



## **Lumen's Digital Disparity:**

Underinvestment in Infrastructure Discriminates Against  
Lower-Income, Rural, and Native American Customers

**June 2021**

## Executive Summary

Lumen Technologies (formerly known as CenturyLink) is making the digital divide worse and failing its customers and workers by not investing adequately in the essential fiber-optic buildout that is the standard for broadband networks worldwide. An analysis of Lumen's network in states where the company has more than 100,000 households in its service area, interviews with Lumen technicians, and reports by customers in Lumen's service area show that its service in large parts of its footprint<sup>1</sup> is below the Federal Communications Commission's broadband definition of 25/3 Mbps and demonstrates Lumen's failure to build fiber to much of its service area.

- Thirty-nine percent of households in Lumen's footprint do not have access to speeds that meet the FCC's definition of broadband.
- This underinvestment is especially devastating for rural communities, which make up more than half (57%) of the counties in the Lumen footprint and struggle with access to essential broadband services.
- The median income for households with fiber available is 12 percent higher than in areas with DSL (Digital Subscriber Line) service only. The median income of households with access to fiber is \$62,649, while the median income of households with only access to DSL is \$56,123.
- The company targets wealthy areas - 42 percent of households with access to fiber are in census blocks with median incomes above \$75,000 - while leaving behind lower income areas, with only 7 percent of Lumen's fiber network in census blocks with median incomes below \$35,000.
- In counties with higher populations of Native Americans (more than 25% of households) only about 5.2 percent have access to fiber-to-the-home service and 50 percent only have DSL access.

This analysis uses data submitted by Lumen to the FCC as part of its mandatory semi-annual Form 477 reports. Due to data collection issues the FCC has only recently addressed, Form 477 data show an overly optimistic representation of Lumen's network.<sup>2</sup> For example, the Form 477 data show over 8 million households in the Lumen footprint have fiber-to-the-home broadband service available to them, while Lumen's first quarter 2021 earnings report indicates the company only has 2.5 million "fiber-enabled" households. The disparity in Lumen's network deployment may be significantly worse than reported to the FCC.

Lumen's employees -- many of whom are Communications Workers of America (CWA) members -- know the company could do much more to connect its customers to high-speed internet if it invested in upgrading its wireline network with fiber. They know the company's recent job cuts -- more than 4,500 union represented employees since 2017 -- are hobbling the company's ability to meet the critical need for broadband infrastructure.

## Background

Across the country, the private sector has failed to deliver affordable broadband for all. Major broadband providers, both telecom and cable, chose not to build their networks to areas they deem less profitable, and declined to upgrade many existing customers left behind using outdated technology. The result of private sector underinvestment combined with decades of deregulation at the federal and state levels is a persistent and deeply harmful digital divide.

Providers like Lumen know that not all broadband technologies are created equal. Wireline is superior to wireless service, and fiber is the best available wireline technology.<sup>3</sup> Fiber internet uses optic lines that are made of many small fibers of glass. With this method, data is sent at the speed of light. As a result, fiber connections deliver faster download (250-1,000Mbps) and upload (250-1,000Mbps) speeds than DSL (5 to 35Mbps) and cable (25-500Mbps range). For fiber connections, unlike DSL and cable connections, speeds are symmetrical (upload and download speeds are equal), which is important for video conferencing and other applications that exchange large amounts of data. In addition, fiber technology is less susceptible to deterioration and environmental conditions like storms and electrical interference than copper and other materials that DSL and cable rely on. Some broadband companies deploy VDSL (Very High Speed Digital Subscriber Line), a newer technology that uses fiber optic cable to connect nodes in the neighborhood and then copper lines from the nodes to the home. VDSL can reach download speeds of about 25 Mbps to 50 Mbps, but (like standard DSL) speeds are significantly slower for subscribers more than 1,000 yards from the node.

According to the FCC's most recent Internet Access Services report, 26.4 million households -- 23.8 percent of all households -- do not have a broadband connection that meets the FCC speed benchmark,<sup>4</sup> either because they do not have access, they cannot afford it, do not have a computer, or do not have the skills to use the internet or device.

Broadband access is stratified by race and income. According to Pew Research, 29 percent of Black households and 35 percent of Latinx households do not have a wired broadband connection. For low-income households earning less than \$30,000 per year, 43 percent lack home broadband, compared to 8 percent of households that earn over \$75,000 per year.<sup>5</sup> The Census Bureau recently found that Native American reservations have lower rates of access to broadband than the rest of the country with 39 percent of those living on tribal lands lacking any broadband service.<sup>6</sup>

As one of the country's major broadband providers, with 4.7 million residential and small business subscribers and \$20.5 billion in revenue, Lumen should be part of the solution by meeting customer demand for fiber-optic broadband. But Lumen is reluctant to deploy fiber to areas that are lower income or where customers would not subscribe in sufficient numbers to justify the investment. Since the acquisition of Level 3 Communications in 2017, Lumen has prioritized investments in products for large enterprise customers, edge computing, and content delivery over investments in

broadband services for residents and small businesses.<sup>7</sup> Lumen’s consumer segment continues to shrink with declines in landline telephone services and DSL subscriptions. However, the company has consistently grown its subscribers in the limited areas where it has upgraded its network and offers service over 100 Mbps.<sup>8</sup>

From 2015 to 2021, Lumen (f/k/a CenturyLink) received \$506 million per year from the FCC’s Connect America Fund to build broadband to unserved areas.<sup>9</sup> In 2021, Lumen won \$262 million over ten years in the FCC’s Rural Digital Opportunity Fund reverse auction to build fiber to the home in underserved areas.<sup>10</sup>

Lumen hired contractors to complete most of the construction, even as it continues to eliminate union-represented jobs -- the company cut 4,500 union jobs since 2017.<sup>11</sup>

## Broadband Service in the Lumen Footprint

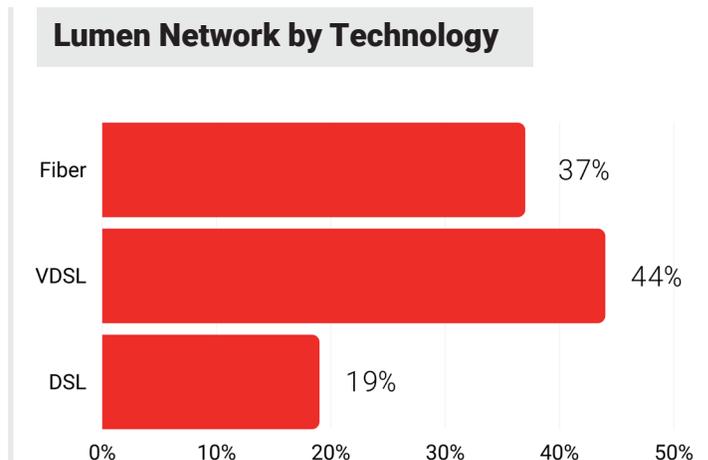
Using Form 477 data from June 2020, an analysis of the network in the 30 states where Lumen has more than 100,000 households with access to its network (encompassing a total of 21,467,377 households) reveals widespread service below the FCC’s broadband definition of 25/3 Mbps and Lumen’s disinterest in building fiber-optic cable that is the standard for broadband networks worldwide. Lumen chooses to limit its fiber deployments to more economically privileged customers, leaving lower income and rural customers without adequate access to essential broadband services.

Across this footprint, 19% of households (4 million) only have access to DSL, 44% of households (9.4 million) have VDSL as their fastest technology, and 37% of households (8 million) have access to fiber-to-the-home (FTTH) internet service, as of June 30, 2020. For a full breakdown of Lumen’s service availability by state, see Appendix A.

**Limited fiber build-out:** Lumen has made fiber-to-the-home available to fewer than 40 percent of the households in its footprint (8,049,226 households with fiber access out of 21,467,377 total households). Lumen’s fiber-to-the-home buildout is worst in Michigan where only 14 households (.01 percent of Lumen’s footprint) have fiber access, followed by New Jersey (0.3 percent), Indiana (0.3 percent), and Tennessee (.9 percent).

### Failure to meet FCC broadband benchmark:

In addition to inadequate fiber deployment levels, Lumen’s internet speeds fall short of modern standards. For 39 percent of the households in its network footprint, Lumen’s internet service does not meet the FCC’s 25/3 Mbps benchmark to be considered broadband.



In 10 of the top 30 Lumen states – Alabama, Iowa, Indiana, Michigan, Montana, North Dakota, Ohio, South Dakota, Tennessee, and Wyoming – a majority of each state’s households do not have access to 25/3 broadband from Lumen. It’s even worse in some states: For 71 percent of its network footprint in Montana and for 68 percent of its network footprint in Wyoming, Lumen’s internet service does not meet the FCC’s benchmark.

**Lumen is leaving rural communities stuck in the slow lane.** On average, rural households in the U.S. have lower income.<sup>12</sup> Depriving rural communities of access to essential broadband services prevents them from fully participating in the economy and civic life. Fifty-two percent of households in predominantly rural counties do not have access to internet access that meets the FCC definition of broadband, compared to 36 percent in predominantly urban counties.

Across the predominantly rural counties in Lumen’s national footprint, only 5.8 percent of households (214,277 out of 3,670,314 households in mostly rural counties) have access to fiber-to-the-home service.

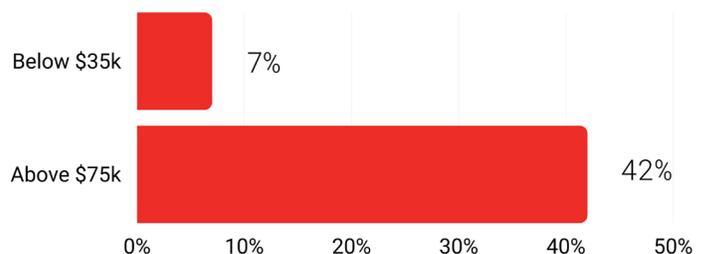
**Leaving Native households behind:** In 29 counties with Lumen’s service area where more than 25 percent of households identify as Native American (62,191 households), only about 5.2 percent have access to fiber-to-the-home service and 50 percent only have DSL access. In these counties, 60 percent of households do not have access to broadband as defined by the FCC (25/3 mbps).

In these counties, the average household income is \$47,476, eighteen percent below the average for the Lumen footprint, \$58,147.

**Income disparities define deployment:** The analysis of the network in Lumen’s top 30 states reveals that the company is prioritizing network upgrades to wealthier areas, leaving lower income communities with outdated technologies that won’t keep up with modern broadband usage. In Lumen’s service areas, the median income for households with fiber available is 12 percent higher than in areas with DSL only. The median income of households with access to fiber is \$62,649, while the median income of households with only access to DSL is \$56,123. A similar disparity in income exists for households where Lumen does not meet the FCC definition of broadband.

A closer look at the census blocks within the counties where Lumen deployed fiber to the home reveals an even starker contrast by median household income.<sup>13</sup> Forty-two percent of the households with access to fiber broadband were in census blocks with median household incomes above \$75,000 per year (3,373,854 of 8,049,226 households), compared to seven percent of the households with access to fiber broadband that were in census blocks with median household

**Proportion of Fiber Network Deployed to Census Block By Income**



incomes below \$35,000 per year (591,863 of 8,049,226 households).

Looking at households in the Lumen network that have access to broadband as defined by the FCC (25mbps down/3mbps up), 34% of the households that meet this definition are in census blocks that have median incomes above \$75,000, while only 9% of its broadband network is in census blocks with less than \$35,000 median income.

### **New Mexico**

% of Lumen network without fiber access: **46%**

% of Lumen network that does not meet FCC broadband standard: **43%**

% of rural households that do not meet FCC broadband standard: **58%**

Average income of fiber-enabled households: **\$54,960**

Average income of households with only DSL: **\$44,000**

### **Colorado**

% of Lumen network without fiber access: **38%**

% of Lumen network that does not meet FCC broadband standard: **30%**

% of rural households that do not meet FCC broadband standard: **52%**

Average income of fiber-enabled households: **\$74,972**

Average income of households with only DSL: **\$61,976**

### **Arizona**

% of Lumen network without fiber access: **37%**

% of Lumen network that does not meet FCC broadband standard: **33%**

% of rural households that do not meet FCC broadband standard: **100%**

Average income of fiber-enabled households: **\$62,720**

Average income of households with only DSL: **\$48,456**

### **Texas**

% of Lumen network without fiber access: **90%**

% of Lumen network that does not meet FCC broadband standard: **45%**

% of rural households that do not meet FCC broadband standard: **56%**

Average income of fiber-enabled households: **\$67,666**

Average income of households with only DSL: **\$60,294**

### **Minnesota**

% of Lumen network without fiber access: **46%**

% of Lumen network that does not meet FCC broadband standard: **35%**

% of rural households that do not meet FCC broadband standard: **54%**

Average income of fiber-enabled households: **\$75,774**

Average income of households with only DSL: **\$56,538**

## **Lumen Customers Frustrated with Outdated Infrastructure**

In Phoenix, a frustrated Lumen customer experiencing home bandwidth issues spoke with a technician who told him that outdated infrastructure was preventing him from reaching advertised speeds.

“The underground wiring had not been updated in our part of the city,” Miles Miller said. “The guy told us that if we’d lived 500 feet to the west in another grid, we wouldn’t have any speed issues.”

Miles Miller is a Program Associate with the National Digital Inclusion Alliance. After Miller learned that residents were getting different speeds depending on wiring infrastructure, he asked when his grid would be updated.

“They told us ‘maybe in the next six to 12 months, maybe.’ It seemed so wishy-washy and our experience with the initial customer service beforehand was so bad. We decided to drop them then.”

Beyond the disconnect between advertised and actual speeds, however, the most frustrating part of the experience for Miller is the cost.

“There are no affordable options in the area. We’d gone with CenturyLink because it was the ‘affordable’ option,” Miller said. “They didn’t even offer a refund when we cancelled.”<sup>14</sup>

## **Lumen Makes Working and Learning From Home More Difficult During the Pandemic**

Lumen’s disinterest in improving its broadband network can even be noticed in suburban areas. In August 2020, when the impact of Covid-19 made broadband even more essential to people who were required to work from home, residents of Parker, Colorado complained of extremely slow speeds that made working and learning from home far more difficult.

Denver7 quoted area residents:

*“I mean, I can see ten houses from here that do have internet, and ours just doesn’t,” said Michael Levy, who said four houses on Ponderosa Lane have internet so slow that they can get email, but forget about streaming video. “It’s slightly ahead of two cans and a string that you played telephone when you were a little kid. It’s pathetic.”*

*Now that more people are working from home and e-learning, CenturyLink’s slow speeds have become a liability.*

*"I have to be on video calls. I have to share documents," said Kelly Ellingson, who has lived in the home for 15 years. "And I go through numerous occasions every single work day where my internet connection causes the video to fail. Documents can't load, and it's really hard for me to do my job."*

Lumen (then known as CenturyLink) responded to the Denver7 story: "expanding in certain areas is not economically feasible without alternative methods, such as public-private partnerships."<sup>15</sup>

In Orlando, WFTV reported on residents that struggle with online schooling in November 2020. One Lumen customer reported relying on less than a 1mbps connection for his childrens' online schooling.<sup>16</sup>

*"He complained to his provider, CenturyLink, and techs made several repairs, but he says modest improvements didn't restore full service. "So, they struggle, struggle to get us what we paid for. I feel cheated to be honest with you," Clement said.*

## **Lumen Workers See the Disparity in the Network**

Lumen workers see the disparity in fiber deployment firsthand. A Field Technician in Kansas City hears from Lumen customers complaining about the difference in network quality and broadband speeds.

*As a technician who has worked in the industry for over 30 years, I have experienced the lack of broadband in rural areas not only personally but professionally.*

*On any given month, I have at least 40 conversations with customers who feel they are not being taken care of and that Lumen doesn't care about them. They know the difference between fiber optics and copper and what it means to their clients, their jobs, and their livelihood because everyone is working from home with COVID and the internet plays a crucial role.*

*A customer I spoke with the other day can only get six meg, you can barely stream a movie with that, however her neighbors less than a mile away can get 40-80 meg. This plan leaves customers behind and does a great disservice to Lumen. This sets us, as workers, and our customers up to fail. And the optics don't look good, because who lives in the rural areas?...low income people and people of color.*

Another technician in Nebraska reports similar frustrations:

*Before divestiture and deregulation, Northwestern Bell cared about customers and employees. Now, the way I see it, Lumen is not spending money on building fiber in*

*our state, with the exception of a limited number of neighborhoods in a handful of towns. I myself do not have fiber to the home and I install it for a living.*

*The other day I worked on a repair job for a clinic which was unable to process blood work for two days because their internet was down due to a bad cable pair. As a technician in the community, I hear all the stories and face the frustration. Internet service does not seem to be considered essential and that has to change.*

Customer complaints about inadequate service and delayed repairs create challenges on the job, adding to technicians' workload and stress. Moreover, the refusal to invest in fiber affects conditions on the job going forward. Technicians face job insecurity due to Lumen's job cuts, which have hobbled the company's ability to rapidly deploy fiber. Investment in next-generation networks would support both customers and good job conditions for Lumen's workforce.

## Recommendations

- Lumen should invest in next-generation networks -- Lumen Technologies should commit to capital investment in fiber deployment that would double the number of households passed by fiber in two years. If Lumen invests one quarter of its annual free cash flow, projected to be \$2.8 to \$3 billion in 2021, into rapid fiber deployment, it could deploy fiber to more than 560,000 locations per year in addition to its current deployment plans.<sup>17</sup> In 2020, Lumen built fiber to the home to about 400,000 households.<sup>18</sup>
- Lumen should pursue federal funding opportunities to build fiber infrastructure in underserved areas with its union represented employees.
- Lumen should stop leaving rural communities behind -- Lumen must upgrade its network in rural communities to meet the FCC's broadband definition, at least, and accelerate its efforts to deploy next-generation fiber.
- Lumen should prioritize Tribal Areas for fiber deployment to bring their access to essential infrastructure up to par with urban communities within the Lumen network footprint.
- Lumen should invest in a low-income product and agree to bulk sales of its wireline service to school districts and other public entities that redistribute plans to households.
- Lumen should build its fiber networks with its union represented employees and stop outsourcing work to subcontractors in order to pay lower wages and avoid being held legally responsible for the subcontractors' conduct. In particular, the company should stop its practice of outsourcing publicly-funded broadband to non-union contractors.<sup>19</sup>

## Appendix <sup>20</sup>

State	Number of Households with access to Lumen network	% With Access to Fiber-to-the-Home	% With DSL Only	% That Does Not Meet FCC Definition of Broadband	% of Rural Households Without Access to Broadband as Defined by the FCC	Household Income with Access to Broadband as Defined by the FCC	Household Income Without Access to Broadband as Defined by the FCC
<b>AL</b>	334,842	8%	15%	50%	55%	\$50,878	\$46,375
<b>AR</b>	264,091	4%	16%	44%	47%	\$ 43,750	\$44,826
<b>AZ</b>	2,303,544	63%	15%	33%	100%	\$62,697	\$56,322
<b>CO</b>	2,055,474	62%	17%	30%	52%	\$73,542	\$68,171
<b>FL</b>	1,870,317	20%	6%	30%	39%	\$57,188	\$52,763
<b>IA</b>	812,938	36%	48%	53%	70%	\$61,602	\$55,917
<b>ID</b>	437,526	59%	24%	38%	64%	\$57,232	\$55,000
<b>IN</b>	226,408	1%	23%	52%	51%	\$57,308	\$62,500
<b>KS</b>	104,404	5%	12%	43%	37%	\$57,356	\$54,575
<b>MI</b>	109,158	0%	30%	58%	58%	\$50,357	\$53,125
<b>MN</b>	1,703,120	54%	21%	35%	54%	\$73,250	\$64,792
<b>MO</b>	595,864	11%	14%	42%	46%	\$51,549	\$52,606
<b>MT</b>	338,870	18%	54%	71%	67%	\$61,813	\$53,859
<b>NC</b>	1,356,267	9%	9%	42%	46%	\$51,167	\$47,054
<b>ND</b>	158,051	24%	57%	66%	70%	\$61,199	\$60,096
<b>NE</b>	413,395	38%	37%	47%	53%	\$66,250	\$53,587
<b>NJ</b>	125,347	1%	11%	43%	n/a	\$103,625	\$109,625
<b>NM</b>	700,095	54%	19%	43%	58%	\$52,569	\$ 48,857
<b>NV</b>	798,131	30%	4%	20%	n/a	\$61,215	\$51,442
<b>OH</b>	585,682	2%	18%	58%	55%	\$56,442	\$62,054
<b>OR</b>	1,144,688	52%	25%	39%	65%	\$ 64,250	\$ 55,208
<b>PA</b>	338,195	2%	13%	49%	50%	\$60,326	\$ 63,125
<b>SD</b>	214,160	21%	52%	60%	61%	\$62,422	\$52,656
<b>TN</b>	232,228	1%	11%	51%	60%	\$46,853	\$43,657
<b>TX</b>	411,946	10%	16%	45%	56%	\$60,761	\$58,856
<b>UT</b>	840,618	57%	21%	35%	75%	\$73,254	\$72,609
<b>VA</b>	345,704	2%	10%	48%	51%	\$51,844	\$48,750
<b>WA</b>	2,020,432	56%	20%	34%	65%	\$ 75,104	\$66,607
<b>WI</b>	433,527	7%	15%	37%	38%	\$57,734	\$59,688
<b>WY</b>	192,355	20%	56%	68%	84%	\$74,632	\$ 62,262
<b>Lumen Network in its top 30 states</b>	<b>21,467,377</b>	<b>37%</b>	<b>19%</b>	<b>39%</b>	<b>52%</b>	<b>\$61,272</b>	<b>\$57,899</b>

## Endnotes

- 1 Throughout the report, when we refer to “footprint,” we refer to Lumen’s service area in states in which the company has more than 100,000 households in its service area.
- 2 The figures in this report are from June 2020 Form 477 data reported by Lumen to the FCC. However, it is probable that this data overestimates the buildout and speed of Lumen’s broadband build-out. This is a result of the FCC’s problematic Form 477 broadband deployment measurement method in which, if even one household in a census block has access to broadband service at a particular speed, the FCC considers the entire census block to have access to that speed. For example, FCC data showed 100 percent broadband access in Ferry County, WA. However, Microsoft estimates that same county’s coverage at two percent. See Steve Lohr, New York Times, “The Digital Divide is Wider Than We Think,” Dec. 4, 2018. <https://www.nytimes.com/2018/12/04/technology/digital-divide-us-fcc-microsoft.html> The FCC acknowledged the many problems with its Form 477 data and took early steps to improve its data maps, adopting the Digital Opportunity Data Collection and new processes for data collection. See Federal Communications Commission, Report and Order and Second Further Notice of Proposed Rulemaking, WC Docket No. 19-195, WC Docket No. 11-10 (Rel. Aug. 6, 2019). <https://ecfsapi.fcc.gov/file/080629599705/FCC-19-79A1.pdf> The idea behind the Order was correct -- the FCC’s maps are bad -- but the FCC’s plans in this Order are insufficient, incomplete, and confused.
- 3 CTC Technology, “Mobile Broadband Service is Not an Adequate Substitute for Wireline,” CTC Technology, October 2017. <https://www.ctcnet.us/wp-content/uploads/2017/10/CTC-Mobile-Broadband-White-Paper-final-20171004.pdf>
- 4 Federal Communications Commission, “Internet Access Services: Status as of December 31, 2018.” <https://docs.fcc.gov/public/attachments/DOC-366980A1.pdf>
- 5 Pew Research Center, “Mobile Technology and Home Broadband 2021,” 6/3/2021. <https://www.pewresearch.org/internet/2021/06/03/mobile-technology-and-home-broadband-2021/>
- 6 Fier, Donna; Todd, Richard; Weyerauch, Kent. “The digital divide in Indian Country” Federal Reserve Bank of Minneapolis. 1/7/2019. <https://www.minneapolisfed.org/article/2019/the-digital-divide-in-indian-country>
- 7 Robuck, Mike. “CenturyLink rebrands as Lumen Technologies” FierceTelecom. 9/14/2020. <https://www.fiercetelecom.com/telecom/centurylink-rebrands-re-defines-enterprise-sector-as-lumen-technology>
- 8 Lumen quarterly earnings reports available at <https://ir.lumen.com>
- 9 Hardesty, Linda. “CenturyLink scored billions in CAF II funds, eyes the next giveaway: RDOF” FierceTelecom. 1/27/2020. <https://www.fiercetelecom.com/operators/centurylink-scored-billions-caf-ii-funds-eyes-next-giveaway-rbof>
- 10 Robuck, Mike. “Lumen execs: Fiber builds a bigger bang for the buck than RDOF” FierceTelecom. 2/11/2021. <https://www.fiercetelecom.com/telecom/lumen-execs-fiber-builds-a-bigger-bang-for-buck-than-rdof>
- 11 CWA records.
- 12 U.S. Census, “Poverty Rates Higher, Median Household Income Lower in Rural Counties Than in Urban Areas,” December 6, 2018. <https://www.census.gov/library/stories/2018/12/differences-in-income-growth-across-united-states-counties.html>
- 13 Census Block Group data on income applied to the Census Block to match 477 data and have continuity with network and county divisions.
- 14 Customer Interview conducted on June 1, 2021 by National Digital Inclusion Alliance
- 15 Allen, Jaclyn. “Douglas County neighborhood can’t get faster internet” Denver7. 8/18/2020. <https://www.thedenverchannel.com/news/contact-denver7/douglas-county-neighborhood-cant-get-faster-internet>

- 16 Ulrich, Todd. "Consumers complain of internet struggles when managing work and school from home" WFTV. 11/11/2020. <https://www.wftv.com/news/action9/consumers-complain-internet-struggles-when-managing-work-school-home/RBKSHFL6Y5EKPPNJLSH4WH7L4M/>
- 17 This assumes a cost of \$1,325 for passing and connecting a household, which is an estimate of Lumen's cost provided by analyst MoffetNathanson. Lumen provided its 2021 outlook in its First Quarter earnings report on May 5, 2021. <https://www.prnewswire.com/news-releases/lumen-technologies-inc-reports-fourth-quarter-2020-results-301226073.html>
- 18 1Q2021 Earning Presentation, 5/5/2021
- 19 Letter from CWA President Chris Shelton to FCC Chairman Tom Wheeler. 6/27/2016. [https://speedmatters.org/sites/default/files/cwa\\_shelton\\_caf\\_ii\\_letter\\_to\\_wheeler\\_-\\_june\\_2016.pdf](https://speedmatters.org/sites/default/files/cwa_shelton_caf_ii_letter_to_wheeler_-_june_2016.pdf)
- 20 Data from ACS FCC Form 477 data, June 2020 ; Census Bureau, American Community Survey, Five Year Estimates.