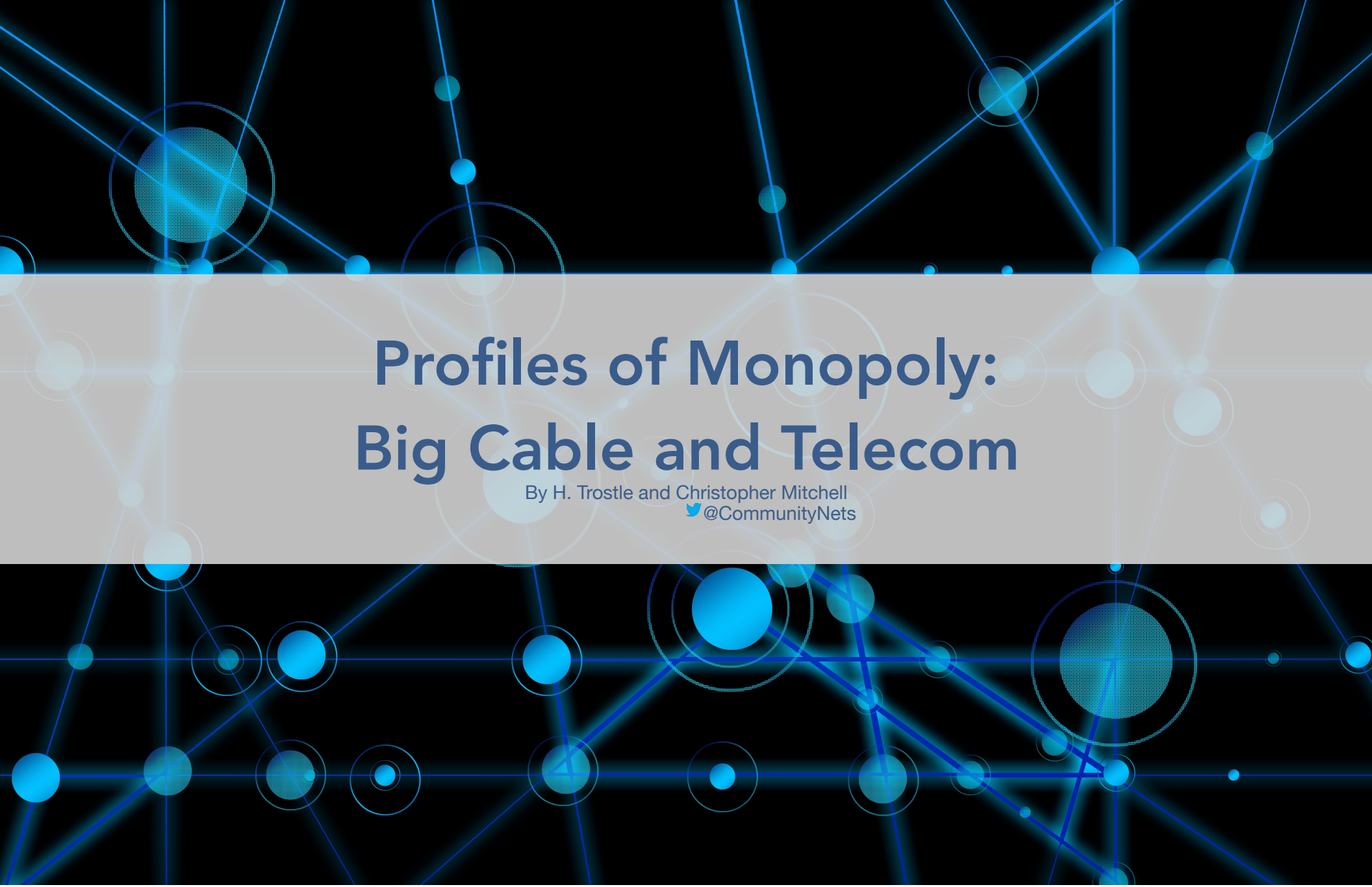

Profiles of Monopoly: Big Cable and Telecom

By H. Trostle and Christopher Mitchell
@CommunityNets

Community Networks

July 2018

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Introduction

The market has spoken: The market is broken. This research sets the stage to explore how national forces are at work in local communities. Nationally, cable companies maintain monopolies on high-speed Internet access. The large telecommunication companies, such as AT&T and Verizon, invest mainly where they face cable competition.[1] Admittedly, cable service is available to the vast majority of Americans, in large part because of historic municipal franchise requirements for buildout. However, available data suggests that government programs to encourage rural investment from the biggest companies has generally failed whereas cooperatives and smaller firms have thrived with fewer subsidies.

This research began with the simple desire to explore where the largest providers offer service and how they have carefully minimized head-to-head competition with each other, particularly when looking solely at the cable companies or the telephone companies. We came to believe others would find it helpful not just to see these territories but also to include some basic facts, such as the number of households with access to broadband as defined by the FCC or basic revenues for the providers.

Monopolies and Broadband Internet Access

Millions of Americans still do not have a real choice when it comes to their Internet service. In urban areas, a thin majority can choose between the monopoly cable company and the often slower monopoly phone company. In rural areas the situation is worse. Residents and businesses are often lucky to have access to high-quality Internet access at all. No matter where you go, people tend to be confused about their options. Even policymakers tasked with improving access lack basic information as to which service providers are in each geographic region.

In this report, we provide detailed information about broadband competition by sifting through data on claimed broadband availability of six of the largest Internet Service Providers (ISPs) through a series of maps. Two of the ISPs are cable companies: Comcast and Charter (largest and second largest, respectively). The other four ISPs are the four largest telecommunication companies, formerly telephone companies (telcos): AT&T, CenturyLink, Frontier, and Verizon. We classify their broadband service areas and identify where each ISP faces no competition in providing broadband speeds of 25 Megabits per second (Mbps) download and 3 Mbps upload, the Federal Communications Commission's (FCC) definition of broadband.[2]

Charter and Comcast rely on coaxial cable to provide Internet service. This type of network can offer fast downloads and slow-to-moderate speed uploads — easily supporting broadband. The telcos, however, primarily use two types of technology: DSL and Fiber-to-the-Home (FTTH). DSL is based on copper telephone lines and often cannot deliver broadband-level speeds, especially in rural areas. FTTH is considered the gold standard of high-speed Internet service. It provides the most reliable connection and fastest download and upload speeds, as well as the most robust upgrade path. For that reason we also present corresponding maps of the four telcos' FTTH service areas.

[1] The term monopoly is used rigidly by some to mean a sole single seller but historically, and we believe more correctly, has been understood to mean companies that exert a large amount of market power. This definition was good enough for Milton Friedman and it is good enough for us.

[2] Both the Obama and Trump administrations agree on the definition for the minimum threshold for"broadband." For an in-depth discussion on the changing definition of broadband, see BroadbandNow's article (February 2018) https://broadbandnow.com/report/fcc-broadband-definition/. See also, MuniNetworks' article (May 2018) https://muninetworks.org/content/why-25-mbps-3-mbps-reasonable-minimum-standard-2018.

Since 2015, the federal government has given the large telcos $1.5 billion in subsidies each year through the Connect America Fund to bring high-speed Internet service to rural areas. Large telcos only need to provide speeds of at least 10 Mbps (download) and 1 Mbps (upload) in order to receive the subsidy.

Despite the Connect America Fund, the large providers have rarely invested in next-generation services in areas where they do not face competition. The telcos' widespread, legacy DSL networks, especially in rural areas, often do not support broadband service and, as such, the majority of their rural DSL networks rarely appear on maps showing connections that meet the broadband definition. The Connect America Fund will continue to provide these subsidies through 2020 but areas that have already received the basic upgrades funded by it will need additional subsidies immediately to avoid falling further behind.

This demonstrates a key point: The largest telephone companies have far different incentives than smaller firms, whether private, cooperative, or public. Large firms appear to invest in modern networks solely where they face competition and provide the minimum allowable under subsidy programs elsewhere. Cooperatives and municipal networks as well as locally owned private networks tend to invest in longer-term, next-generation services that well exceed the minimum definition of broadband.[3] Compare the fiber maps of the telcos in this report to the map in Appendix G of fiber networks built by rural cooperatives.

[3] Trostle and Mitchell, "Cooperatives Fiberize Rural America: A Trusted Model for the Internet Era," Institute for Local Self-Reliance (November 2017) https://ilsr.org/the-fiber-future-is-cooperative-policy-brief-on-rural-cooperative-fiber-deployment/; and Lucey and Mitchell, "Successful Strategies for Broadband Public-Private Partnerships," Institute for Local Self-Reliance (July 2016) https://ilsr.org/ppp-fiber/.

The Data

Our primary source of information is the FCC Form 477 Data December 2016 v1. The FCC releases updates to this form every six months. ISPs self-report this information to the FCC down to the census block level. The result overestimates actual broadband availability and ISPs' service areas.

Census blocks are the smallest unit of measurement in the U.S. census, but they vary in both land area and population. An ISP may classify a census block as served even if only one resident *could* receive service.[4] This methodology leads to an overstatement of broadband service available (see Figure 1). Competition is also overstated (see Figure 2).

We have deep hesitations about using this data because of its many inaccuracies, but there is no other feasible option. In any event, this provides a conservative baseline for the problems in the market — though we believe the true level of competition is worse than this analysis shows, neither is tolerable in a country that claims to support a market-driven solution for supplying broadband Internet access.

Throughout this analysis, we include all fixed wireless Internet access providers (WISPs) that claim to offer 25 Mbps / 3 Mbps broadband service as competitors to the cable and telecom companies. Fixed wireless data, however, appears to be inaccurate at a higher rate than other technologies in this data set. WISPs are often smaller firms that have legitimate challenges in completing the unnecessarily complex

[4] "For this purpose, 'broadband service' is 'available' at an address if the provider does, or could, within a typical service interval (7 to 10 business days) without an extraordinary commitment of resources, provision two-way data transmission to and from the Internet with advertised speeds…." NTIA State Mapping NOFA, 74 Fed. Reg. at 32557 (July 7, 2009) https://www.ntia.doc.gov/files/ntia/publications/fr_broadbandmappingnofa_090708.pdf.
See also, FCC 2015 Broadband Progress Report, Footnote 137 (January 2015) https://apps.fcc.gov/edocs_public/attachmatch/FCC-15-10A1.pdf.

and poorly managed FCC data collection process. The result is that more than a few have claimed to offer faster speeds than what they actually advertise.[5] We, however, do include fixed wireless providers because the FCC uses the fixed wireless broadband data in their estimate of national terrestrial fixed broadband access.[6] Additionally, fixed wireless is often a superior option to DSL in rural regions and even some urban areas.[7]

We do not include satellite service providers because the technology is highly dependent on terrain and weather, has very poor latency, and is often more expensive than terrestrial ISPs. Further, households and businesses have unequivocally rejected satellite Internet access where there is a single alternative. Unlike many cable and telephone companies, satellite service bases pricing on both speed and data usage, making it difficult to estimate monthly bills.[8] Satellite service is also excluded by the FCC in the official estimates of fixed broadband coverage published in the National Broadband Deployment Progress reports.[9]

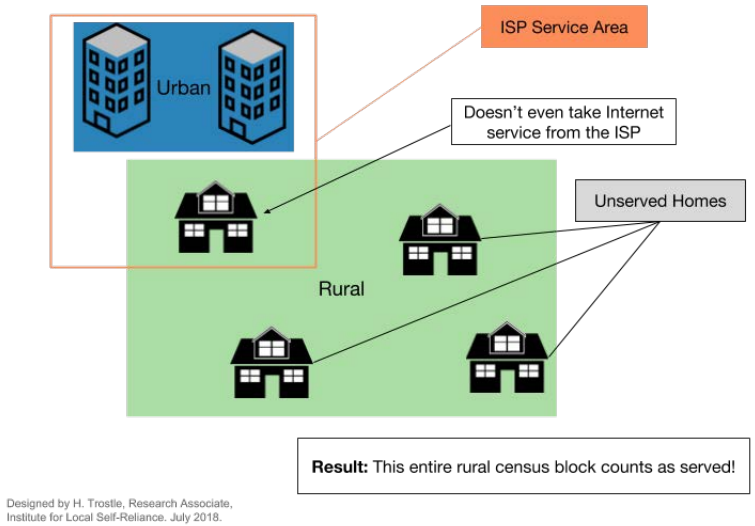


Figure 1: Diagram of FCC Broadband Data Overstatement

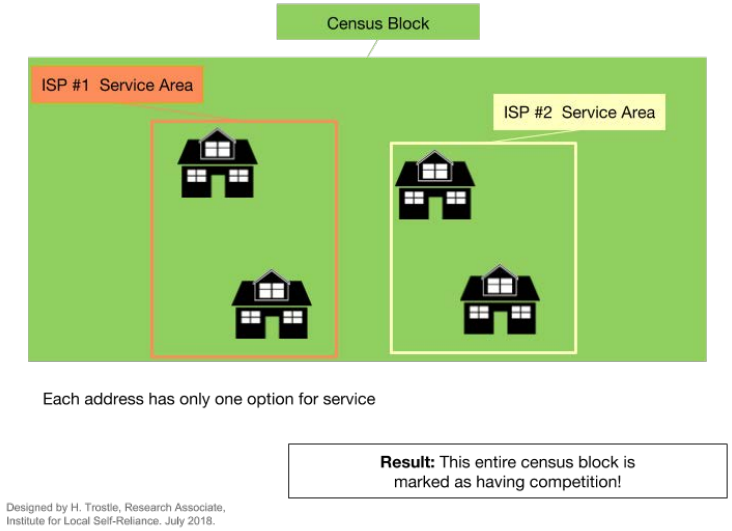


Figure 2: Diagram of FCC Broadband Data Competition Overstatement

[5] For instance, LTD Broadband misreported its advertised speeds to the FCC near Rochester, Minnesota, in FCC Form 477 December 2016 v1. The company stated that it offers speeds of 244 Mbps, but LTD Broadband only advertises speeds up to 10 Mbps for $75 per month, http://ltdbroadband.com/plans.html.

[6] The FCC estimates that 92.3 percent of the population has access to fixed terrestrial Internet service of 25 Mbps / 3 Mbps in the 2018 Broadband Deployment Report, https://www.fcc.gov/reports-research/reports/broadband-progress-reports/2018-broadband-deployment-report.

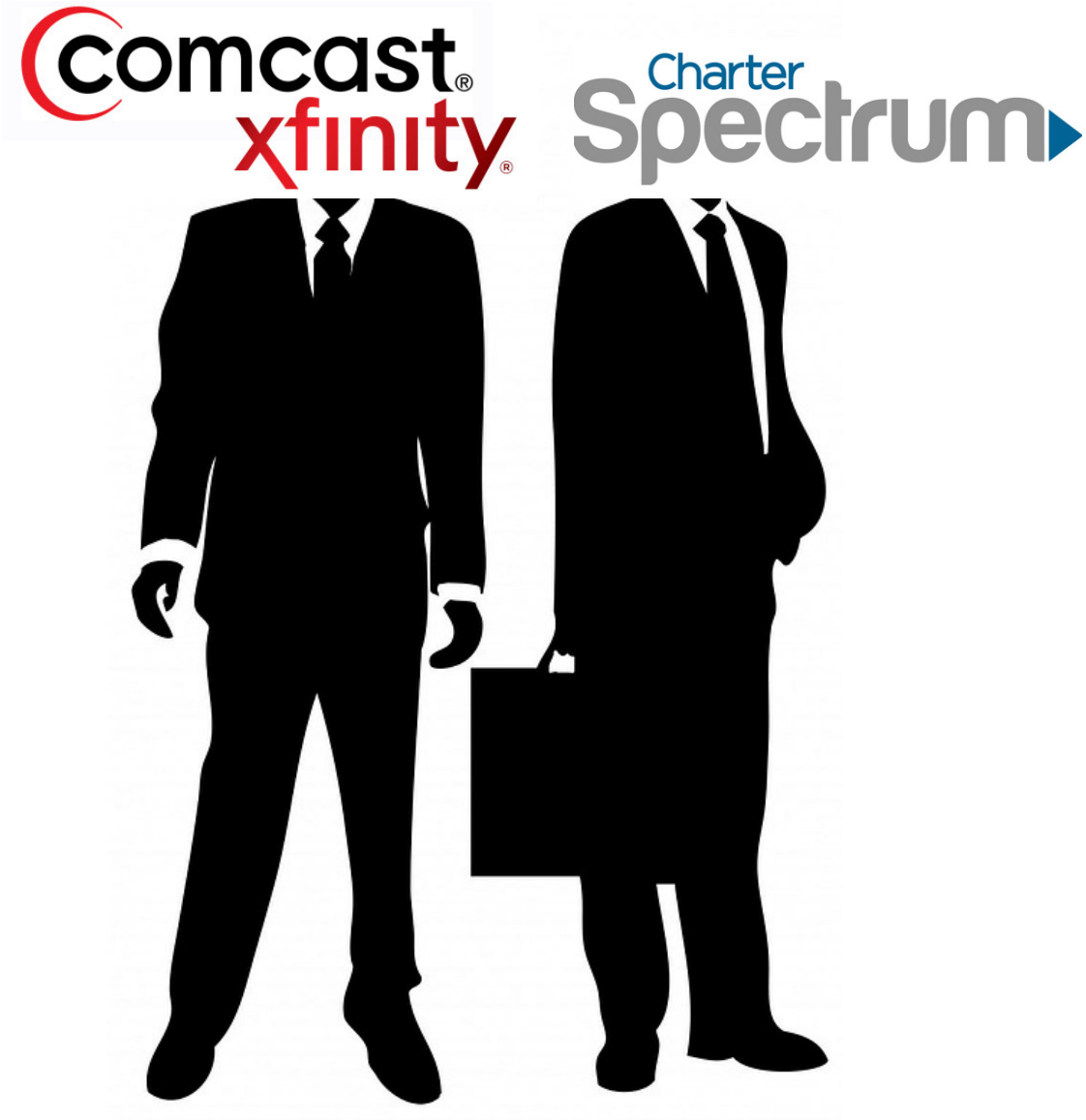
[7] Companies like NetBlazr in Boston and Monkey Brains in San Francisco, for instance.

[8] Minnesota Rural Broadband Coalition, "Understanding Satellite: The Technology and Pricing," http://mnbroadbandcoalition.com/?page_id=464.

[9] The FCC did calculate that 95.6 percent of the population would have fixed broadband access if the FCC were to count satellite data in the 2018 Broadband Deployment Report. The BroadbandNow Team explains why this is a bad idea. BroadbandNow.com, "FCC Concludes Satellite Internet Is Good Enough for Rural Broadband," https://broadbandnow.com/report/satellite-internet-good-enough-rural-broadband/.

[9] The FCC did calculate that 95.6 percent of the population would have fixed broadband access if the FCC were to count satellite data in the 2018 Broadband Deployment Report. The BroadbandNow Team explains why this is a bad idea. BroadbandNow.com, "FCC Concludes Satellite Internet Is Good Enough for Rural Broadband," https://broadbandnow.com/report/satellite-internet-good-enough-rural-broadband/.

Cable Profiles



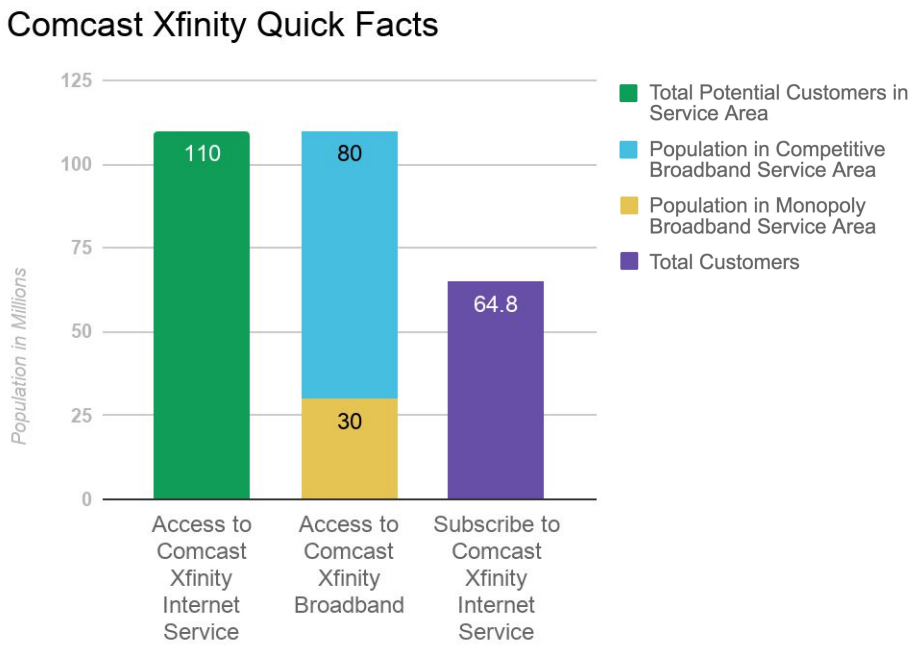
Comcast Xfinity

Comcast is the largest residential ISP and also the largest cable company in the U.S. Approximately 110 million people in 39 states live in Comcast's residential Xfinity Internet service area.[10] All of these people have access to broadband-level service through Comcast Xfinity, but about 30 million of these people have no other option for broadband service.[11]

Per Comcast, approximately 25.5 million households, or about 64.8 million people, subscribe to Comcast's Internet service (average U.S. household is 2.54 people).[12] These households may not actually subscribe to broadband speeds because that service tier may be unaffordable.

According to Comcast's 2017 fourth quarter results, revenue from this Internet division was $3.8 billion, and capital expenditure for the entire company was about $2.1 billion. Annual revenue from the Internet division was approximately $14.8 billion, and the annual capital expenditure was about $8 billion in 2017.[13]

Comcast receives no federal Connect America Fund subsidies but has received subsidies from some states, like Vermont and Massachusetts.[14]



[10] 110 million according to the US 2010 Census . Current estimates in 2018 are 111.2 million from BroadbandNow.com, XFINITY by Comcast, https://broadbandnow.com/XFINITY.

[11] There are some exceptions - for instance apartment buildings that do not allow Comcast to offer services are included in this number because of the problems previously discussed in the data set.

[12] Comcast 4th Quarter Results 2017, https://www.cmcsa.com/news-releases/news-release-details/comcast-reports-4th-quarter-and-year-end-2017-results.
Statista, Average Household Size, https://www.statista.com/statistics/183648/average-size-of-households-in-the-us/.

[13] Comcast 4th Quarter Results 2017, https://www.cmcsa.com/news-releases/news-release-details/comcast-reports-4th-quarter-and-year-end-2017-results.

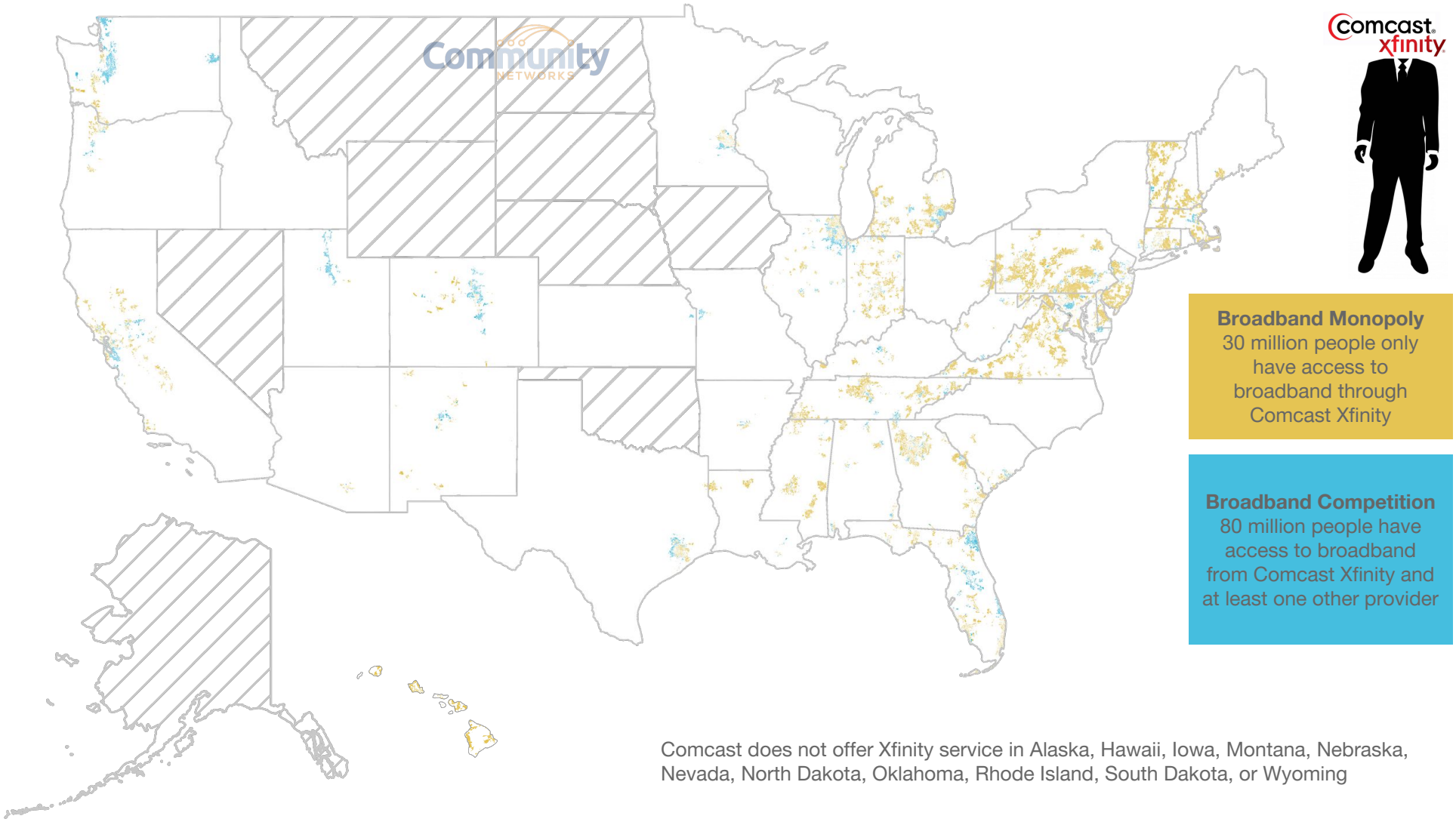
[14] Woodward, "State to pay Comcast $4m to build out rural broadband," Boston Globe (August 2016) https://www.bostonglobe.com/business/2016/08/22/state-pay-comcast-for-more-rural-broadband/Zb8bqq5qGlpKfQ0RErgDHM/story.html;
and Edwards, "Grants help fund 'last mile' of Vermont broadband," Rutland Herald (March 2014) https://www.rutlandherald.com/articles/grants-help-fund-last-mile-of-vermont-broadband/.

Comcast's Captured Customers

30 million people only have access to broadband (25 Mbps / 3 Mbps) through Comcast Xfinity

Read the full report at:
ILSR.org/Monopoly-Networks

Internet customers: 25.5 million households (~64.8 million people)
2017 fourth quarter revenue from Internet division: $3.8 billion



Broadband Monopoly
30 million people only have access to broadband through Comcast Xfinity

Broadband Competition
80 million people have access to broadband from Comcast Xfinity and at least one other provider

Comcast does not offer Xfinity service in Alaska, Hawaii, Iowa, Montana, Nebraska, Nevada, North Dakota, Oklahoma, Rhode Island, South Dakota, or Wyoming

Design: H. Trostle, Institute for Local Self-Reliance
Source: FCC Form 477 December 2016 v 1; Comcast 4th Quarter Results 2017
This is a best-case scenario. FCC Form 477 data overstates broadband availability and competition.

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Charter Spectrum

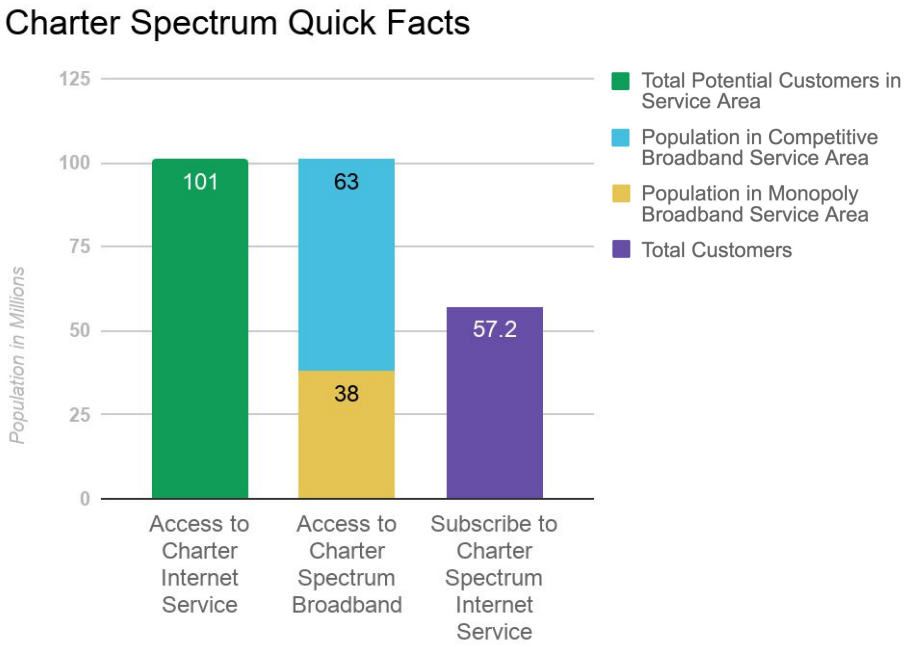
Charter is the 2nd largest cable company in the U.S. Approximately 101 million people in 45 states can subscribe to Charter Spectrum residential Internet service.[15] All of these people people have access to broadband-level service through Charter Spectrum.[16] About 38 million have no other option for broadband service.

According to Charter, approximately 22.5 million households, or about 57.2 million people, subscribe to Charter Spectrum Internet service (average U.S. household size is 2.54 people).[17]

According to Charter's 2017 fourth quarter results, revenue from the Internet division was $3.6 billion and capital expenditure for the entire company was about $2.6 billion. Annual revenue from the Internet division was approximately $14.1 billion, and the annual capital expenditure was about $8.7 billion in 2017.[18]

Charter receives no federal Connect America Fund subsidies.

As of July 2018, Charter is under orders from the State of New York to sell the Time Warner Cable system which the company had bought in 2016. Charter has not met the state's broadband expansion goals.[19] As this report goes to press, Charter has about 60 days to present a transition plan.[20]



[15] 101 million according to the US 2010 census. Current estimates in 2018 are 101.5 million from BroadbandNow.com Charter Communications, https://broadbandnow.com/Charter-Communications.

[16] There are some exceptions - for instance apartment buildings that do not allow Charter to offer services are included in this number because of the problems previously discussed in the data set.

[17] Charter 4th Quarter Results 2017, http://ir.charter.com/phoenix.zhtml?c=112298&p=irol-newsArticle&ID=2330071.
Statista, Average Household Size, https://www.statista.com/statistics/183648/average-size-of-households-in-the-us/.

[18] Charter 4th Quarter Results 2017, http://ir.charter.com/phoenix.zhtml?c=112298&p=irol-newsArticle&ID=2330071.

[19] Brodkin, "NY orders Charter out of state, says it must sell Time Warner Cable system," Ars Technica (July 2018) https://arstechnica.com/tech-policy/2018/07/new-york-revokes-approval-of-chartertime-warner-cable-merger/?amp=1

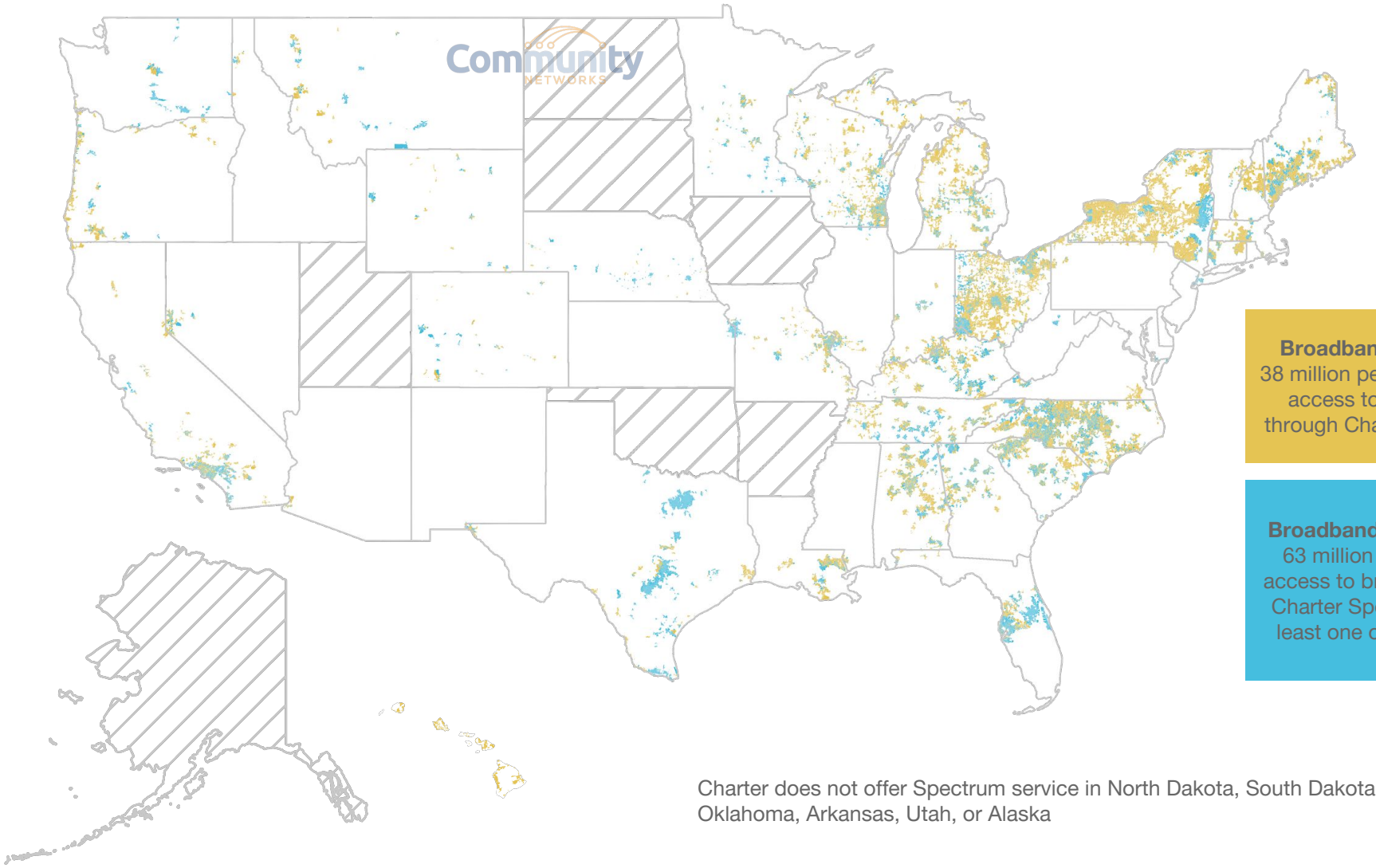
[20] Fung, "New York moves to break up Charter's merger with Time Warner Cable," Washington Post (July 2018) https://www.washingtonpost.com/technology/2018/07/27/new-york-moves-break-up-charters-merger-with-time-warner-cable/?utm_term=.92cf46ed3438

Charter's Captured Customers

38 million people only have access to broadband
(25 Mbps / 3 Mbps) through Charter Spectrum

Read the full report at:
ILSR.org/Monopoly-Networks

Internet customers: 22.5 million households (57.2 million people)
2017 fourth quarter revenue from Internet division: $3.6 billion



Broadband Monopoly
38 million people only have access to broadband through Charter Spectrum

Broadband Competition
63 million people have access to broadband from Charter Spectrum and at least one other provider

Charter does not offer Spectrum service in North Dakota, South Dakota, Iowa, Oklahoma, Arkansas, Utah, or Alaska

Design: H. Trostle, Institute for Local Self-Reliance
Source: FCC Form 477 December 2016 v 1; Charter 4th Quarter Results 2017
This is a best-case scenario. FCC Form 477 data overstates broadband availability and competition.

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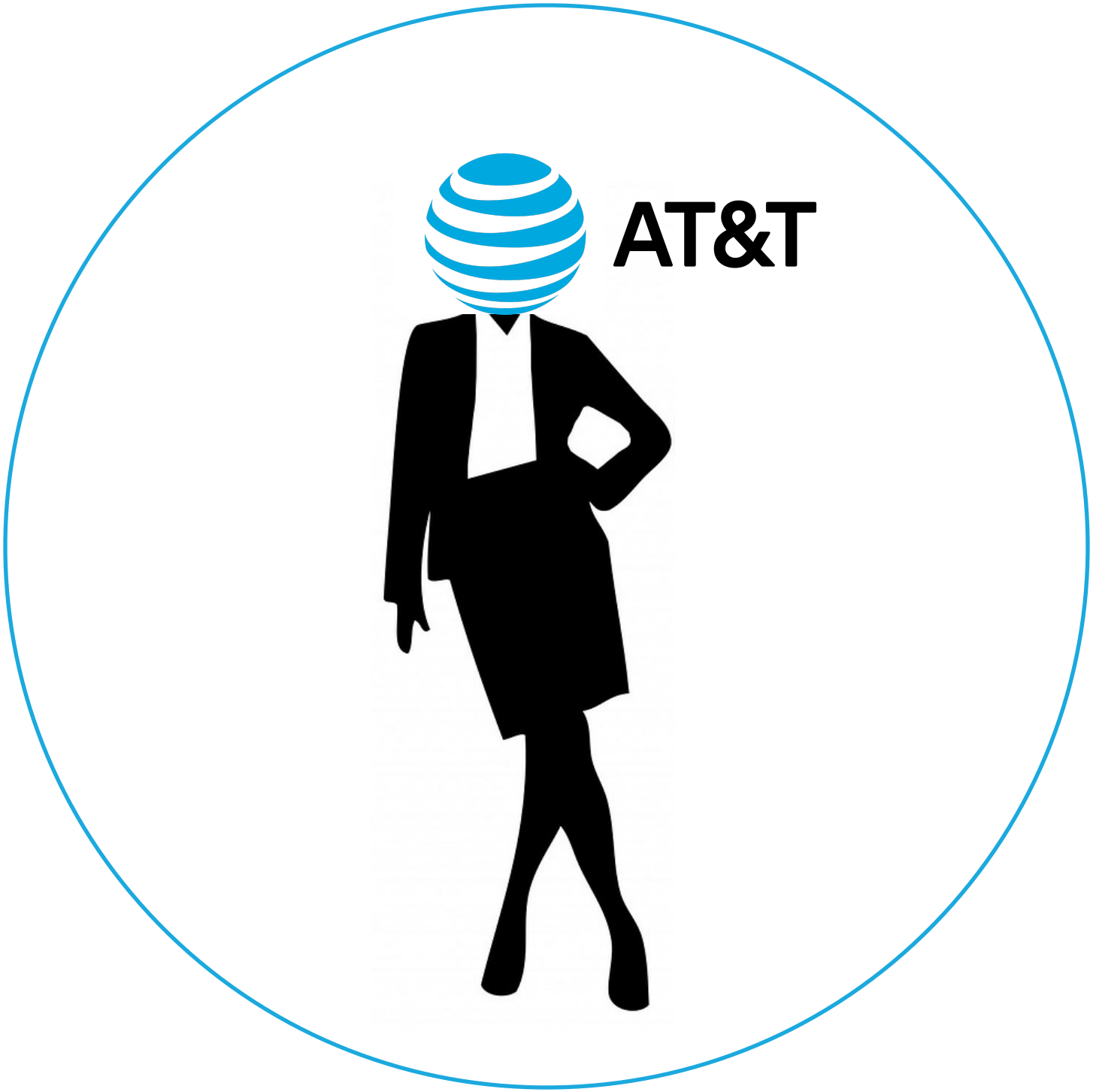

AT&T

AT&T

AT&T is the largest telecommunications provider in the world and the largest DSL provider in the U.S. AT&T has also invested in FTTH, almost entirely in urban areas. This analysis does not include any of AT&T's wireless customers.

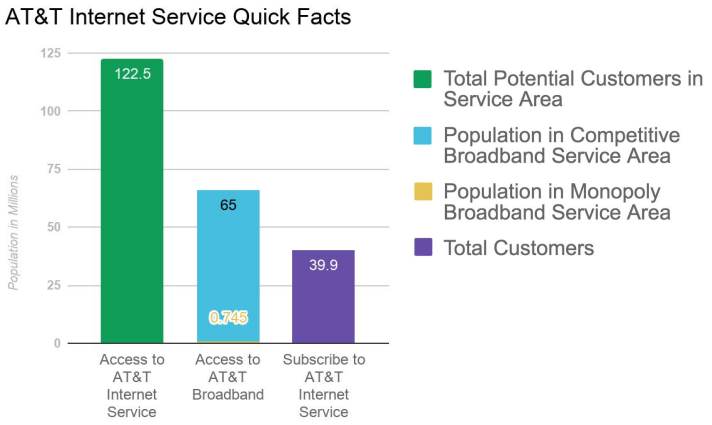
AT&T claims 122.5 million people in 21 states can subscribe to AT&T's residential Internet service.[21] The DSL service area covers 119.9 million people, but the FTTH service area covers 7.8 million people; these service areas overlap.

About 53.7 percent of people (65.8 million) in the total service area have access to broadband-level service through AT&T.[22] Of these people, at least 745 thousand have no other other option for broadband service. The data suggests that AT&T has almost exclusively upgraded its networks to offer broadband-level service only in areas where it faces competition.

Approximately 15.7 million households, or about 39.9 million people, subscribe to Internet service from AT&T (average U.S. household size is 2.54 people) .[23] These households may not actually subscribe to broadband speeds because that speed tier may be unavailable at their address or it may be unaffordable.

According to AT&T's 2017 fourth quarter results, revenue from the Internet division was $1.9 billion and capital expenditure for the entire company, including video and wireless, was $5.1 billion. Annual revenue from the Internet division was approximately $7.6 billion, and the annual capital expenditure for the entire company was about $21.6 billion in 2017.[24]

Through the Connect America Fund, AT&T receives $427.7 million each year from 2015 to 2020 to serve 1.1 million homes and businesses.[25] That is $2.5 billion total. In order to receive this subsidy, AT&T only needs to provide download speeds of 10 Mbps and upload speeds of 1 Mbps — far less than broadband service. AT&T's Internet service subsidized by the Connect America Fund service is quite costly with monthly bandwidth caps.[26]



[21] 122.5 million according to the US 2010 census. Current estimates in 2018 are 119.9 million from BroadbandNow.com, AT&T, https://broadbandnow.com/ATT.

[22] There are some exceptions - for instance apartment buildings that do not allow AT&T to offer services are included in this number because of the problems previously discussed in the data set.

[23] AT&T 4th Quarter Results 2017, https://investors.att.com/financial-reports/quarterly-earnings/2017. And Statista, Average Household Size, https://www.statista.com/statistics/183648/average-size-of-households-in-the-us/.

[24] AT&T is also currently building FirstNet, a network a network which will provide dedicated connectivity for police officers, firefighters, and emergency medical services. AT&T 4th Quarter Results 2017, https://investors.att.com/financial-reports/quarterly-earnings/2017.

[25] FCC Connect America Fund Phase II Funding Carrier State County, https://www.fcc.gov/document/connect-america-fund-phase-ii-funding-carrier-state-and-county.

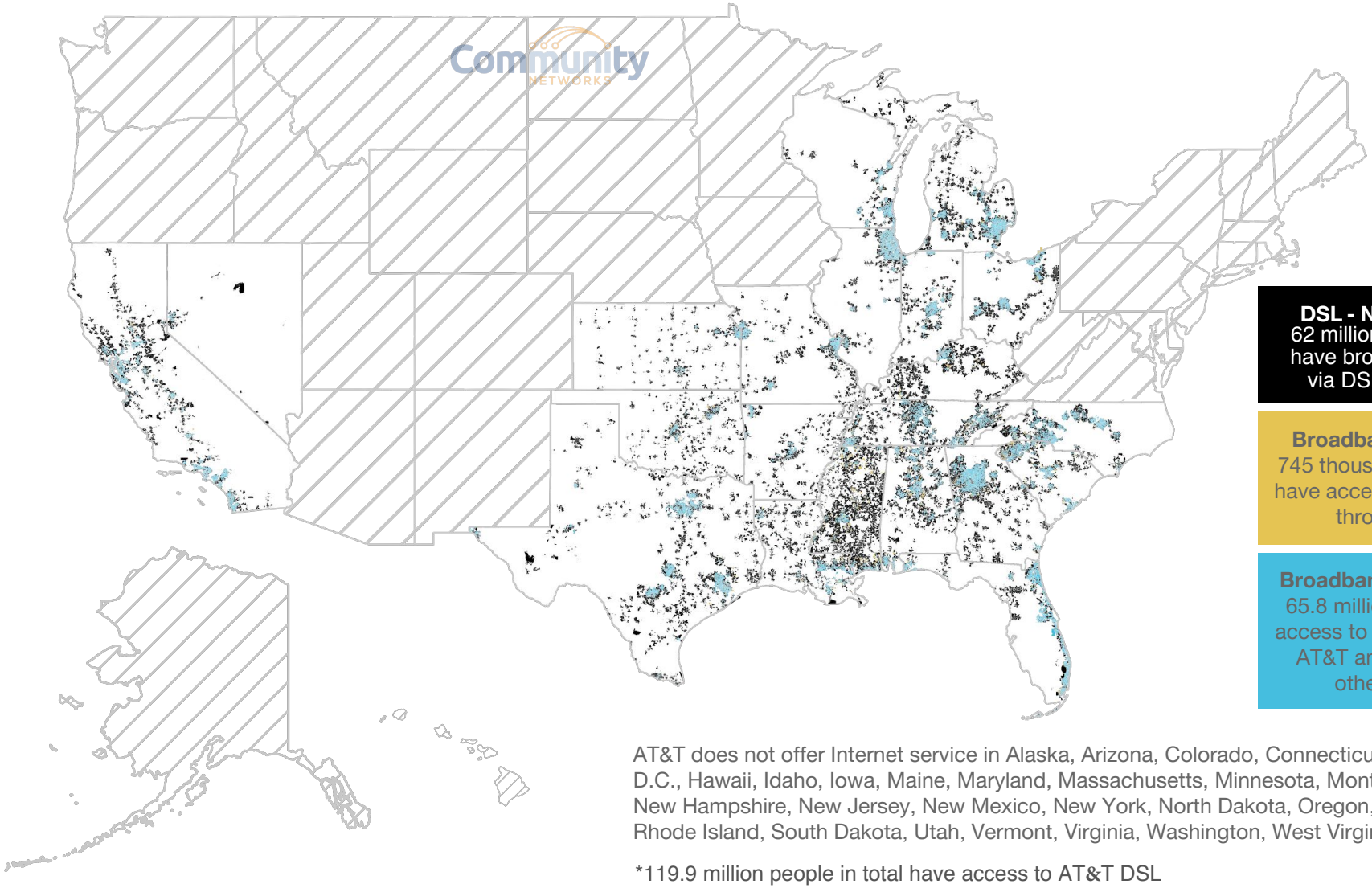
[26] Dawson, "AT&T's CAF II Data Caps," Pots And Pans by CCG Consulting, (July 2017) https://potsandpansbyccg.com/2017/07/13/atts-caf-ii-data-caps/.

AT&T's Captured Customers

AT&T has a widespread DSL network, but many of these DSL customers cannot get broadband (25 Mbps / 3 Mbps).

Read the full report at:
ILSR.org/Monopoly-Networks

Internet customers: 15.7 million households (~39.9 million people)
2017 fourth quarter revenue Internet division: $1.9 billion



DSL - No Broadband
62 million people do not have broadband access via DSL from AT&T*

Broadband Monopoly
745 thousand people only have access to broadband through AT&T

Broadband Competition
65.8 million people have access to broadband from AT&T and at least one other provider

AT&T does not offer Internet service in Alaska, Arizona, Colorado, Connecticut, Delaware, D.C., Hawaii, Idaho, Iowa, Maine, Maryland, Massachusetts, Minnesota, Montana, Nebraska, New Hampshire, New Jersey, New Mexico, New York, North Dakota, Oregon, Pennsylvania, Rhode Island, South Dakota, Utah, Vermont, Virginia, Washington, West Virginia, or Wyoming

*119.9 million people in total have access to AT&T DSL

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Design: H. Trostle, Institute for Local Self-Reliance
Source: FCC Form 477 December 2016 v 1; AT&T 4th Quarter Results 2017
This is a best-case scenario. FCC Form 477 data overstates broadband availability and competition.

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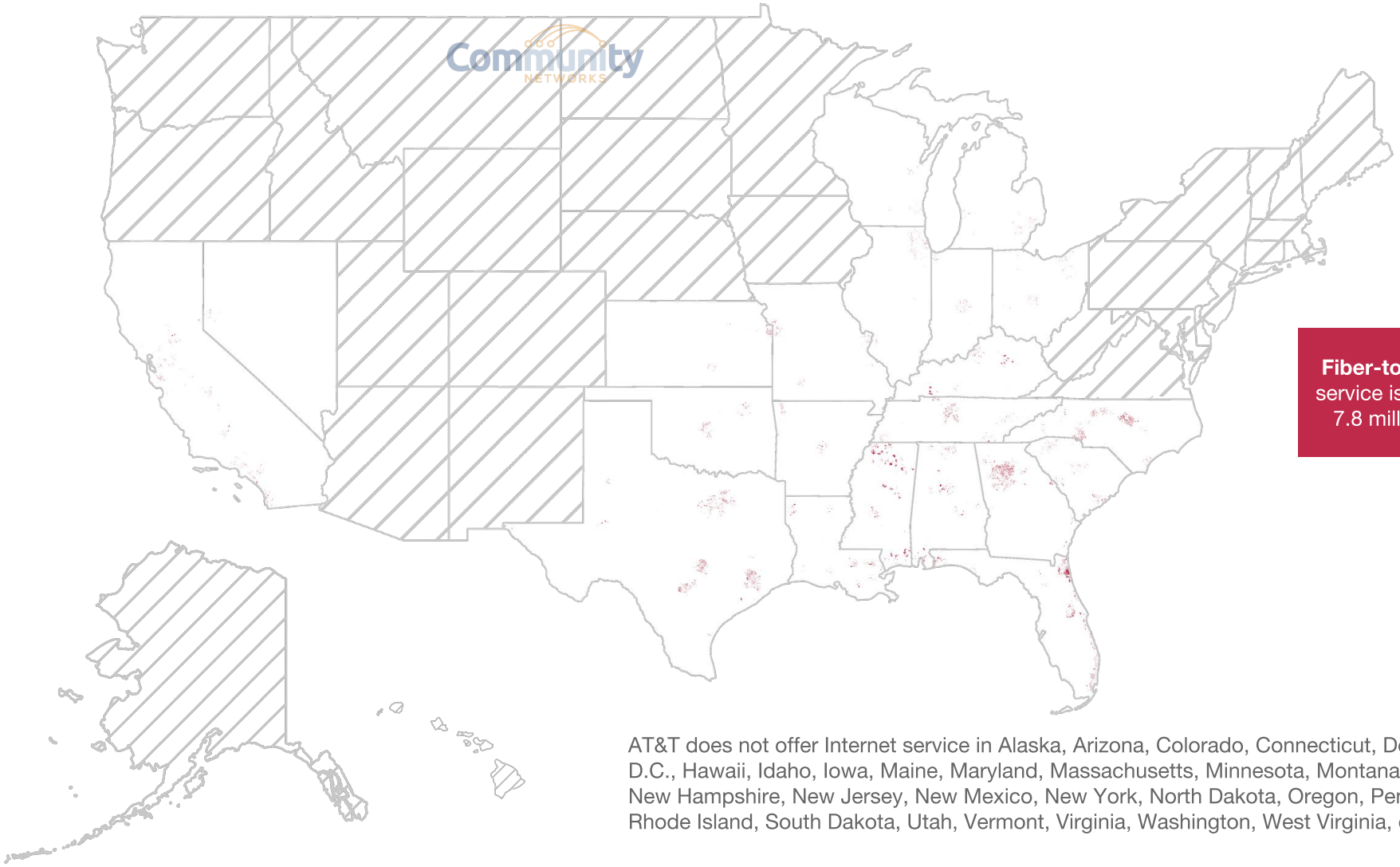
AT&T's Broadband Fiber-to-the-Home

Most investment is concentrated in urban areas.

Read the full report at:
ILSR.org/Monopoly-Networks



Fiber-to-the-Home service is available to 7.8 million people

AT&T does not offer Internet service in Alaska, Arizona, Colorado, Connecticut, Delaware, D.C., Hawaii, Idaho, Iowa, Maine, Maryland, Massachusetts, Minnesota, Montana, Nebraska, New Hampshire, New Jersey, New Mexico, New York, North Dakota, Oregon, Pennsylvania, Rhode Island, South Dakota, Utah, Vermont, Virginia, Washington, West Virginia, or Wyoming

Design: H. Trostle, Institute for Local Self-Reliance
Source: FCC Form 477 December 2016 v 1
This is a best-case scenario. FCC Form 477 data overstates fiber availability.

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verizon

Verizon

Verizon is the 3rd largest DSL provider in the U.S. and has heavily invested in its FTTH FiOS throughout its service area and in areas it has since sold off to Frontier. This analysis does not include any of Verizon's wireless customers.

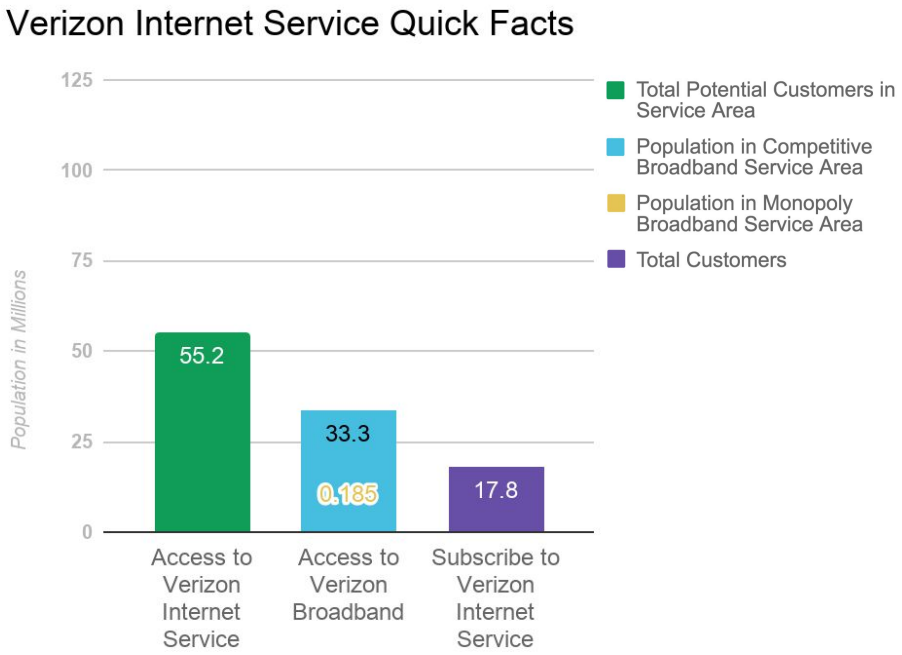
Verizon has reported that approximately 55.2 million people in 9 states and D.C. can subscribe to Verizon's Internet service.[33] The DSL service area covers 47.7 million people, but the FTTH service area covers 33.3 million people; these service areas overlap.

About 60.7 percent of people (33.5 million) in the total service area have access to broadband-level service through Verizon.[34] Approximately 185 thousand people have no other option for broadband service. This means that FiOS has almost exclusively been deployed to areas where it faces cable competition.

Of that population, 7 million households, or about 17.8 million people, subscribe to Internet service from Verizon (average U.S. household size is 2.54 people).[35] These households may not actually subscribe to broadband speeds because that speed tier may be unavailable at their address or it may be unaffordable.

According to Verizon's 2017 fourth quarter results, revenue from the FIOS division was $2.9 billion and the capital expenditure for the FIOS division was about $2 billion. In total in 2017, annual revenue from the Internet division was approximately $11.7 billion, and the annual capital expenditure was about $5.3 billion.[36]

Verizon turned down most Connect America Fund dollars in 2012 and 2015. The areas where Verizon did accept funding, the company sold to Frontier and passed along the Connect America Fund money to Frontier. Verizon has been in the process of selling much of its rural wireline network to competitors.[37]



[33] 55.2 million according to the US 2010 census. Current estimates in 2018 are 47.7 million from BroadbandNow.com, Verizon High Speed Internet, https://broadbandnow.com/Verizon-High-Speed-Internet.

[34] There are some exceptions - for instance apartment buildings that do not allow Verizon to offer services are included in this number because of the problems previously discussed in the data set.

[35] Verizon 4th Quarter Results 2017, http://www.verizon.com/about/investors/quarterly-reports/4q-2017-quarter-earnings-conference-call-webcast.

[36] Verizon 4th Quarter Results 2017, http://www.verizon.com/about/investors/quarterly-reports/4q-2017-quarter-earnings-conference-call-webcast.

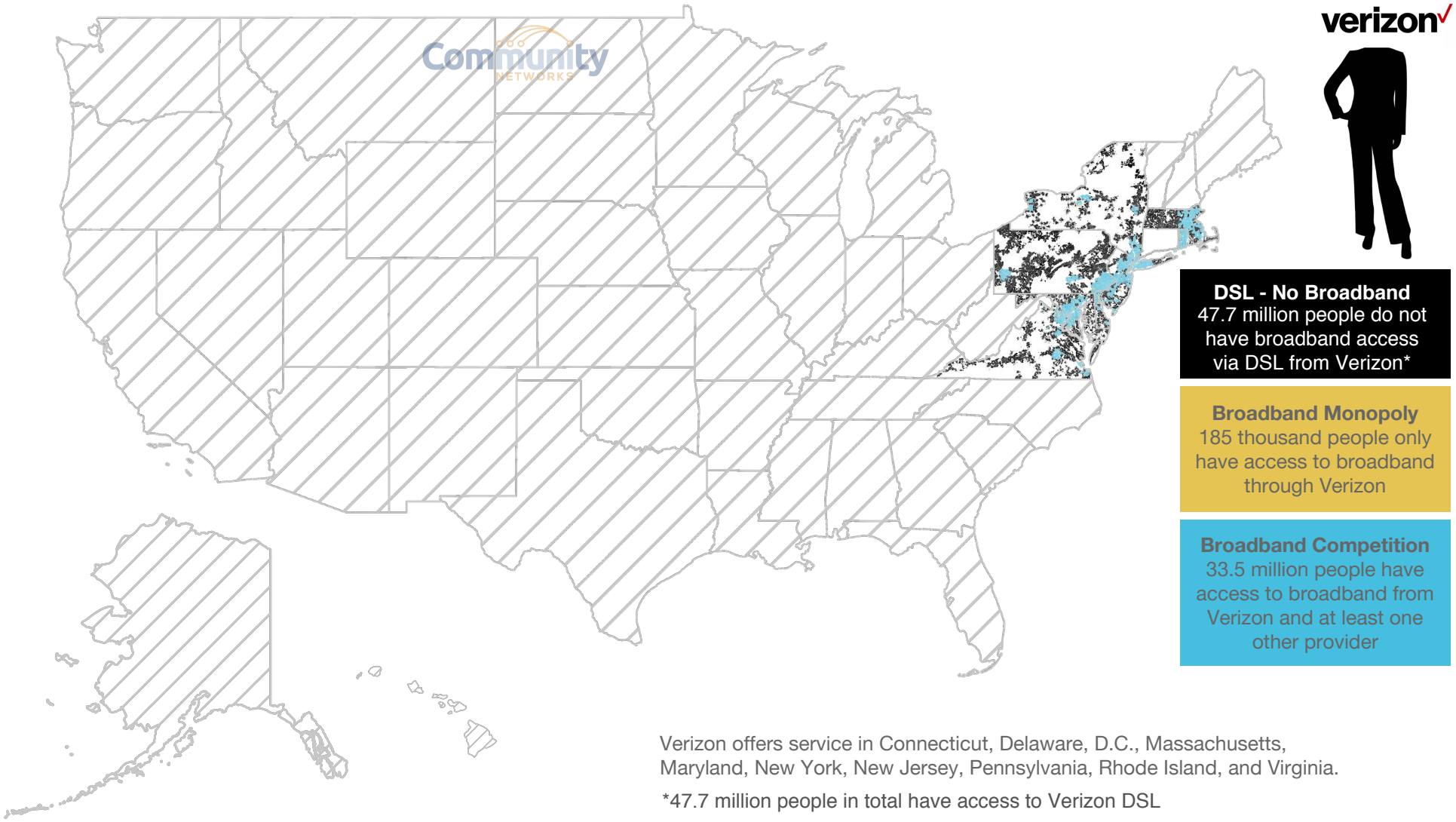
[37] Buckley, "Verizon passes on $144M in CAF II funding as wireline asset sale rumors swirl," Fierce Telecom, (August 2015) https://www.fiercetelecom.com/telecom/verizon-passes-144m-caf-ii-funding-as-wireline-asset-sale-rumors-swirl.

Verizon's Captured Customers

Verizon sold off much of its wireline network to competitors, such as Frontier. Many of Verizon's DSL customers cannot get broadband (25 Mbps / 3 Mbps).

Read the full report at:
ILSR.org/Monopoly-Networks

Internet customers: 7 million households (~17.8 million people)
2017 fourth quarter revenue from Verizon FIOS division: $2.9 billion



Verizon offers service in Connecticut, Delaware, D.C., Massachusetts, Maryland, New York, New Jersey, Pennsylvania, Rhode Island, and Virginia.

*47.7 million people in total have access to Verizon DSL

ILSR INSTITUTE FOR Local Self-Reliance

Design: H. Trostle, Institute for Local Self-Reliance
Source: FCC Form 477 December 2016 v 1; Verizon 4th Quarter Results 2017
This is a best-case scenario. FCC Form 477 data overstates broadband availability and competition.

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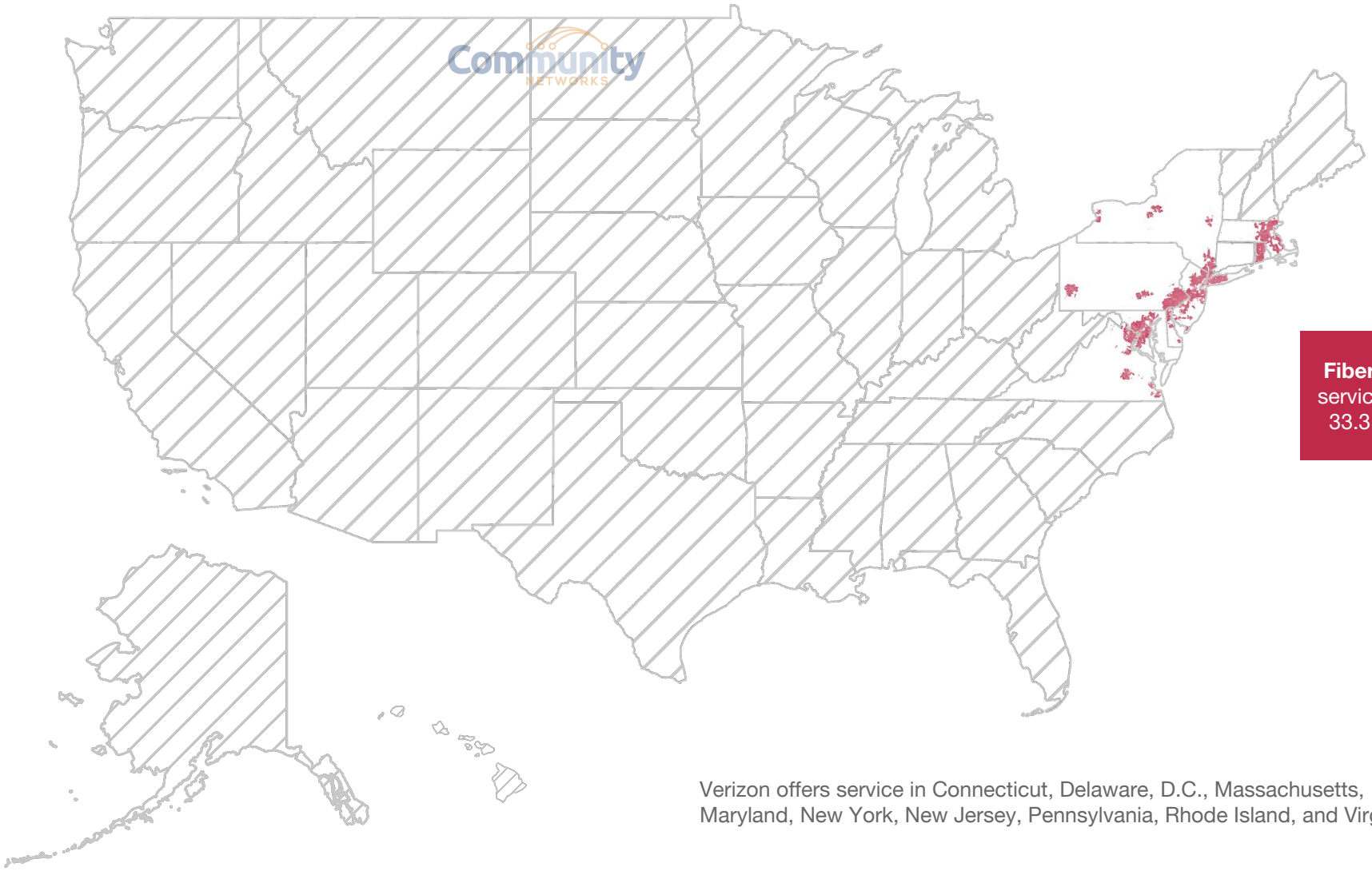
Verizon's Broadband Fiber-to-the-Home

Broadband (25 Mbps/ 3 Mbps) is only available from Verizon on its Fiber-to-the-Home network.

Read the full report at:
ILSR.org/Monopoly-Networks

verizon



Fiber-to-the-Home service is available to 33.3 million people

Verizon offers service in Connecticut, Delaware, D.C., Massachusetts, Maryland, New York, New Jersey, Pennsylvania, Rhode Island, and Virginia

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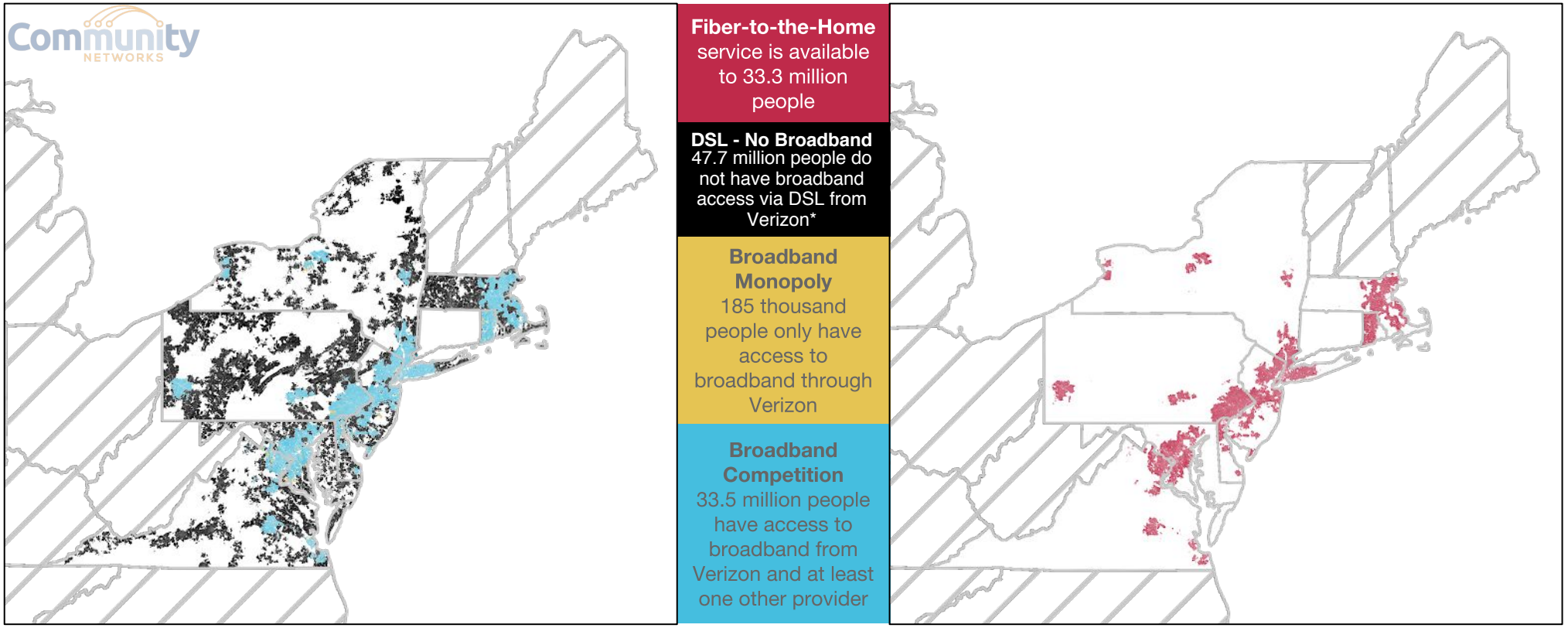
Design: H. Trostle, Institute for Local Self-Reliance
Source: FCC Form 477 December 2016 v 1
This is a best-case scenario. FCC Form 477 data overstates fiber availability.

Verizon's Network

Broadband (25 Mbps/ 3 Mbps) is only available from Verizon on its Fiber-to-the-Home network.
The network is only available in New England and the Mid-Atlantic

Read the full report at:
ILSR.org/Monopoly-Networks



Verizon offers service in Connecticut, Delaware, D.C., Massachusetts, Maryland, New York, New Jersey, Pennsylvania, Rhode Island, and Virginia.

*47.7 million people in total have access to Verizon DSL

Design: H. Trostle, Institute for Local Self-Reliance
Source: FCC Form 477 December 2016 v 1
This is a best-case scenario. FCC Form 477 data overstates fiber availability.

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New York City is pursuing action against Verizon.

Verizon was supposed to deploy FTTH throughout the city by 2014. Many in the city, however, remain without access to this service. Verizon places the blame on landlords: apartment buildings require landlord permission to install fiber. New York City filed suit in 2017. The case is pending.

Read more on Ars Technica:
https://arstechnica.com/information-technology/2018/04/nyc-blasts-broadband-competition-shortage-as-it-pursues-suit-against-verizon/


CenturyLink®

CenturyLink

CenturyLink is the 2nd largest DSL provider in the U.S. and has also invested in FTTH, mainly in urban areas.

According to CenturyLink, roughly 49.1 million people in 39 states can subscribe to CenturyLink's Internet service.[27] The DSL service area covers 48.4 million people, but the FTTH service area covers 3.8 million people; these service areas overlap.

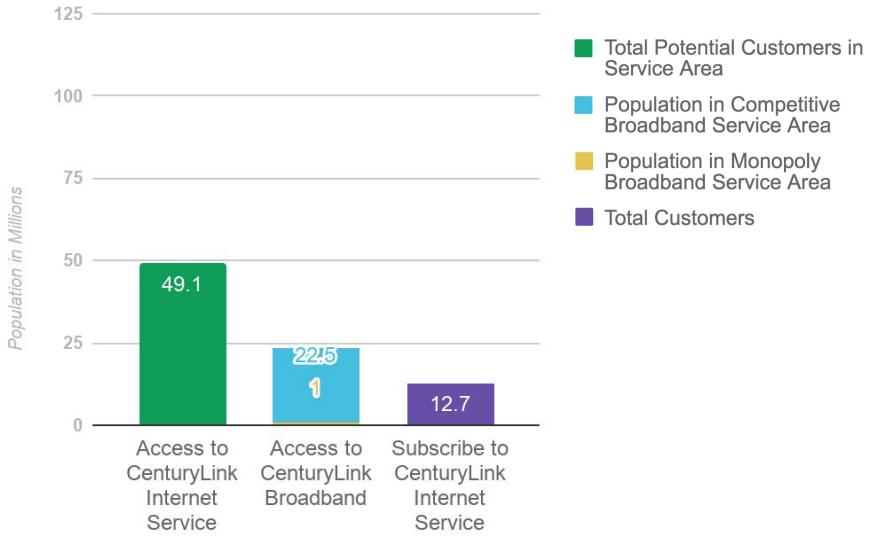
About 47.9 percent of people (23.5 million) in the total service area have access to broadband-level service through CenturyLink[28] and approximately 1 million people have no other option for broadband service. Of the 4 biggest telcos, CenturyLink has the most potential customers that have no other broadband choice, meaning it has invested more in areas without competition, but not by much.

Of that population, 5 million households, or about 12.7 million people, subscribe to Internet service from CenturyLink (average U.S. household size is 2.54 people).[29] These households may not actually subscribe to broadband speeds because that speed tier may be unavailable at their address or it may be unaffordable.
In early 2018, CenturyLink's CFO announced that it would focus less on rural investment to focus on enterprise and urban markets.[30]

According to CenturyLink's 2017 fourth quarter results, revenue from CenturyLink's Internet division was $1.4 billion and capital expenditure for the entire company was $528 million. Annual revenue from the Internet division was approximately $5.7 billion, and the annual capital expenditure was about $2.9 billion in 2017.[31]

Through the Connect America Fund, CenturyLink receives $505.7 million each year from 2015 to 2020 to serve 1.1 million homes and businesses.[32] That is $3 billion total. In order to receive this subsidy, CenturyLink only needs to provide download speeds of 10 Mbps and upload speeds of 1 Mbps — far less than broadband service.

CenturyLink Internet Service Quick Facts



[27] 49.1 million according to the US 2010 census. Current estimates in 2018 are 48.4 million from BroadbandNow.com, CenturyLink, https://broadbandnow.com/CenturyLink.

[28] There are some exceptions - for instance apartment buildings that do not allow CenturyLink to offer services are included in this number because of the problems previously discussed in the data set.

[29] CenturyLink 4th Quarter Results 2017, http://ir.centurylink.com/quarterly-results.
And Statista, Average Household Size, https://www.statista.com/statistics/183648/average-size-of-households-in-the-us/.

[30] Buckley, "CenturyLink's Patel: Broadband expansion will focus on higher speeds, dense areas," Fierce Telecom (January 2018) https://www.fiercetelecom.com/telecom/centurylink-s-patel-broadband-expansion-will-focus-higher-speeds-dense-areas

[31] CenturyLink 4th Quarter Results 2017, http://ir.centurylink.com/quarterly-results.

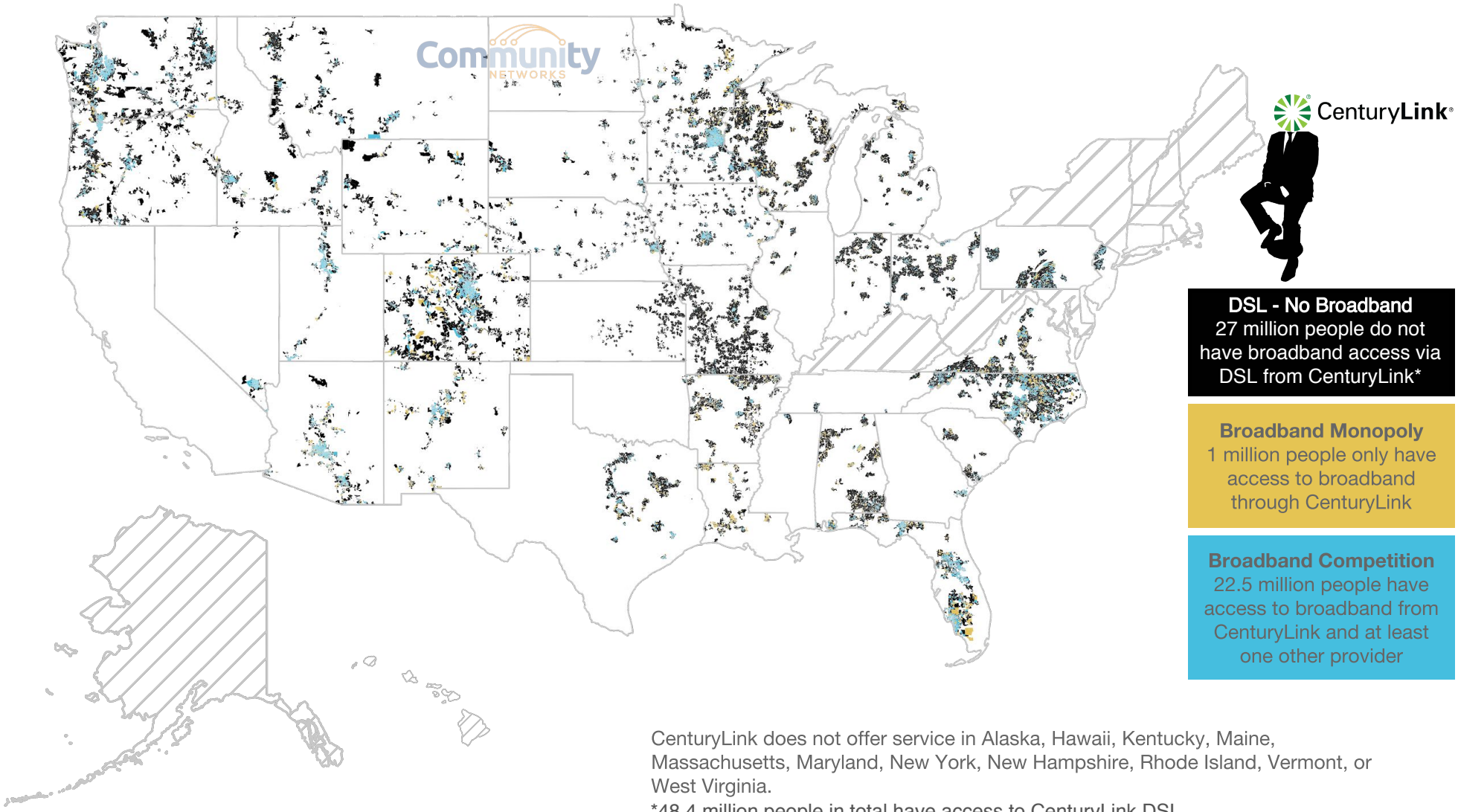
[32] FCC Connect America Fund Phase II Funding Carrier State County, https://www.fcc.gov/document/connect-america-fund-phase-ii-funding-carrier-state-and-county.

CenturyLink's Captured Customers

CenturyLink has a widespread DSL network, but many of these DSL customers cannot get broadband (25 Mbps / 3 Mbps).

Read the full report at:
ILSR.org/Monopoly-Networks

Internet customers: 5 million households (~12.7 million people)
2017 fourth quarter revenue from consumer division: $1.4 billion



DSL - No Broadband
27 million people do not have broadband access via DSL from CenturyLink*

Broadband Monopoly
1 million people only have access to broadband through CenturyLink

Broadband Competition
22.5 million people have access to broadband from CenturyLink and at least one other provider

CenturyLink does not offer service in Alaska, Hawaii, Kentucky, Maine, Massachusetts, Maryland, New York, New Hampshire, Rhode Island, Vermont, or West Virginia.
*48.4 million people in total have access to CenturyLink DSL

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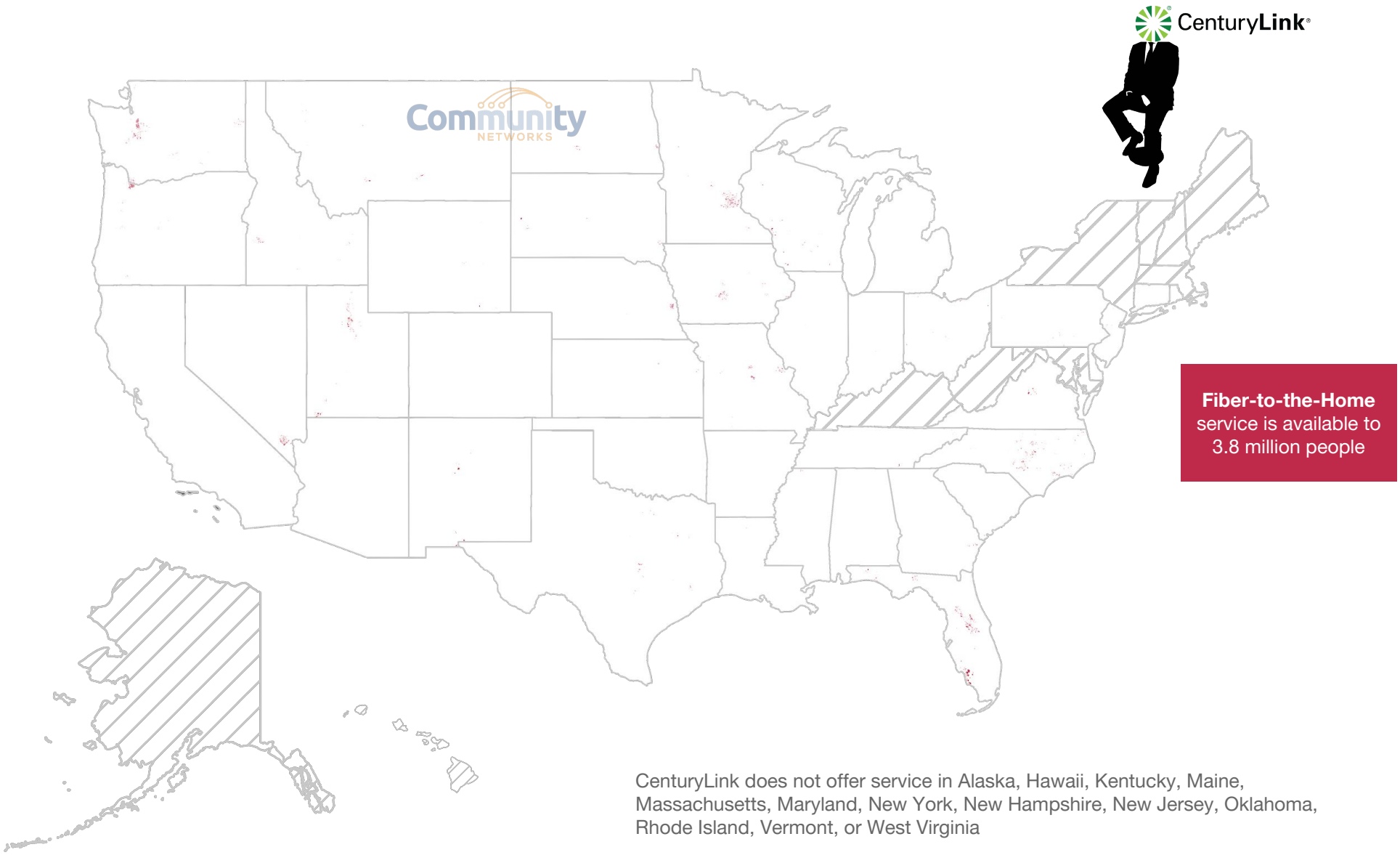
Design: H. Trostle, Institute for Local Self-Reliance
Source: FCC Form 477 December 2016 v 1; **CenturyLink 4th Quarter Results 2017**
This is a best-case scenario. FCC Form 477 data overstates broadband availability and competition.

MuniNetworks.org

CenturyLink's Broadband Fiber-to-the-Home

CenturyLink primarily invests in Fiber-to-the-Home in urban areas.

Read the full report at:
ILSR.org/Monopoly-Networks



Fiber-to-the-Home service is available to 3.8 million people

CenturyLink does not offer service in Alaska, Hawaii, Kentucky, Maine, Massachusetts, Maryland, New York, New Hampshire, New Jersey, Oklahoma, Rhode Island, Vermont, or West Virginia

Design: H. Trostle, Institute for Local Self-Reliance
Source: FCC Form 477 December 2016 v 1
This is a best-case scenario. FCC Form 477 data overstates fiber availability.

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Frontier
COMMUNICATIONS

Frontier

Frontier is the 4th largest DSL provider in the U.S. Frontier has some FTTH in urban areas, mostly due to its FiOS acquisition from Verizon.

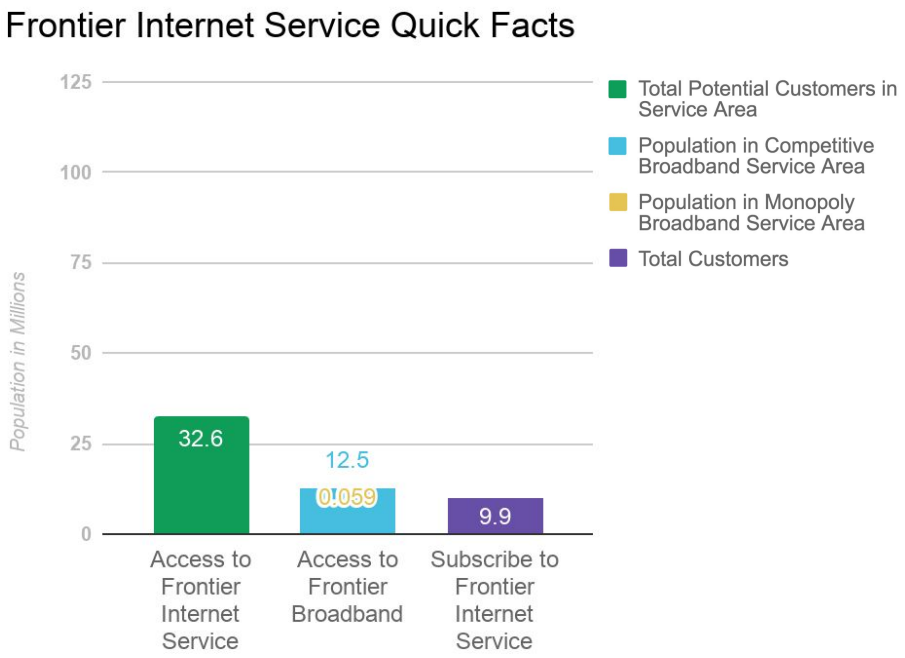
Per Frontier, approximately 32.6 million people in 29 states can subscribe to Frontier's Internet service.[38] The DSL service area covers 30 million, but the FTTH service area covers 10 million; these service areas overlap.

About 38.7 percent of people (12.6 million) in this service area have access to broadband-level service through Frontier.[39] Approximately 59 thousand people have no other option for broadband service. These data suggest that Frontier has invested in faster services almost solely where it faces competition and not in more rural areas.

Approximately 3.9 million households, or about 9.9 million people, subscribe to Internet service from Frontier (average U.S. household size is 2.54 people) .[40] These households may not actually subscribe to broadband speeds because that speed tier may be unavailable at their address or it may be unaffordable.

According to the 2017 fourth quarter results, revenue from the Internet division was $1 billion and capital expenditure for the entire company was $308 million. Annual revenue from the Internet division was approximately $4.5 billion, and the annual capital expenditure was about $1.2 billion in 2017.[41]

Through the Connect America Fund, Frontier receives $238.4 million each year from 2015 to 2020 to serve about 660 thousand homes and businesses.[42] That is $1.4 billion total. In order to receive this subsidy, Frontier only needs to provide download speeds of 10 Mbps and upload speeds of 1 Mbps — far less than broadband service.



[38] 32.6 million according to the US 2010 census. Current estimates in 2018 are 30 million from BroadbandNow.com, Frontier Communications, https://broadbandnow.com/Frontier-Communications.

[39] There are some exceptions - for instance apartment buildings that do not allow Frontier to offer services are included in this number because of the problems previously discussed in the data set.

[40] Frontier 4th Quarter Results 2017, http://investor.frontier.com/financial-information.
And Statista, Average Household Size, https://www.statista.com/statistics/183648/average-size-of-households-in-the-us/.

[41] Frontier 4th Quarter Results 2017, http://investor.frontier.com/financial-information.

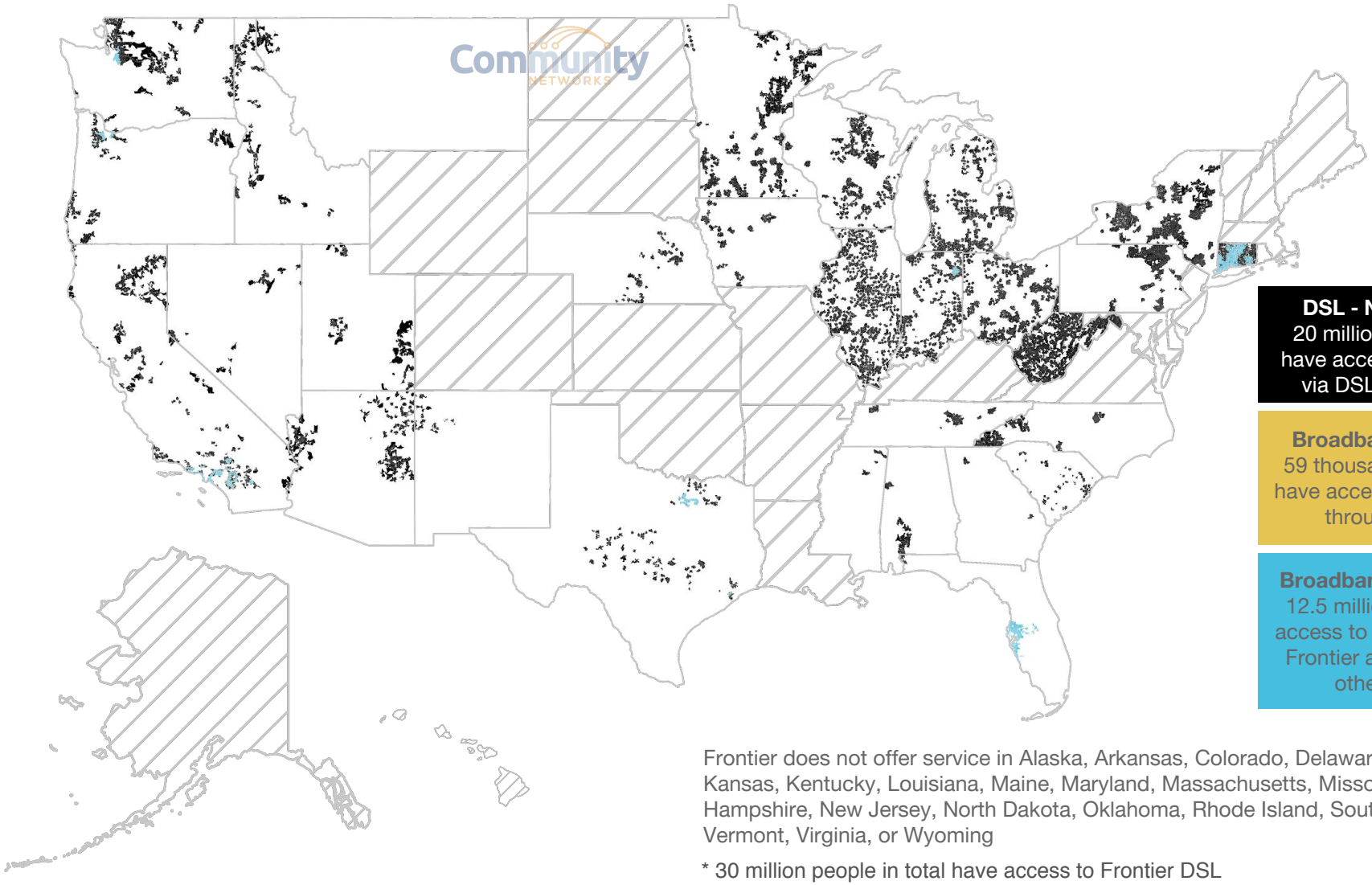
[42] FCC Connect America Fund Phase II Funding Carrier State County, https://www.fcc.gov/document/connect-america-fund-phase-ii-funding-carrier-state-and-county.

Frontier's Captured Customers

Frontier has a widespread DSL network, but many of these DSL customers cannot get broadband (25 Mbps / 3 Mbps).

Read the full report at:
ILSR.org/Monopoly-Networks

Internet customers: 3.9 million households (~9.9 million people)
2017 fourth quarter revenue from consumer division: $1 billion



DSL - No Broadband
20 million people do not have access to broadband via DSL from Frontier*

Broadband Monopoly
59 thousand people only have access to broadband through Frontier

Broadband Competition
12.5 million people have access to broadband from Frontier and at least one other provider

Frontier does not offer service in Alaska, Arkansas, Colorado, Delaware, D.C., Hawaii, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Missouri, New Hampshire, New Jersey, North Dakota, Oklahoma, Rhode Island, South Dakota, Vermont, Virginia, or Wyoming

* 30 million people in total have access to Frontier DSL

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Design: H. Trostle, Institute for Local Self-Reliance
Source: FCC Form 477 December 2016 v 1; Frontier 4th Quarter Results 2017
This is a best-case scenario. FCC Form 477 data overstates broadband availability and competition.

MuniNetworks.org

Frontier's Fiber-to-the-Home Broadband

Frontier bought most of its fiber networks from Verizon.

Read the full report at:
ILSR.org/Monopoly-Networks

Fiber-to-the-Home service is available to 10 million people

Frontier does not offer service in Alaska, Arkansas, Colorado, Delaware, D.C., Hawaii, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Missouri, New Hampshire, New Jersey, North Dakota, Oklahoma, Rhode Island, South Dakota, Vermont, Virginia, or Wyoming

Design: H. Trostle, Institute for Local Self-Reliance
Source: FCC Form 477 December 2016 v 1
This is a best-case scenario. FCC Form 477 data overstates fiber availability.

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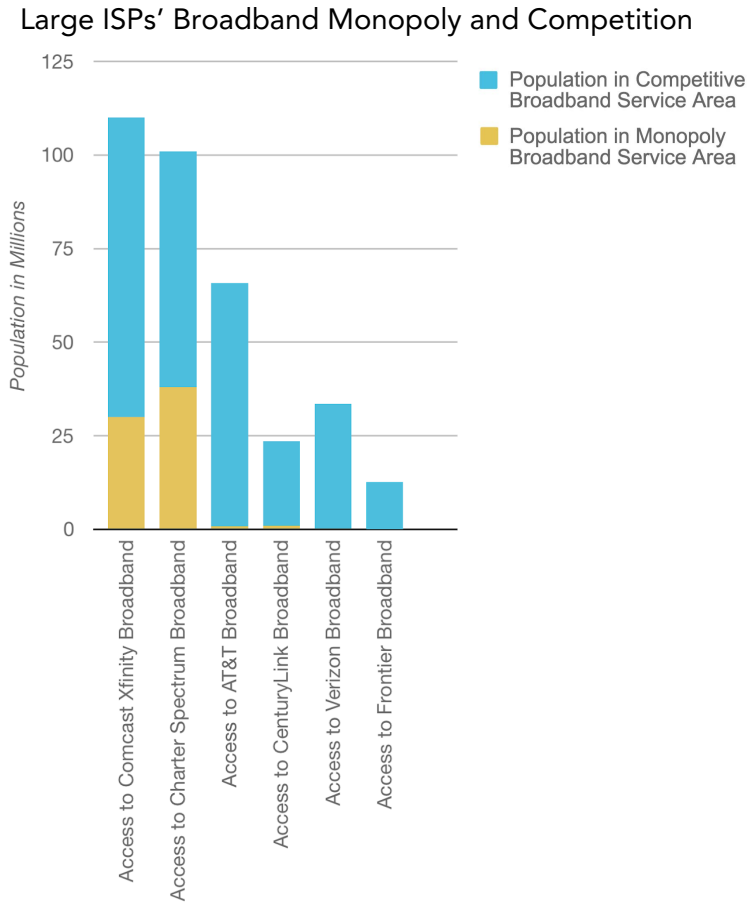
Conclusion

The broadband market is broken. Comcast and Charter maintain a monopoly over 68 million people. Some 48 million households (about 122 million people) subscribe to these cable companies, whereas the four largest telecom companies combined have far fewer subscribers — only 31.6 million households (about 80.3 million people). The big telecom companies have largely abandoned rural america — their DSL networks overwhelmingly do not support broadband speeds — despite years of federal subsidies and many state grant programs.



These are our key findings with potential for more research:

- *Real Competition Drives Investment*
  The telecom companies have invested in Fiber-to-the-Home in areas where they face competition, which are generally more urban areas. The advent of Google Fiber in 2011 further increased the competition in urban markets.[43] Efforts to increase investment from the largest firms in more rural areas have largely failed. Though states have varied regulations, the same trend results in every state — investment by the large ISPs is correlated to competition rather than the regulatory environment. This reality does not suggest that competition between a cable monopoly and a telephone monopoly is sufficient for high-quality Internet access, but it clearly helps to ensure connections at the minimum definition of broadband.

- *Big Cable Companies Dominate*
  These networks are capable of delivering high-speed broadband to everyone within their service area, a legacy of the local franchising requirements that often required universal service or at least service to all areas with a specified density of housing.[44] More than half of the states have since removed local authority to negotiate such

[43] Google Fiber is available in several cities, including Kansas City, Missouri; Nashville, Tennessee; and Austin, Texas. https://fiber.google.com/newcities/ See also, Karsten and West, "Google Fiber, Competition, and Broadband for All," Brookings.edu (March 2016) https://www.brookings.edu/blog/techtank/2016/03/22/google-fiber-competition-and-affordable-broadband-for-all/.

[44] These cable networks are much better at providing high-speed downloads than uploads, but speeds in both directions tend to far greater than those available from DSL.

provisions but they bear some responsibility for the far-reaching cable networks.

- *Big Cable and Telecom Focus on Urban Markets*
  The big cable and telecom companies fight over urban customers, not rural customers. About 98 percent of the urban population (254 million people) have access to broadband.[45] About 5 million urban residents, however, remain without broadband access. In rural areas, only 69 percent of the population (43.6 million people) have broadband access, leaving 19.3 million rural residents without high-speed Internet access.

Moving Forward

These profiles in our report show the tremendous influence the large telecom and cable companies have in the broadband market. The visuals and maps explore each company's reach and offer some clues as to how national policies have an impact on local broadband markets.

Public data on broadband deployment in the U.S. is deeply flawed and may push policymakers to misunderstand the true problems in broadband access across the nation. We are torn as to whether the Form 477 data is even worth collecting given the challenge smaller providers face in completing the paperwork. We can only imagine the frustration small ISPs must have in paying these compliance costs to produce such flawed data. With modern technology, it should be trivial to develop a process that is easy for ISPs to use and less likely for monopoly ISPs to game, but we have not found a single person with deep knowledge of the FCC that believes it will happen in the near future. We would love to see a talented group of programmers develop a solution to shame the FCC into improving its process.

[45]FCC 2018 Broadband Deployment Report, Appendix D, (February 2018) https://www.fcc.gov/reports-research/reports/broadband-progress-reports/2018-broadband-deployment-report.

The big four phone companies offer FTTH service to some areas of some urban areas, but only FiOS (some still owned by Verizon, some sold to Frontier) approaches ubiquitous coverage of some communities. Future research should focus on where within each city these large providers have brought Fiber-to-the-Home service. The 2017 report, "AT&T's Digital Divide in California" from the Haas Institute for a Fair and Inclusive Society at UC Berkeley offers a model for this investigation, highlighting how AT&T has invested in Fiber-to-the-Home in mostly higher-income neighborhoods throughout California while leaving the low-income communities on slow DSL.[46]

Furthermore, this research on the big telcos highlights the failed strategy of the Connect America Fund. Some articles and small studies have begun to examine whether the Connect America Fund is improving Internet access to a reasonable level. See the recent report from Blandin Foundation: "Impact of CAF II-funded Networks: Lessons From Two Rural Exchanges Left Underserved."[47] We predict the vast majority of households touched by the Connect America Fund will rapidly need another large subsidy to achieve high-quality Internet access.

Rural areas may do better to look elsewhere for improved broadband service. Our 2017 policy brief, "Cooperatives Fiberize Rural America: A Trusted Model for the Internet Era," explores the role of electric and telephone cooperatives in providing broadband service.[48] Small

[46] Strain, Moore, and Gambhir, "AT&T's Digital Divide in California: An Analysis of AT&T Fiber Deployment and Wireline Broadband Speeds in California," (2017) https://haasinstitute.berkeley.edu/atts-digital-divide-california.
[47] Coleman, "Impact of CAF II-funded Networks: Lessons From Two Rural Exchanges Left Underserved," Blandin Foundation, (June 2018) https://blandinfoundation.org/content/uploads/Impact-of-CAF-II-funded-Networks_WEB.pdf.
[48] Trostle and Mitchell, Cooperatives Fiberize Rural America: A Trusted Model for the Internet Era," Institute for Local Self-Reliance, (November

towns may need to look to their city councils or municipal electric utilities to explore ways of improving high-speed Internet service.

Many cities and small towns across the U.S. have already improved their communities' Internet service options by building their own networks. This new competition can encourage the incumbent provider, whether a cable or telecom company, to offer better service and rates. A 2017 Pew Research Center report found that 70 percent of the public believe that local governments should be able to invest in better Internet infrastructure.[49] About 20 states, however, have erected barriers to these municipally owned networks.[50]

These preemption laws have been on the books for many years, but have only served to discourage investment by preventing competition. Residents in Colorado must vote in a referendum before their city council can build a municipal network. Almost 120 Colorado communities have already voted to enable their city councils to explore all the options for better Internet service.[51] North Carolina's ban on municipal networks is forcing at least one small town to disconnect from a FTTH network, due to state lawmakers' alliance with the cable industry.[52]

The fact is, the large providers, such as Comcast and AT&T, have not answered the digital divide. Communities must find their own way, whether be working in partnership with local ISPs, cooperatives, or building their own community networks.

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[49] Olmstead, Anderson, and Horrigan, "Americans have mixed views on policies encouraging broadband adoption," Pew Research Center (April 2017) http://www.pewresearch.org/fact-tank/2017/04/10/americans-have-mixed-views-on-policies-encouraging-broadband-adoption/

[50] Baller, Stokes, and Lide, "State restrictions on community broadband services or other public communications initiatives," Baller Stokes & Lide (January 2018) http://www.baller.com/wp-content/uploads/BallerStokesLideStateBarriers1-1-18.pdf

[51] The law is called SB 152, and many communities vote each year to restore local authority. "SB 152," MuniNetworks.org https://muninetworks.org/tags/tags/sb-152.

[52] For more on Pinetops, North Carolina, read the MuniNetworks coverage, "Pinetops," MuniNetworks.org https://muninetworks.org/tags/tags/pinetops.

Resources

MuniNetworks
The Institute for Local Self-Reliance's Community Broadband Initiative creates a daily digest of stories on locally rooted, community networks across the country. The Initiative also produces fact sheets, videos, and policy briefs on the community network movement. MuniNetworks.org

Next Century Cities
185 cities are members of this organization that advocates for better Internet service and affordable solutions. NextCenturyCities.org

Coalition for Local Internet Choice
This collaboration of public and private organizations promotes local authority in improving connectivity. LocalNetChoice.org

Open Technology Institute
The New America Foundation's Open Technology Institute considers the intersection of technology, policy, and research. NewAmerica.org/OTI/

Fiber Film Fest
This curated collection of videos and documentaries explores issues related to Internet access and community networks. It features *Dividing Lines,* a four-part documentary series by Maria Smith, and *"Do Not Pass Go" from Hyrax Films, a* short film by Cullen Hoback. FiberFilmFestival.com/

Broadband Communities
This organization produces the Broadband Communities Magazine, and hosts conferences on key issues, such as economic development. http://www.bbpmag.com/

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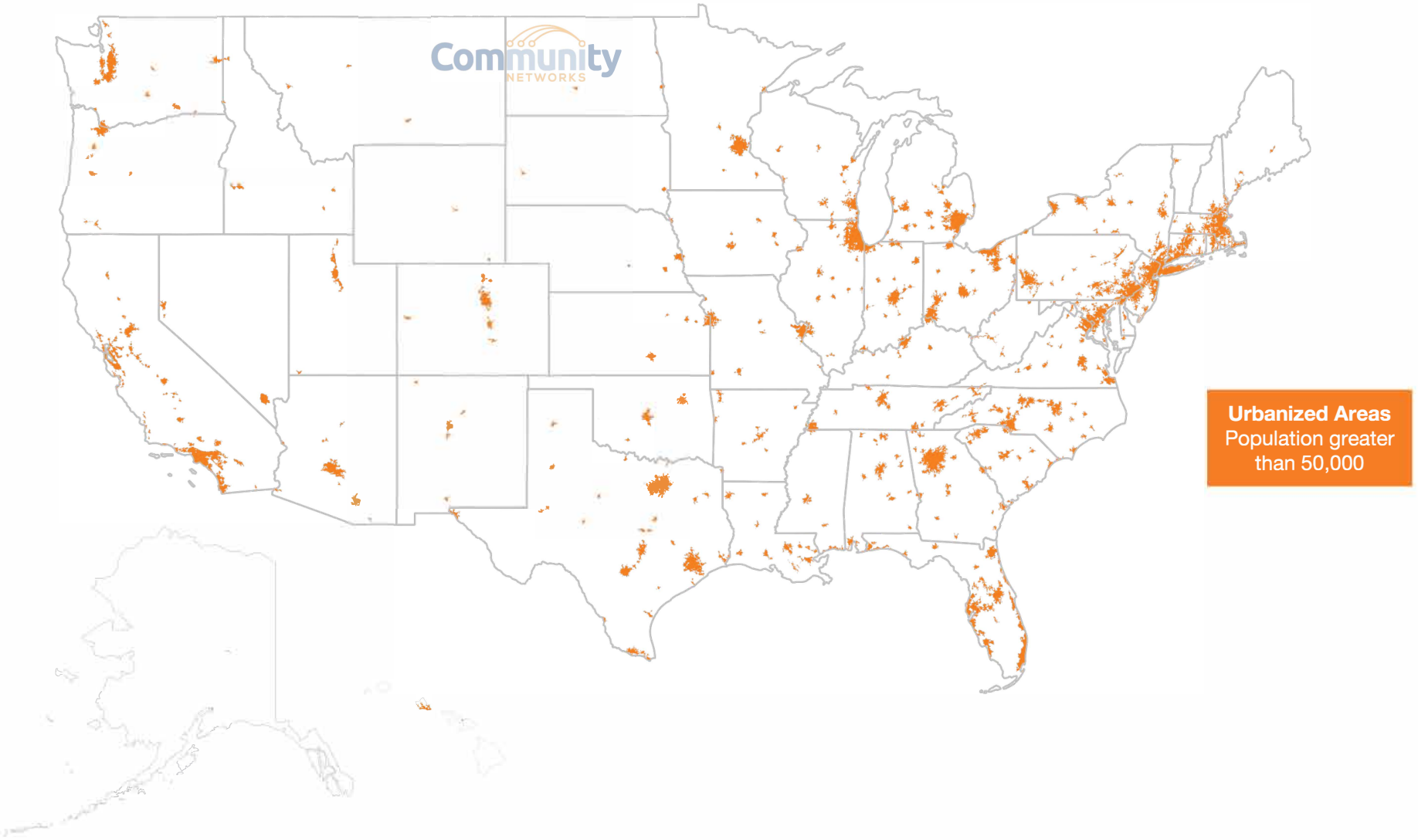
2016 Urban Areas in the U.S.

This map highlights urbanized areas with a population greater than 50,000.

Read the full report at:
ILSR.org/Monopoly-Networks



Design: H. Trostle, Institute for Local Self-Reliance
Source: U.S. Census. 2016 Urban Areas.
Definition of urban: Berg. "U.S. Urban Population Is Up ... But What Does 'Urban' Really Mean?" CityLab. March 2012

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Appendix B: Summary Table for Large ISPs

ISP	Access to Internet Service *(millions)*	Access to Broadband 25 Mbps / 3 Mbps Service *(millions)*	Access to FTTH *(millions)*	Access to DSL *(millions)*	Subscribers *(millions)*	2017 4th Quarter Revenue *(billions)*
Comcast	110	Total: 110 Monopoly: 30 Competitive: 80	N/A	N/A	Population: 64.8 Households: 25.5	$3.8
Charter	101	Total: 101 Monopoly: 38 Competitive: 63	N/A	N/A	Population: 57.2 Households: 22.5	$3.6
AT&T	122.5	Total: 65.8 Monopoly: 0.745 Competitive: 65	7.8	119.9	Population: 39.9 Households: 15.7	$1.9
CenturyLink	49.1	Total: 23.5 Monopoly: 1 Competitive: 22.5	3.8	48.4	Population: 12.7 Households: 5	$1.4
Verizon	55.2	Total: 33.5 Monopoly: 0.185 Competitive: 33.5	33.3	47.7	Population: 17.8 Households: 7	$2.9
Frontier	32.6	Total: 12.6 Monopoly: 0.059 Competitive: 12.5	10	30	Population: 9.9 Households: 3.9	$1

All populations are approximate and based on 2010 census data.
This is a best-case scenario based on the December 2016 FCC Form 477.

Appendix C: Urban-Rural Summary of Large ISPs' Monopoly and Competitive Service Areas

ISP	Population in Monopoly Service Area *(millions)*	Population in Competitive Service Area *(millions)*
Comcast	Total: 30 Urban: 25.7 Rural: 4.7	Total: 80 Urban: 76 Rural: 4
Charter	Total: 38 Urban: 29.3 Rural: 8.6	Total: 63 Urban: 58.9 Rural: 4.5
AT&T	Total: 0.745 Urban: 0.498 Rural: 0.247	Total: 65 Urban: 53.2 Rural: 1.8
CenturyLink	Total: 1 Urban: 0.647 Rural: 0.367	Total: 22.5 Urban: 20.6 Rural: 1.9
Verizon	Total: 0.185 Urban: 0.158 Rural: 0.027	Total: 33.5 Urban: 0.839 Rural: 32.5
Frontier	Total: 0.059 Urban: .042 Rural: .017	Total: 12.5 Urban: 12.2 Rural: 0.282

All populations are approximate and based on 2010 census data.
This is a best-case scenario based on the December 2016 FCC Form 477.

Appendix D: Summary of Large ISPs' Annual Revenue and Capital Expenditures

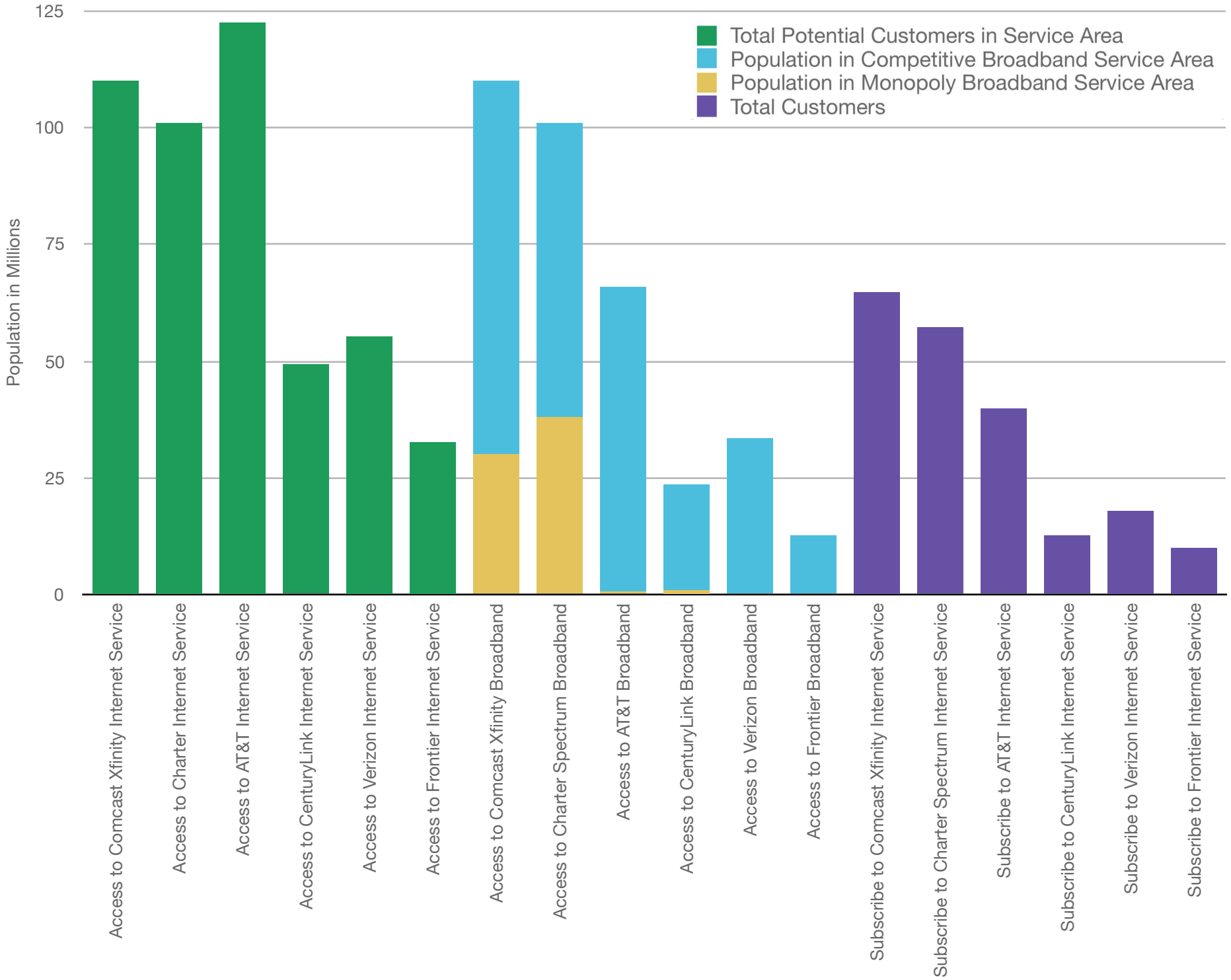
ISP	2017 4th Quarter Revenue from Internet Division *(billions)*	2017 4th Quarter Capital Expenditure *(billions)*	2017 Annual Revenue from Internet Division *(billions)*	2017 Annual Capital Expenditure *(billions)*
Comcast	3.8	2.1	14.8	8.0
Charter	3.6	2.6	14.1	8.7
AT&T	1.9	*5.1**	7.6	*21.6**
CenturyLink	1.4	*.528***	5.7	*2.9***
Verizon	2.9	2	11.7	5.3
Frontier	1	.308	4.5	1.2

**For the entire company of AT&T, including mobile wireless and video offerings. AT&T is currently building FirstNet, a network which will provide dedicated connectivity for police officers, firefighters, and emergency medical services.*

***For the entire company of CenturyLink, excluding the Level 3 acquisition*

These numbers are based on the 4th Quarter Reports from the providers.

Appendix E: Summary of Large ISPs Quick Facts

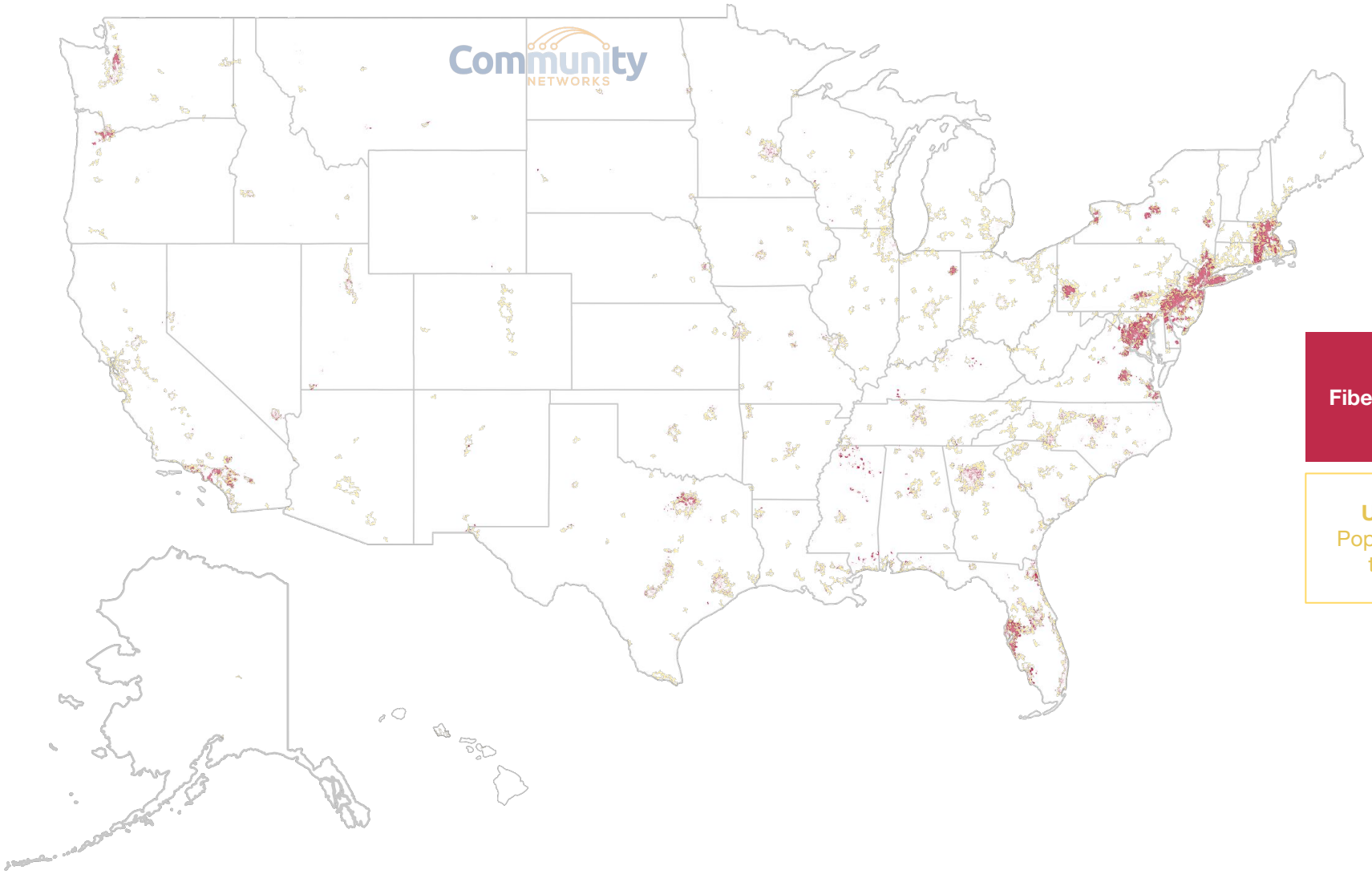


Appendix F: FTTH Aggregate

Fiber-to-the-Home from BigTelecom

AT&T, CenturyLink, Verizon, and Frontier have invested in Fiber-to-the-Home in select urban areas

Read the full report at:
ILSR.org/Monopoly-Networks



Fiber-to-the-Home

Urban Areas
Population greater than 50,000

Design: H. Trostle, Institute for Local Self-Reliance
Source: FCC Form 477 December 2016 v 1
This is a best-case scenario. FCC Form 477 data overstates broadband availability and competition.

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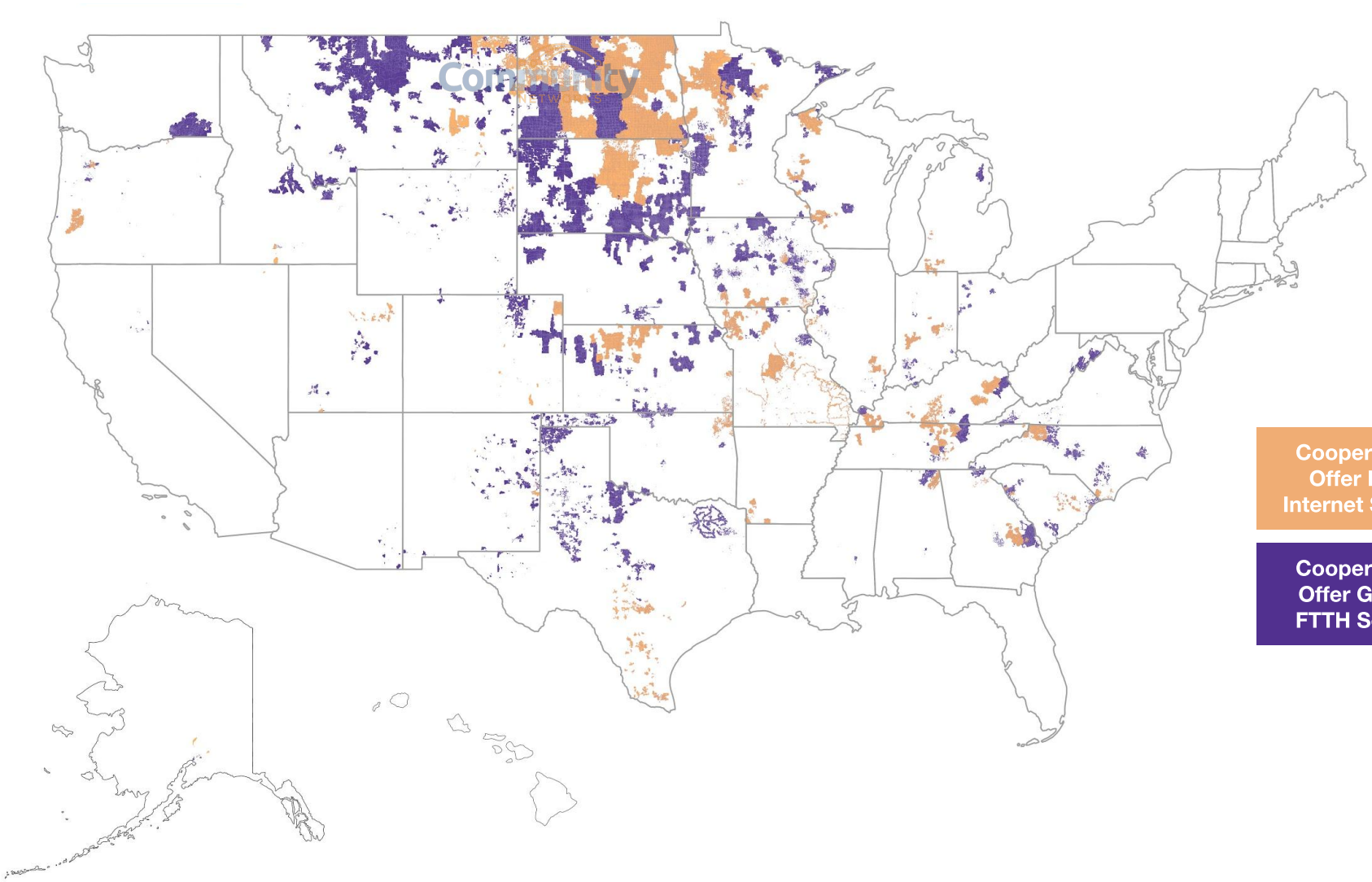
Fiber Networks from Cooperatives

Rural telephone and electric cooperatives have built next-generation networks.

Read the full report at:
ILSR.org/Monopoly-Networks



Design: H. Trostle, Institute for Local Self-Reliance
Source: FCC Form 477 December 2016 v 1
This is a best-case scenario. FCC Form 477 data overstates broadband availability and competition.

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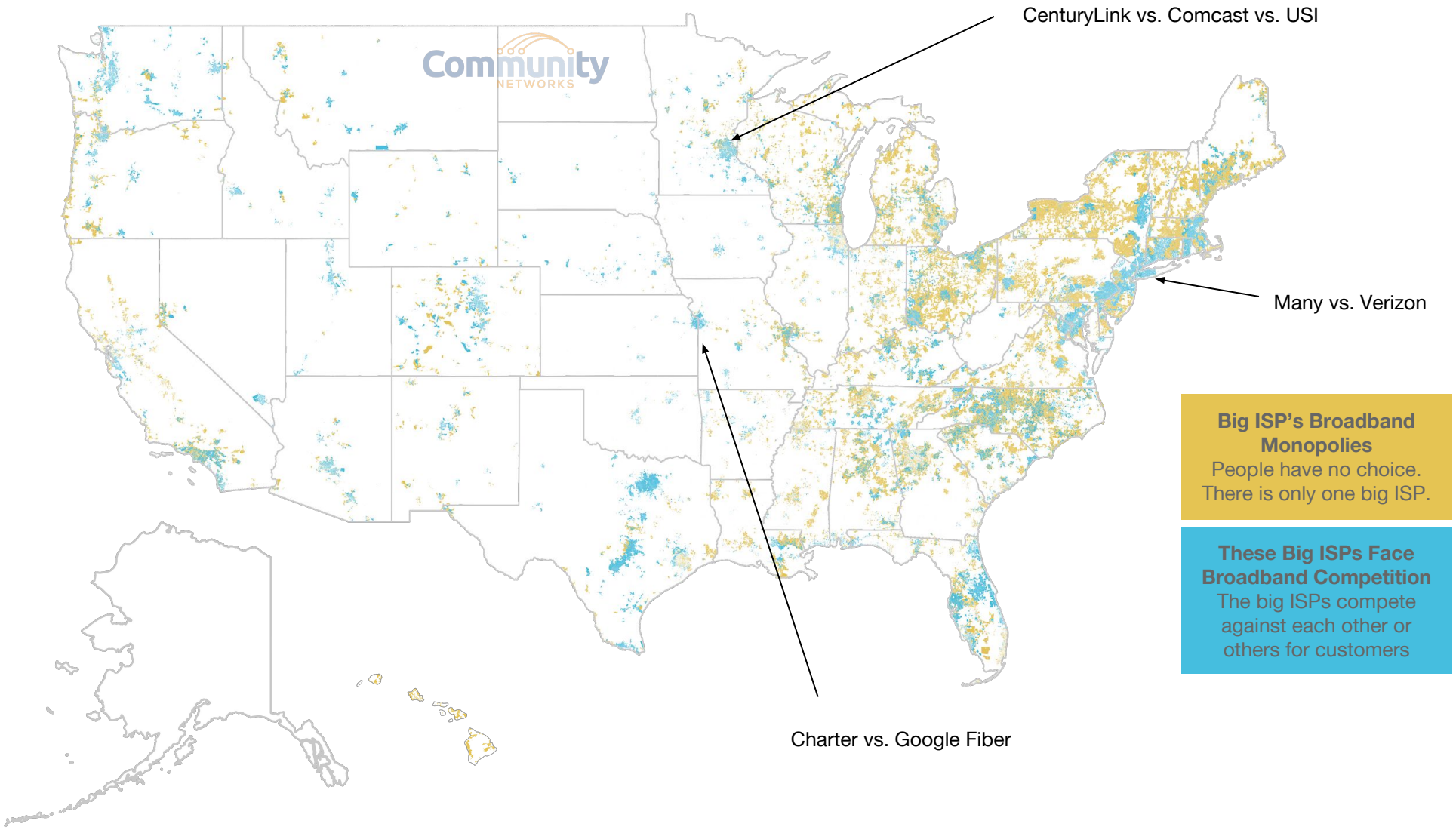
Captured Customers

70 million people have only one broadband provider, and that provider is Comcast, Charter, AT&T, CenturyLink, Verizon, or Frontier.

Read the full report at:
ILSR.org/Monopoly-Networks



Design: H. Trostle, Institute for Local Self-Reliance
Source: FCC Form 477 December 2016 v 1
This is a best-case scenario. FCC Form 477 data overstates broadband availability and competition.

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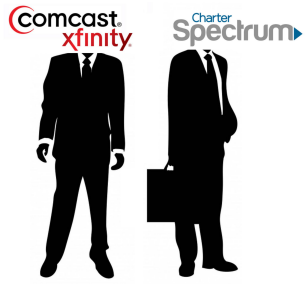
A Cable Duopoly

Charter and Comcast have little overlapping service territory



Read the full report at:
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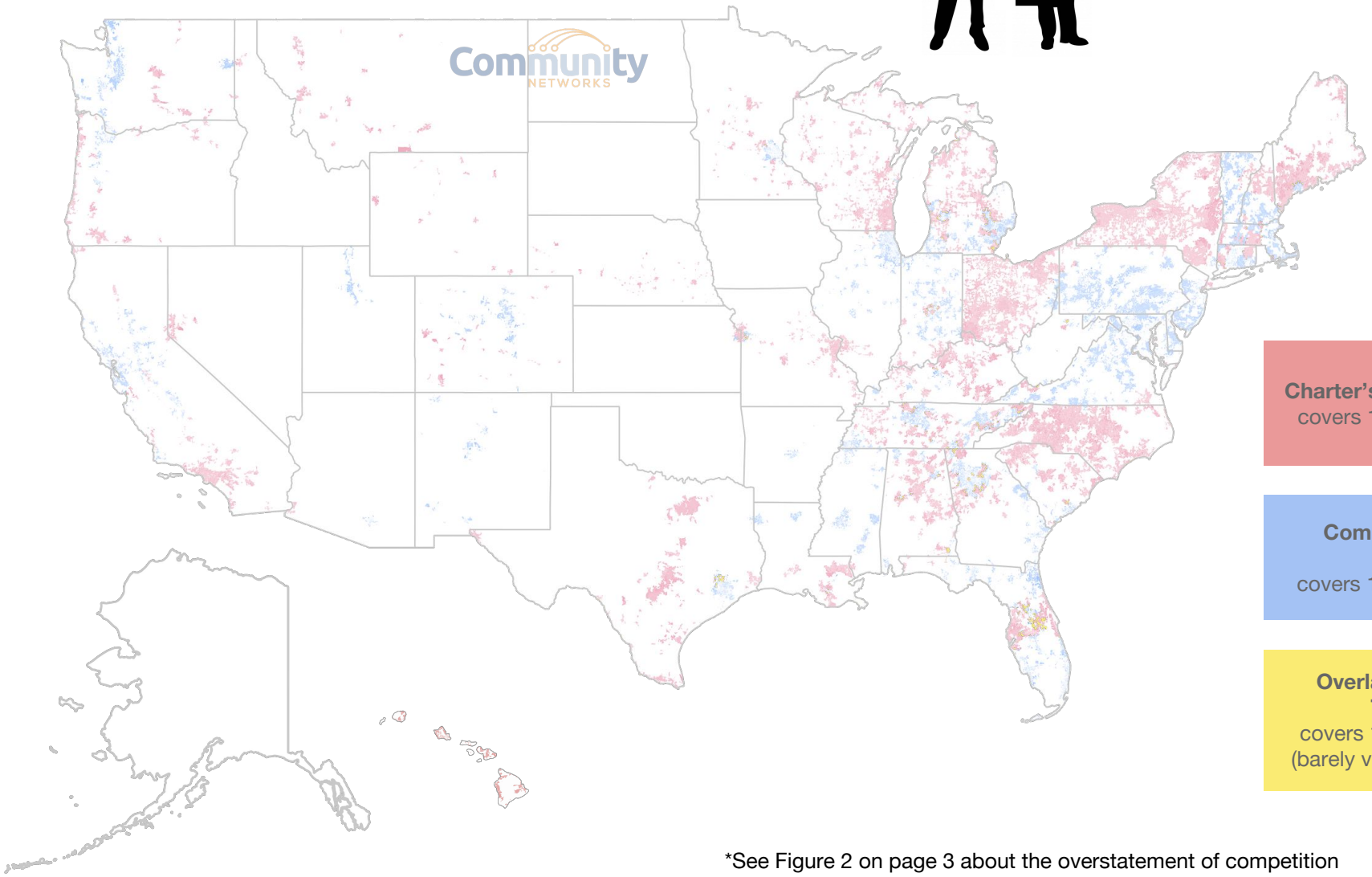

Charter's Service Territory
covers 101 million people

Comcast's Service Territory
covers 110 million people

Overlapping Service Territory*
covers 1.5 million people
(barely visible at this scale)

*See Figure 2 on page 3 about the overstatement of competition

Design: H. Trostle, Institute for Local Self-Reliance
Source: FCC Form 477 December 2016 v 1
This is a best-case scenario. FCC Form 477 data overstates broadband availability and competition.

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Thanks for reading!