EXHIBIT D

Arkansas Broadband Master Plan

Executive Summary

15-APR-2022

BROADBAND DEVELOPMENT GROUP

altman solon

Executive Summary

Current Broadband Coverage

Budget to Bridge the Gap

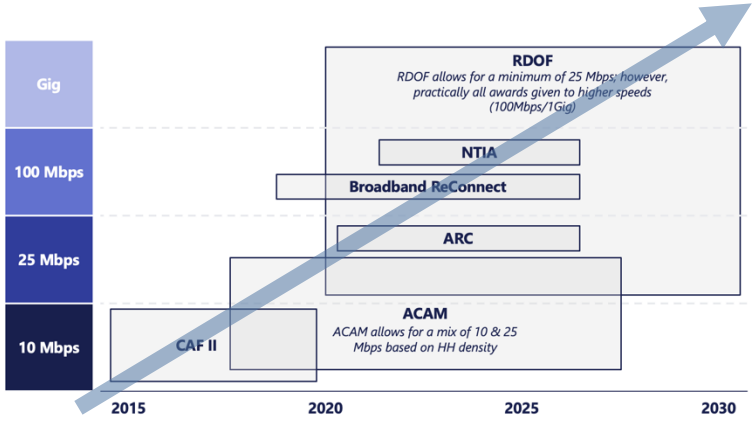
Program Recommendations

Community Outreach

The Broadband Gap is a Moving Target

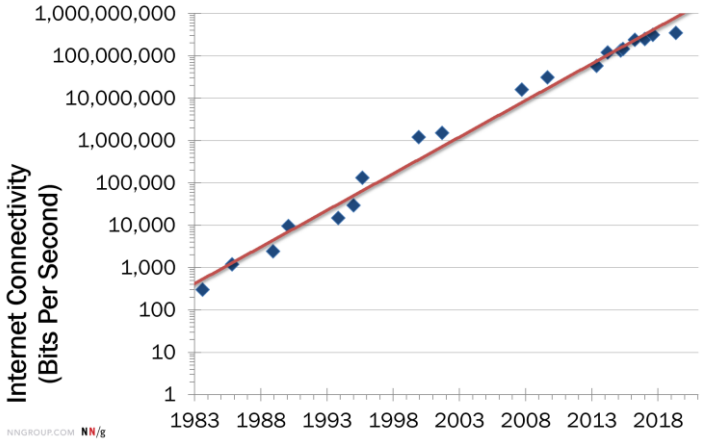
Yesterday's fast speed is in the broadband gap today. Today's fast speed will be in the broadband gap tomorrow.

Broadband funding speed targets keep shifting upward

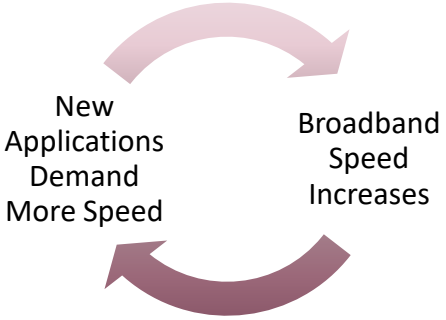


It's a risky bet to build infrastructure with the idea that 2022 is the special year when speed demand stops growing.

Nielsen's Law of Home Broadband Speed
60% annual growth = 57x increase per decade



AT&T just announced 2 Gbps and 5 Gbps products.



Broadband and Applications in a Perpetual Virtuous Cycle
HD/4K/8K, AR/VR, Metaverse, Holographic Displays…

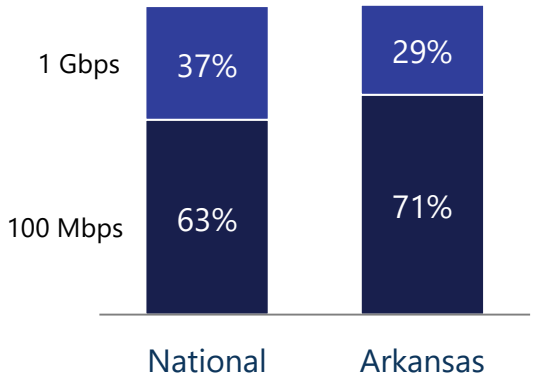
Despite moving goalposts, we must answer two key policy questions on speed:

1) ***What speed defines the current broadband gap?***
2) ***What speed is required for new infrastructure?***

Consensus view is that HH < 100 Mbps are in the Gap

FCC makes a case for 100 Mbps by estimating require simultaneous bandwidth for application in use by families.

Two children doing online schoolwork	25-50 Mbps
Netflix streaming on living room smart TV	5-25 Mbps
Parent attending Zoom meeting	1-4 Mbps
Total Bandwidth Required	**~30-80 Mbps**



RDOF results demonstrate that 100+ Mbps is being widely offered in new deployments.

- **All RDOF winners in Arkansas were 100+ Mbps**
- Only 269 (~0.5%) of RDOF awards nationally were below 100 Mbps

Federal leadership on record touting the need for 100 Mbps broadband

"It's **time for the FCC to adopt a standard of 100 megabits per second.** I regret we are so unambitious that we do not even consider this here.

I think 100 megabits per second is table stakes and we are going to need more symmetrical upload and download speeds as we move from an internet that is about consumption to one that is about creation. This is especially true in rural areas, where we anticipate whole new economies developing based on mass amounts of data from precision agriculture."

Jessica Rosenworcel (FCC Chairwoman)

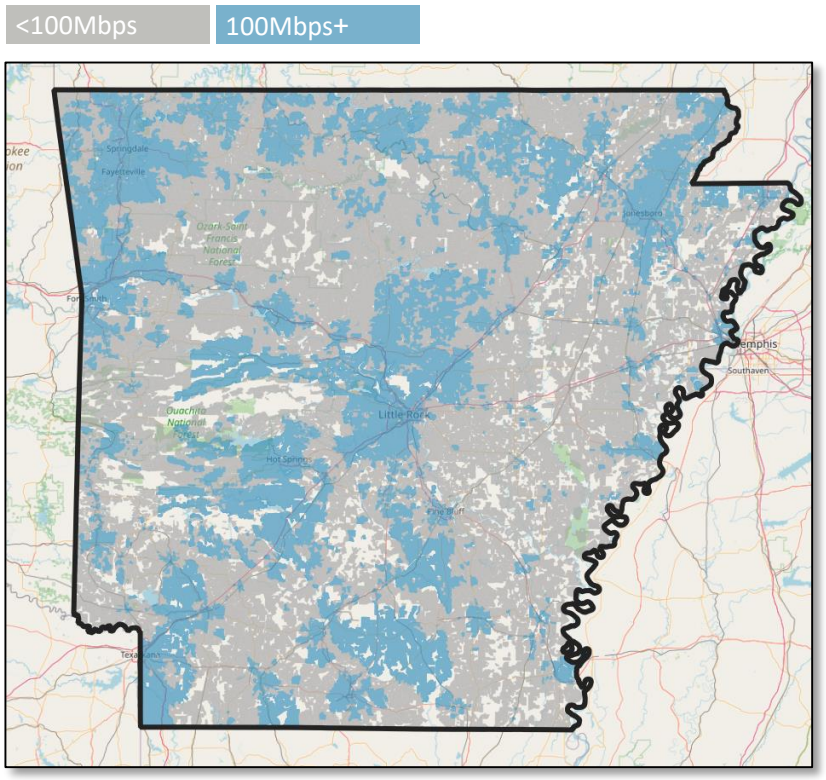
"Going forward, **we should make every effort to spend limited federal dollars on broadband networks capable of providing sufficient download and upload speeds and quality**, including low latency, high reliability, and low network jitter, for modern and emerging uses... **Our goal for new deployment should be symmetrical speeds of 100 Mbps**, allowing for limited variation when dictated by geography, topography, or unreasonable cost"

– Bipartisan Group of Senators in letter addressed to FCC Chairwoman, USDA Secretary, USDOC Secretary, NEC Directory (3/28/21)

Recent Federal Programs Embrace 100 Mbps Target	
NTIA Infrastructure Fund	**100/20 Mbps**
ARPA SLFRP	**100/20 Mbps, path to 100/100**
ARPA Capital Projects Fund	**100/100 Mbps**
IIJA Bead	**100/20 Mbps, prefer fiber**

Households unserved by 100+ Mbps are considered eligible for subsidized infrastructure upgrades.

Where is the < 100 Mbps broadband gap in Arkansas? FCC 477 Baseline



Authoritative source

- Basis of Federal funding programs
- Source of national broadband map

Form 477 data collected from ISPs semi-annually

- But most recent *published* data is getting stale, from in Q3 2020

Census block data is very granular

- On average, there are less than 12 HH per inhabited census block in AR

Per the latest FCC 477 Data

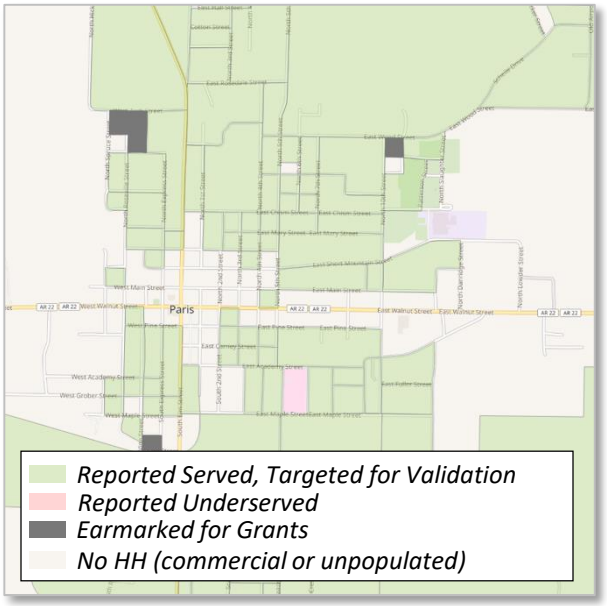
- 251k Arkansas HH (21%) lack access to broadband of at least 100 Mbps

Widely held belief is that FCC 477 underreports the broadband gap

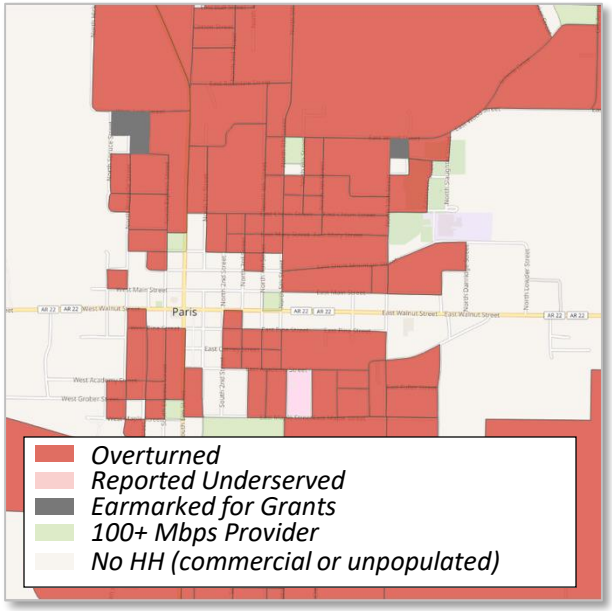
Process to create a more accurate broadband coverage map

FCC 477 Baseline → Integrate New Provider Data → Primary Research Address Validation → Grant Funded Areas

Example: Paris



Per FCC 477, 400 Mbps speed across Paris



Updated coverage map for Paris
~ 850 HHs reported served in FCC 477 overturned

Statewide, we corrected 45k HH wrongly reported to have 100+ Mbps broadband

However, we also corrected 87k HH wrongly reported to lack 100+ Mbps broadband

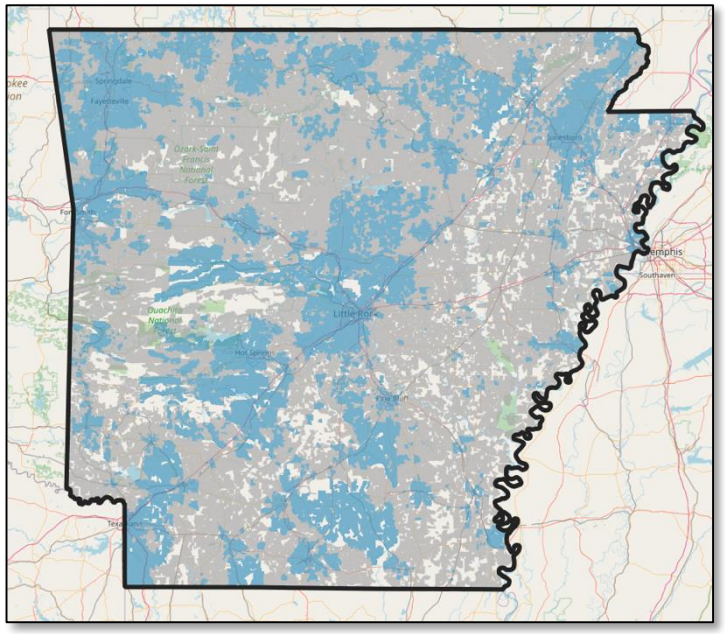
Pleasant Surprise: The Arkansas broadband gap is reduced by 42k HH from FCC 477 data

Coverage status was corrected on 132k households

<100Mbps 100Mbps+

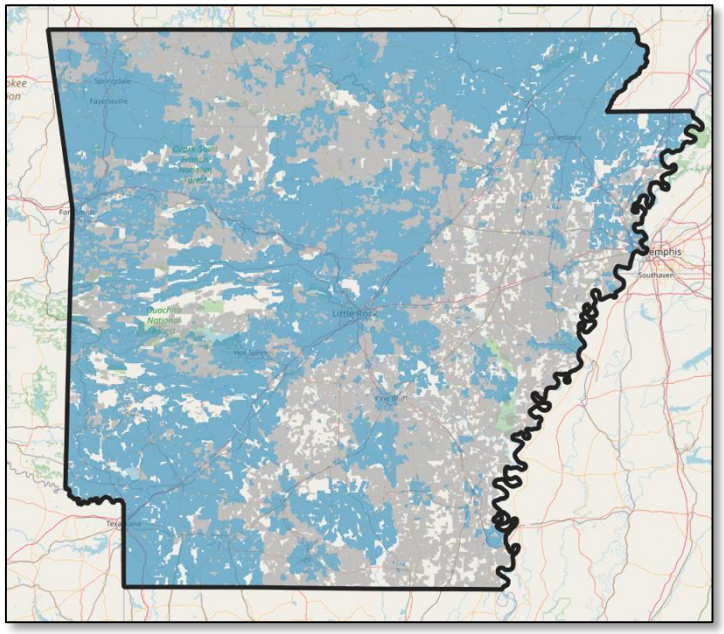
Form 477 Reported Coverage Map

- **251K HHs (21%) reportedly underserved** with speeds < 100 Mbps
- Based on December 2020 FCC Form 477



Updated Current Coverage Map

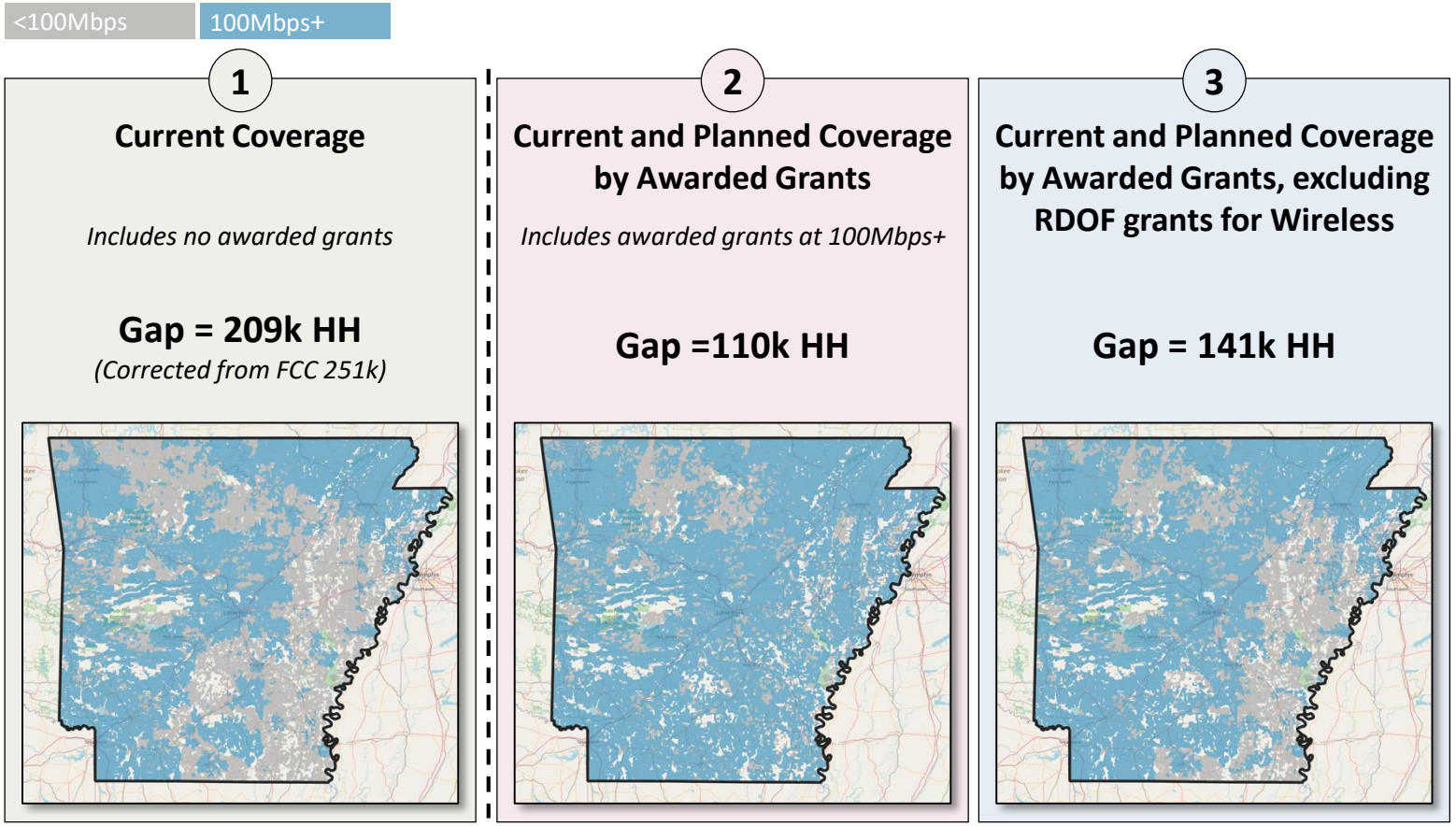
- **Findings: 209K HHs (17%) are underserved**
- Net improvement primarily due to extensive new coverage by service providers



Pleasant surprise: Primarily due to outdated FCC 477 data that excludes network buildouts by ISPs during the past 2.5 years , the broadband gap is smaller by 42K HH as compared to the FCC map.

Three top-level scenarios for budget guidance

1. 209k HH lack access to 100+ Mbps broadband today
2. 110k of those HH have no path to 100+ Mbps via awarded grants
3. 31k HH with awarded grants will not get future-proof fiber



Initial *and* future speed must be weighed among all key factors

Current Speed

- Consensus established around 100/20 Mbps
- Preference for 100/100 Mbps or higher
- Preference for symmetrical uplink

Future speed

- Major infrastructure investment must endure decades
- Speed will increase greatly over time, so it's critical that infrastructure can keep pace – *without* more subsidies
- Deployed technology must be "future-proof"

Quality

- Coverage should serve *all* households in funded areas
- Coverage and speed should not vary due to location or obstructions such as hills and trees

Time to Deploy

- Time is of the essence. The ability to deploy and launch service quickly is very important.
- The need for broadband to support work-from-home, distance-learning, and tele-medicine is critical *now*.

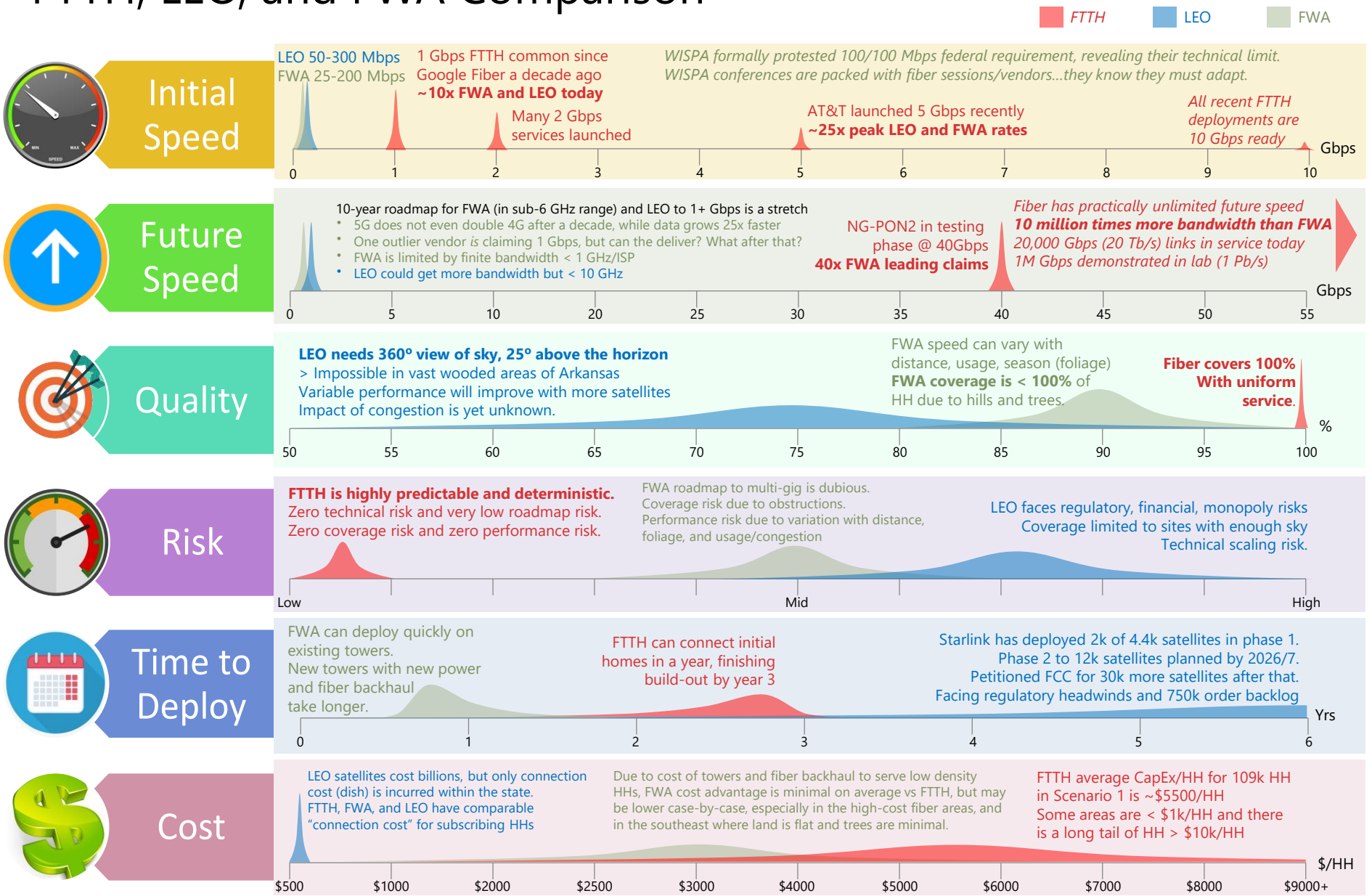
Performance Risk

- It's vital to assure funds go toward firms and technologies with low risk of failure.
- Financial losses and setbacks due to failed projects is intolerable, so risk must be minimized *up front*.

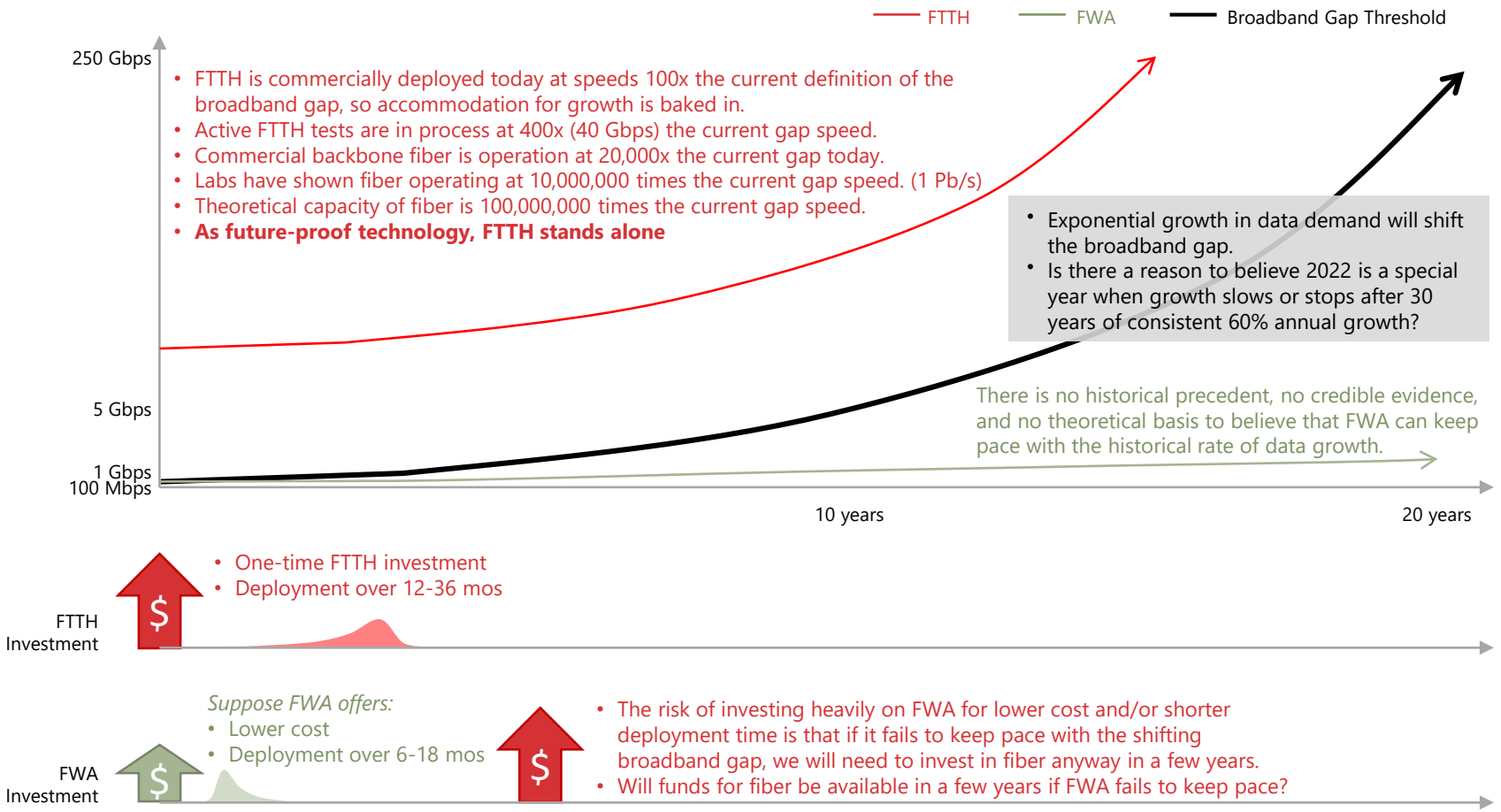
Cost

- With finite resources, it's necessary to balance the above factors against cost.

FTTH, LEO, and FWA Comparison



Taking the long view for generational infrastructure investment



- Fiber offers higher speed, future-proof upgrades, superior quality (100% uniform coverage), and least risk.
- With federal grants available exclusively for broadband and in an amount sufficient for statewide FTTH, there is little benefit to compromise for lower cost.
- Less deployment time is valuable, but dire consequences may result if the infrastructure can't keep pace for decades.
- LEO is a complementary infill technology featuring high consumer price and and high uncertainty

Complementary role of fiber and wireless technologies

We need *two* complementary networks for the foreseeable future:

- Fiber for high performance at fixed locations
- Wireless for basic connectivity over broad areas
  - Mobile/portable devices (phones, tablets, laptops…)
  - Connected cars, tractors, drones…
  - Sensor networks, meters, controls….

This work is focused on home broadband where fiber/FTTH prevails

FWA could provide stopgap home broadband while fiber is built out

- Hybrid proposals that deploy FWA for rapid home broadband while FTTH is built out for the long term should be welcomed
  - FWA based on 4G/5G could migrate from homes to mobile/coverage applications
  - Fiber deployed to towers could be leveraged for FTTH backhaul
  - FTTH could be leveraged for small cell backhaul to enhance wireless coverage

Fiber and Wireless networks are complementary.

Fiber is best for high-performance applications at fixed endpoints, like home broadband.

Wireless is best for modest speed but ubiquitous connectivity over broad areas, like mobile phones.

Speed and Technology Recommendations

Minimum initial speed should be at least 100/20 Mbps

- Preference for 100/100 or higher speed

Future-proof fiber should be strongly preferred

- Fiber is the only future-proof technology available today*
- Though FWA may meet initial speed requirements, its likely that households not served by fiber will eventually fall into the ever-shifting broadband gap
  - To avoid future reinvestment/subsidies, fiber is strongly preferred
  - Fiber preference is aligned with IIJA BEAD guidelines
- While fiber preference is very high, it is not absolute.
  - Fiber's future-proof speed, high quality, and low risk must be balanced against cost and time-to-deploy
    - Cost will be a non-issue if federal funds exclusively for broadband are sufficient for statewide FTTH
    - Time-to-deploy is important and should be weighed project-by-project against all considerations

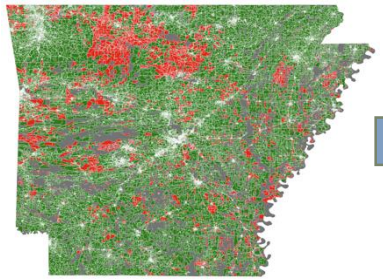
Initial target speed for subsidized infrastructure is 100/20 Mbps minimum, with preference for higher speeds and symmetric uplink.

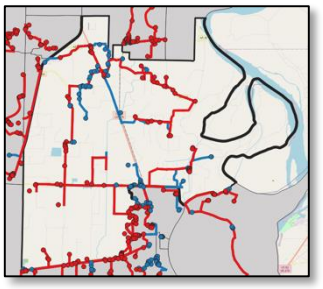
Fiber is the preferred technology for 100% uniform coverage, low risk, and future-proof speed.

* Cable/coax or hybrid fiber coax (HFC) with DOCSIS 3.1 (~10/1 Gbps) or DOCSIS 4.0 (~10/6 Gbps) will be considered an acceptable Fiber-to-the-Home (FTTH) alternative

Process to estimate project budget

Coverage Scenario → Simulate Fiber Buildout and Cost → ISP Financial Model → Subsidy Calculation





HH Passed	111
Equipment	
Total Fiber Miles	15
CO Upgrade	1
FDH	1
HH Passed:FDH	*111*
FDT	83
HH Passed:FDT	*1.3*
Total Fiber CAPEX	$613K
Equipment CAPEX	$67K
Total Deployment CAPEX	**$680K**
Total Success-Based CAPEX	$80K
Avg. Cost-to-Pass	*$6,120*
Project IRR - No Subsidy	2.4%

Subsidy – Matching Contribution	**$570K**
Subsidy-per-Passing	*$5,131*
Subsidy - IRR Threshold	**$495K**
Subsidy-per-Passing	*$4,458*

For each of the top-level scenarios, census blocks in need of broadband investment were defined.

Software simulated fiber buildout, computed miles of fiber and equipment needed, and calculated total turnkey project cost.

ISP financial model computed the IRR for unsubsidized deployment in each area.

The needed subsidy is calculated in two ways:
1) Simple flat rate 75% cost-share and
2) Amount needed to enable the ISP to achieve acceptable IRR (15%).

Fiber build simulations and ISP financial models were computed at Census Block Group granularity.

CBG figures can be rolled up into Census Tract, County, and Statewide totals.

CBG granularity fits well with ISP coverage areas and will be attractive to both small and large firms.

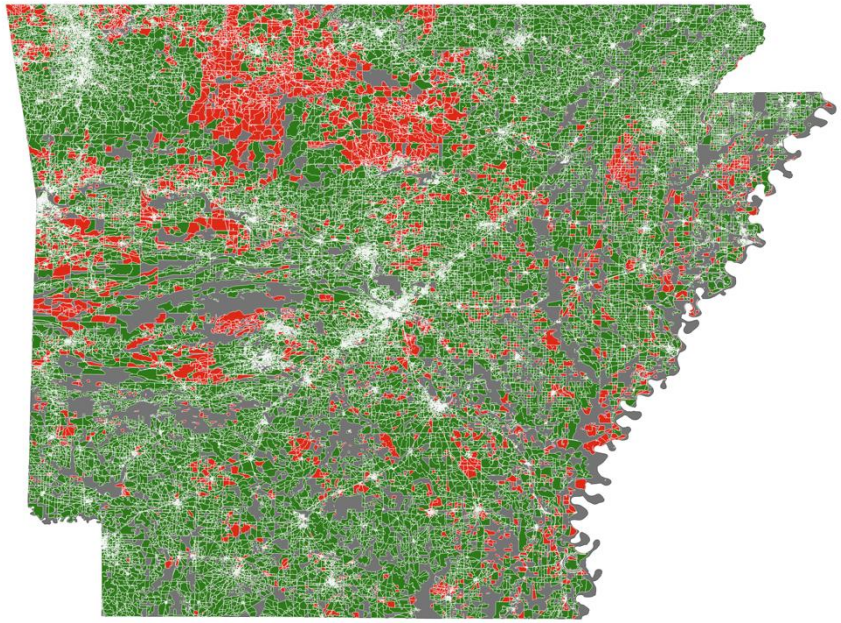
Two methods to estimate subsidy amount

Approach	Description	Considerations
Flat Rate	State pays 75% of CapEx ISP pays 25% of CapEx	✗ Over-subsidizes low-cost areas where little or no subsidy may be needed for a viable ISP financial return ✓ Some low-cost areas should not require a subsidy for ISPs to make at least 15% IRR, yet they have not been built out. Such areas may require an incentive subsidy to spur deployment, whereas an IRR-based subsidy would provide none. ✓ In lower-cost areas, this can be viewed as a "ceiling" where a competitive process should drive the actual subsidy closer to the IRR-based subsidy amount. ✗ Under-subsidizes high-cost areas where 75% isn't sufficient for a viable ISP return.
IRR Based	Using project finance concepts, estimates subsidy required for the ISP to achieve a 15% IRR	✓ More accurate estimate of minimum funding required to entice providers to build. ✗ May underestimate subsidy required to spur deployment in low-cost areas which should be feasible with no or low subsidy, but where ISPs haver nevertheless declined to deploy. ✓ Accurately estimates the required subsidy for high-cost areas, where more than 75% subsidy is required for the provider to make a viable return.

In a well-designed grant program, competitive market forces will drive subsidies toward the IRR Based approach.

Fiber build simulation to estimate cost. ISP Financial model to estimate needed subsidy.

Example Scenario 2: Gap = Unserved with no grant



- HHs covered (now served or grants awarded)
- Broadband gap
- Uninhabited

Network Build Analysis

Households Passed	**109.7K**
Total Fiber Miles	**13.2K**
Total Deployment CAPEX	**$601M**
CAPEX/HH Passed	*$5,475*
Success-based CAPEX*	**$79M**
15% IRR Subsidy**	**$429M**
IRR Subsidy/HH Passed	*$3,907*
75% Match Subsidy***	**$510M**
Subsidy/HH Passed	*$4,646*

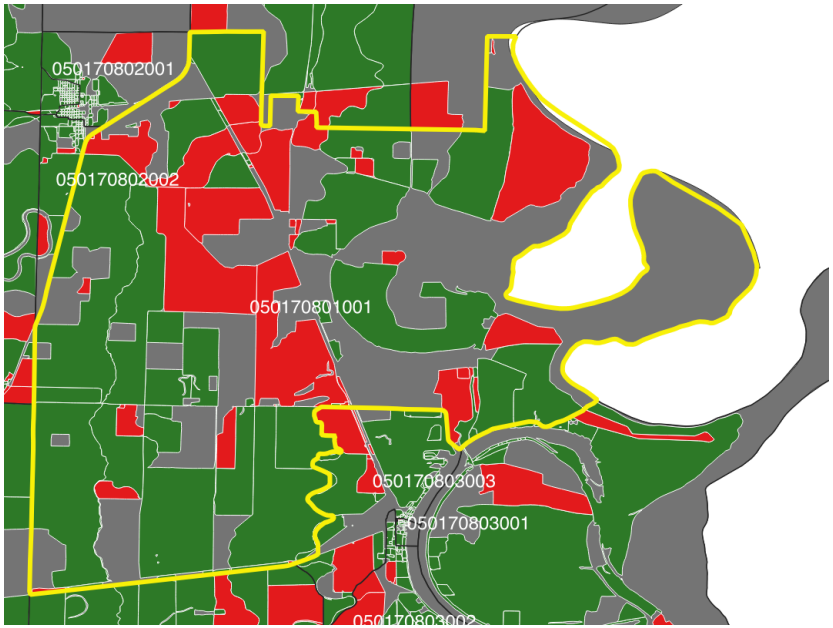
* *"Success-based CAPEX" refers to the additional cost required over time to connect homes that subscribe to service, for example, this would include the cost to run fiber from the street to the house and install a terminal and home router.*

** *Subsidy calculated as the amount needed for ISPs to achieve industry standard 15% IRR while investing in the balance of the required capital for the project. (On average, this came to 71%).*

*** *Alternate subsidy model based on flat 75% from the State. In high-cost areas, the IRR-based subsidy is higher than 75% and in low-cost areas, the IRR-based subsidy is lower than 75%.*

Drill-down analysis at the census block group (CBG) level facilitates program administration

Case Study Build: Panther Forest, AR
Census Block Group 05 017 080100 1



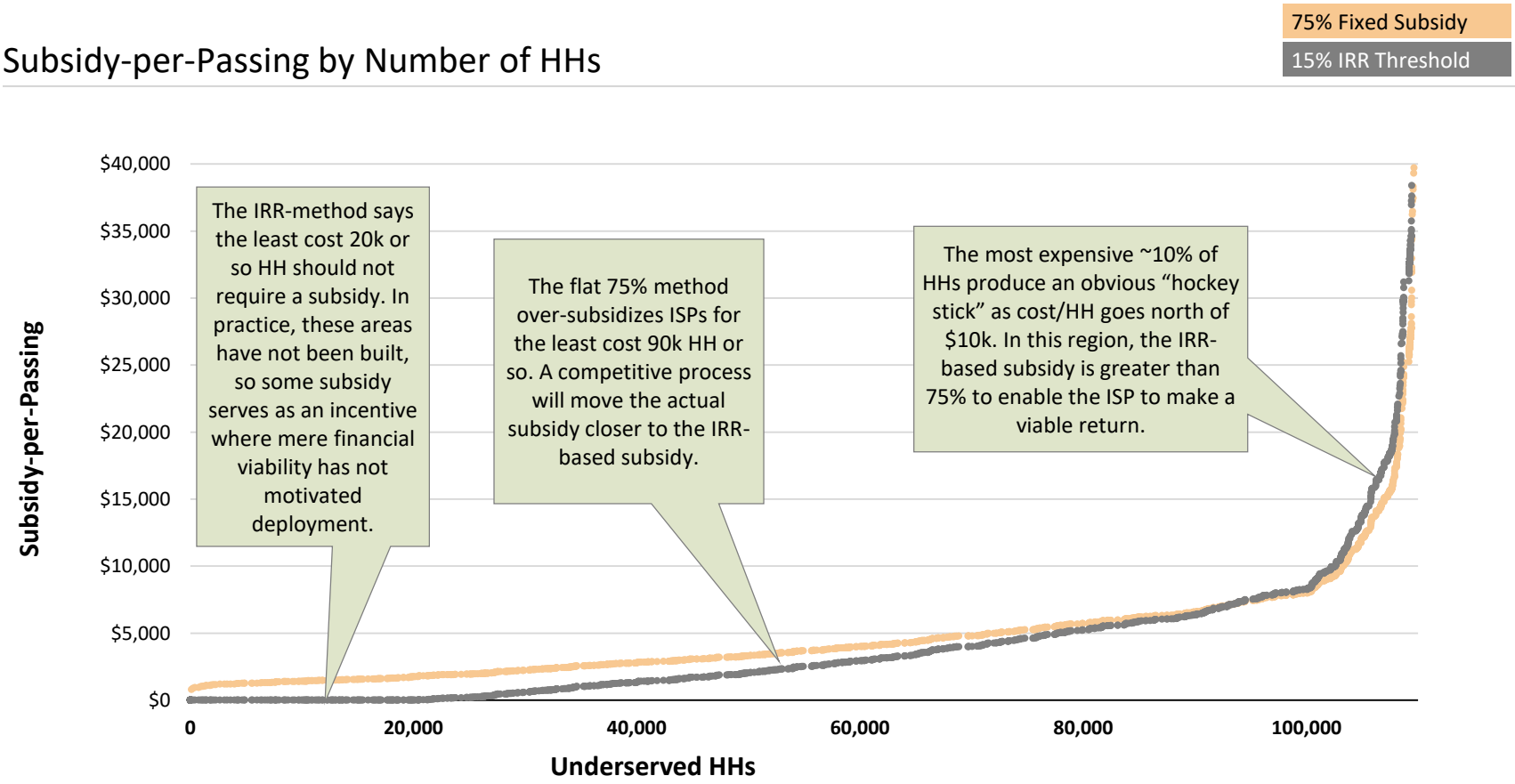
- HHs covered (now served or grants awarded)
- Broadband gap
- Uninhabited

Network Build Details

HH Passed in Unserved Blocks	**111**
Total Fiber Miles	**15**
Equipment	
CO Upgrade	1
Fiber Distribution Hub	1
Fiber Distribution Terminals	83
Total Fiber CAPEX	$613K
Equipment CAPEX	$67K
Total Deployment CAPEX	**$680K**
CAPEX/HH Passed	*$6,120*
Total Success-Based CAPEX	$80K
Project IRR - No Subsidy	2.4%
15% IRR Subsidy	**$495K**
Subsidy/HH Passed	*$4,458*
75% Matching Subsidy	**$570K**
Subsidy/HH Passed	*$5,131*

Comparison of subsidy models

Subsidy-per-Passing by Number of HHs



Competitive forces should drive applicant bids towards the IRR threshold estimates

Three top-level scenarios

	1. Current Gap	2. Current Gap - Awarded Grants	3. Current Gap - Awarded Grants + Wireless RDOF
Statewide Coverage %	**100%**	**100%**	**100%**
HHs Passed	**209.4K**	**109.7K**	**141.0K**
Fiber Miles	**34.5K**	**13.2K**	**20.0K**
Total CapEx	**$1,486M**	**$601M**	**$886M**
Subsidy Range	**$1,147 - $1,228M**	**$429 - $510M**	**$660 - $741M**
Subsidy-per-Passing	*$5,477 - $5,865*	*$3,907 - $4,646*	*$4,680 - $5,257*

Scenario 1

- **"Ceiling" case that estimates subsidies required to expand 100+ Mbps broadband to all HHs not currently served.**

Scenario 2

- **"Floor" subtracts grant awardees for 100+ Mbps from the first scenario. In other words, if all grants are successfully executed, Scenario 2 estimates the cost to bridge the remaining gap.**

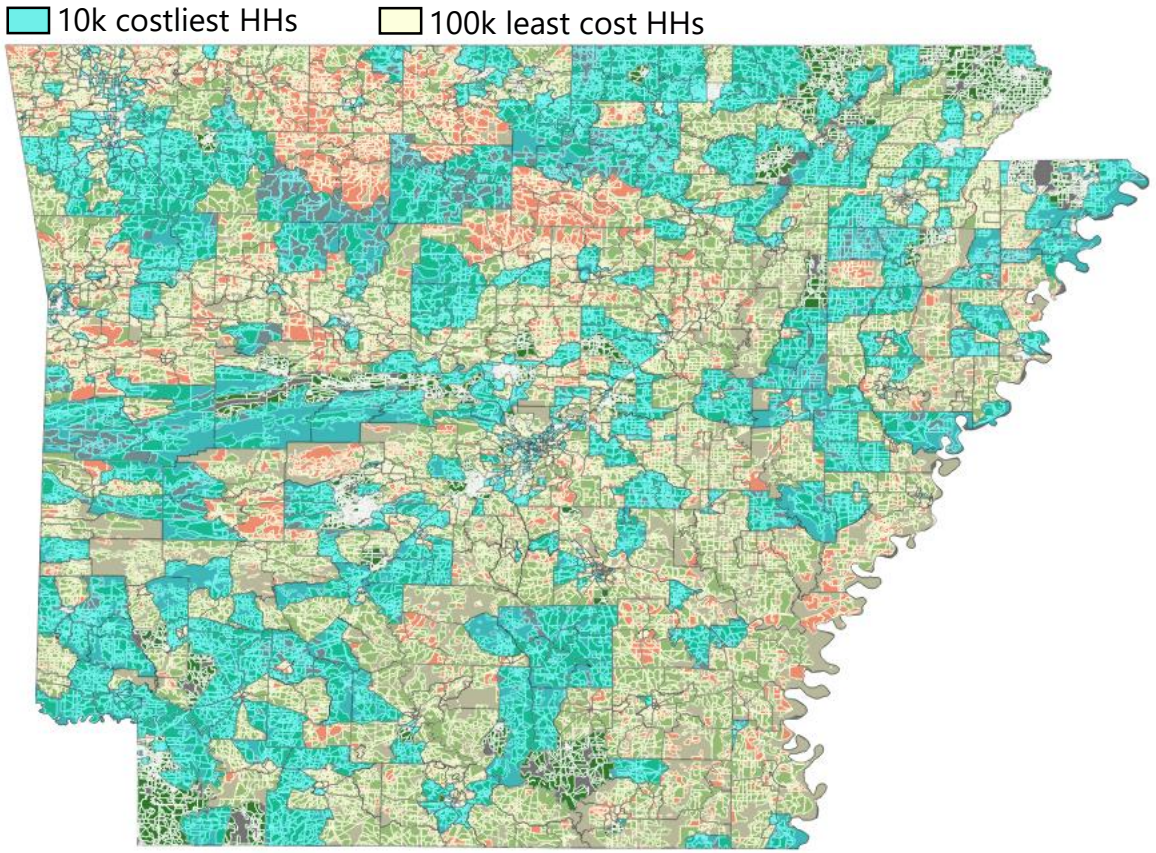
Scenario 3

- **"Middle case" that estimates the remaining gap if wireless RDOF winners from scenario 2 fail to deliver, or if future upgrades are required to future-proof these wireless-served households to fiber.**

Total budget for subsidies estimated in the range of $429M to $741M

Impact of costliest 10k HH (9% of gap) – the "hockey stick"

Analysis shown for Scenario 2



	HHs	CBGs	CapEx	CapEx/HH	% Gap	% AR HH
High Cost	**10k (9%)**	**639 (40%)**	**$178M (30%)**	**$17,800**	**9%**	**0.83%**
All Other	100k (91%)	970 (60%)	$423M (70%)	$4,230	91%	8.3%
Total	110k	1609	$601M	$5,464	100%	9.13%

Reducing the statewide coverage goal from 100% to 99% reduces the number of CBGs (projects) by 40% and reduces subsidies by 30% to 40%.

Program Goals

Bridge the Gap, ASAP

- The over-arching goal is to expand broadband coverage to as many Arkansans as possible
- Slow Internet is an acute problem now for those in the gap, so time is of the essence.
- Coverage of the gap needs to be as complete as possible, ideally 100%

Future-proof

- The Broadband Gap is a moving target
- Infrastructure investment must be positioned to keep ahead of it

Eligible for federal funds

- IIJA BEAD is the 500-lb gorilla in federal funding with perhaps $1B coming to Arkansas
- The Program must target eligibility for massive generational BEAD fund

Cost-efficient

- The program design must stretch funds as far as possible for maximum benefit

Feasible

- The State has finite resources to administer the program
- The program must be designed for efficient administration at statewide scale

Program Characteristics

Program Dimension	Recommendation	Rationale
Applicant Eligibility	ISPs, utilities, PPPs, municipalities…	• Diversifying the pool of applicants yields the greatest number of applications and generates greater competition • Scoring system should weigh qualifications of applicants such as financial strength, experience, D&B rating, Net Promoter Score, etc.
Household Eligibility	< 100 Mbps	• Industry concensus • Priority can be given to HHs with lowest speeds
Geographic Units	Census Block Group	• Best aligns with incumbent networks for least-cost • Enables smaller providers to compete for maximum market-based competition
Upgrade Speed	> 100/20 Mbps	• Prefer symmetric uplink and higher speeds
Future-proof speed upgrades	50% annual increase to 10+ Gbps	• Strong preference will be given to technologies with proven path to 10+ Gbps • FTTH is accepted to meet this objective; other technologies will be evaluated based on credibility of the evidence such as large-scale commercial deployments
Completion Timeline	3 years	• Although past programs had a two-year timeline, some states are allowing longer terms because of supply chain concerns and labor shortages
Applicant Contribution	>= 25% (with flexibility for high-cost areas)	• Matching contribution ensures applicants share cost burden and are invested in success; flexibility ensures ability to cover most expensive HHs • Competitive process will increase % contribution in lower cost areas • 25% is the minimum requirement for BEAD
Maximum Grant Value	No	• Maximum grant values exclude some households from future coverage • Grants should be distributed based on and objective scoring system • The state may wish to set a reserve price per CBG to reject absurdly high bids in non-competitive situations.
Operation Requirements	10 years	• Applicants should guarantee service after the conclusion of the grant contract period in order to ensure households are actively being served by funded infrastructure
Success-Based CapEx	Yes	• The connection from the street to the house is a real part of the CapEx and should be included in the subsidy calculation to attract intended interest from ISPs
Fund Distribution Model	Reimbursement-based grant	• This is the standard system for U.S. states and assures funds only go toward proper and incurred expenses

Implement a comprehensive, evidence-based and objective scorecard to enable efficient program administration at needed scale

Criteria	Scoring Factors
Speed of service	• Additional points for speed above minimum 100 Mbps up to 1 Gbps; bonus points for uplink speed up to symmetrical
Future-proof	• Additional points for fiber
Quality of coverage	• Maximum score for 100% coverage; lower scores for solutions with < 100% coverage due to obstructions or other factors • Maximum score for uniform speed over time and distance for all customers; lower scores for speed variation across customers based on location or utilization.
Time to deploy	• Additional points for service availability ahead of maximum 3-year time frame
Qualifications	• Additional points for experience, financial strength, D&B credit rating, Net Promoter Score, Performance bond, etc. • The state should employ procurement best practices to qualify applicants and thereby minimize performance risk
Contribution	• Additional points for % contribution above minimum (25%)
Community Support	• Additional points for quality and quantity of partnerships, funding, or letters from community leaders
Community Impact	• Additional points for economic benefits such as job creation or job training
Affordability	• Additional points for participation in FCC Affordable Connectivity Program • Additional points for price tiers below required affordable price (an affordable option is required for IIJA fund grants)
Service Adoption Strategy	• Additional points for dedicated service adoption assistance and engagement plans outside of traditional marketing such as digital literacy training or outreach to seniors
Project Readiness	• Additional points for evidence of project readiness. Details on project schedule, budget, financial model, engineering plans, marketing strategy for packages with speed tiers and pricing will increase project readiness score.

We recommend a six-step application process with competition in three rounds

Grant Applicant Process

State Notice of Funding Opportunity	• State to announce funding program, publish overview and offer webinars for potential applicants regarding program rules, applicant eligibility, application process, and scoring system. • The goal is to engage providers and adjust the program based on feedback to attract maximum participation. • State to publish final program rules, process, application form, FAQs, and list of projects (CBGs) available
Challenge Process	• Providers ~30 days to challenge eligibility of underserved census blocks by providing evidence of existing service, grants to deliver service, or firm plans to deploy with private capital within 24 months. • Evidence of pending service plans may include approved project plans, affidavits, shapefiles/KMZs, or other firm evidence. The State should require the challenging provider with a pending build to be qualified and contractually committed.
Initial Applications	• Bid Round 1: After finalizing the list of projects, providers will have ~30 days to submit applications. • Bid Round 1 leaders announced: Bidder, subsidy amount, score, and select criteria to be published online.
Competitive Responses	• Bid Round 2: Competing applications will be accepted for ~30 days from any bidders that did not participate in Round 1 • Bid Round 2 leaders announced: Leading bidders list will be updated.
Final Counter-Offers	• Bid Round 3: First round bidders will be given ~10 days to submit a final updated application
Award Announcement	• Notify winning bidders and announce awards online. • Allow 30 days to adjudicate any appeals

The state may want to run the process in multiple rounds to prioritize areas to fund for BEAD compliance and to reduce peak administrative load.

Community Outreach

28 Service Provider interviews

325 in-person + 32 Zoom meetings in all 75 counties

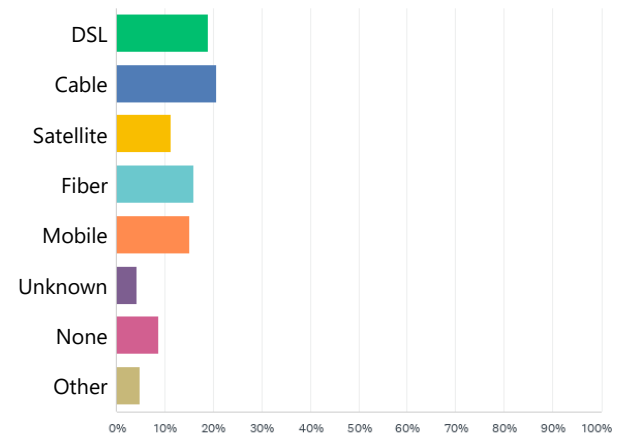
18,309 returned surveys and speed tests

Contacted every county judge, mayor, sheriff, school superintendent, Chamber of Commerce, and Farm Bureau Office

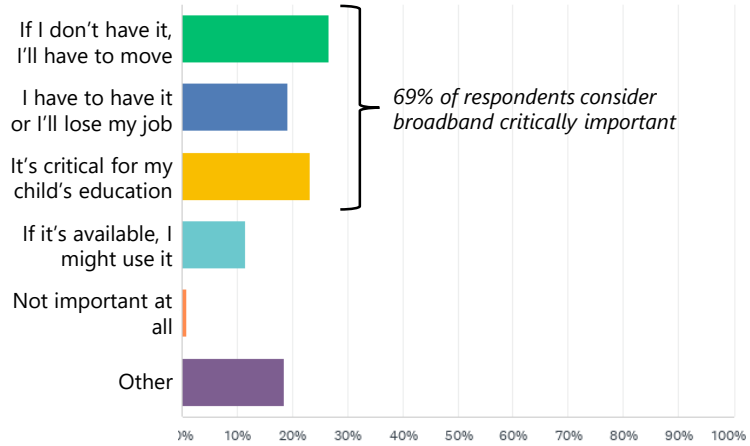
Assisted by numerous state representatives and senators, many of whom attended the in-person meetings

Home Internet Service

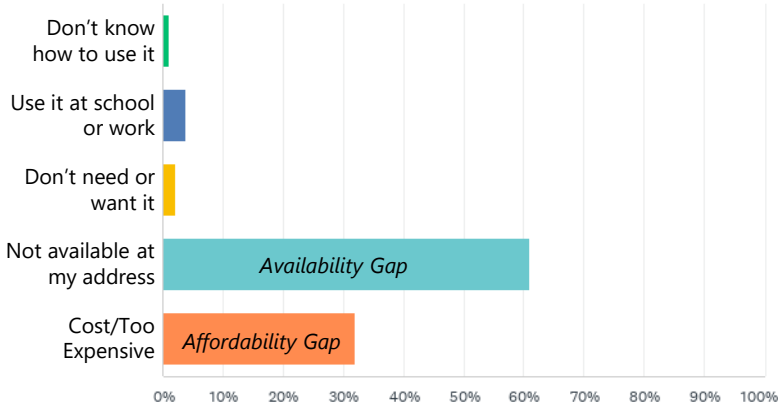
What kind of Internet connection do you have at home?



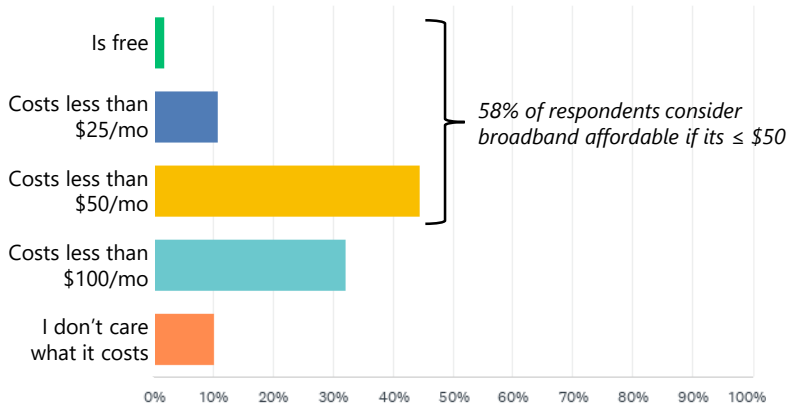
How important to you is having reliable and affordable broadband internet access service?



If you don't have home Internet, what is the main reason?



I define Internet service as "affordable" if it:



Community Survey Results for ~10,000 Speed Tests