architecture is sufficient and provides up to 940M/35M capacity	• Proposing 100% FTTP network architecture
Funding	• No funding details provided	• No funding details provided
Other	• Altice recommends that any TDPUD broadband project should target only the "very limited" number of unserved/underserved households. Using BEAD or ARPA grant funding is discouraged. • Altice recommends that the project avoid unfair regulatory terms (e.g. subsidies) and that TDPUD broadband investment be separated from the electric revenue streams	

Recommendations / Next Steps

Uptown would recommend one or more of the following as next steps to the Initial Scoping Study…

Study Key Findings	• There is strong demand within the District for improved broadband. A $70 price point for 1G should be targeted. • Construction will be costly with total capital of ≈$120M • Both fiber and wireless technology should remain under consideration, with both potentially deployable under open access • The District is ineligible for many grant programs, but both LATA and CASF may provide some grant funding support • Given cost to build, alternative funding sources should be considered (e.g. LID, private philanthropy, grant funds)
Next Steps	• Middle/Last mile system design (field-based including make ready analysis) • Financial analysis including 20 years pro forma • Grant eligibility discussions with CPUC regarding LATA and CASF • ISP engagement as follow-up to RFI responders