Broadband/Internet Availability Survey Report

NTCA–THE RURAL BROADBAND ASSOCIATION

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INTRODUCTION

To gauge the deployment rates of advanced services by its member companies, NTCA–The Rural Broadband Association (NTCA) has conducted its Broadband/Internet Availability Survey for nearly two decades. NTCA is a national association representing nearly 850 rural rate-of-return regulated telecommunications providers in 44 states.

All NTCA members are "rural telephone companies" as defined in the Communications Act of 1934, as amended by the Telecommunications Act of 1996. Over the past two decades, however, NTCA's members have evolved with consumer demand and technological advancement to become full-service voice and broadband providers. Respondents to this year's survey report an average of 4,467 residential and 469 business fixed broadband connections in service. There is also a reported average of 7,581 serviceable locations within the respondents' incumbent local exchange carrier (ILEC) service areas, and members report an average of 72% of customers in their areas subscribe to a broadband service of some speed.

This latest broadband survey is a follow-up to similar surveys conducted in recent years by NTCA and seeks to build upon the results of those surveys.[1] This year's survey asked about technologies used to provide broadband service in ILEC service areas, broadband availability and subscription rates, anchor institutions,[2] fiber deployment, competitive ISP broadband services, competition, fixed wireless broadband services, mobile voice and broadband data service, internet backbone and middle mile connections, and video service. New this year, particularly to capture how the COVID-19 pandemic may have affected members and their customers, the survey sought additional information on upload speeds for broadband and included questions about the impact of equipment and permitting delays on members' operations.

In August 2021, NTCA contracted with Association Research, Inc. (ARI)[3] to conduct its annual survey of broadband/internet availability. ARI sent an email with a link to the online survey to each of the companies (as reflected at the holding company level) in NTCA's email database; 214 holding company members (35.1%) responded. It is important to note that not all respondents answered every question in the survey.

The average ILEC service area identified by respondents is approximately 1,906 square miles. Nearly half (49.0%) report having a service area of less than 500 square miles, while just over one-quarter (29.7%) have a service area between 500-1,999 square miles, and approximately one-fifth (21.3%) have a service area of 2,000 square miles or larger.

[1] Copies of this and previous NTCA survey reports can be downloaded from the NTCA website at https://www.ntca.org/ruraliscool/survey-reports.

[2] Anchor Institutions are defined by the Federal Communications Commission as entities such as "schools, libraries, hospitals and other medical providers, public safety entities, institutions of higher education, and community support organizations that facilitate greater use of broadband by vulnerable populations, including low-income, the unemployed, and the aged."

[3] Association Research, Inc., an independent survey research organization located in Ijamsville, Maryland, conducted the survey, analyzed the findings and prepared this report. All responses have been kept confidential; this report does not reveal information from any individual source.

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Respondents indicated that they use a variety of platforms within their respective ILEC service areas to provide fixed broadband service to their customers.[4] On average, three-quarters (75.0%) of serviceable locations are served by fiber to the home (FTTH) in 2021; this is an increase of 5.1 percentage points from the prior year's survey. An average of 15.0% of locations continue to be served via copper loops. Fiber to the node (FTTN) is used to serve an average of 6.1% serviceable locations, cable modems 2.7%, licensed fixed wireless 0.7% and unlicensed fixed wireless 0.6%.

With respect to *downstream service availability*, on average, respondents reported that the following percentages of their customer base can receive maximum speeds of:

- Greater than/equal to 1 Gig: 55.4%
- Greater than/equal to 100 Mbps but less than 1 Gig: 20.2%
- Greater than/equal to 25 Mbps but less than 100 Mbps: 10.6%
- Greater than/equal to 10 Mbps but less than 25 Mbps: 10.1%
- Less than 10 Mbps: 3.7%

In NTCA's 2020 Broadband Survey Report, 80.4% of respondents' customers could receive a maximum downstream speed greater than or equal to 25 Mbps, lower than the 86.2% of customers identified by respondents this year. It is worth noting again this year, while we are still in the midst of a pandemic that has placed greater emphasis on the need for robust broadband at home, respondents in the 2021 survey indicated that a higher proportion of their customers can receive a maximum downstream speed greater than/equal to 100 Mbps when compared with 2020 (75.6% vs. 67.8%), which had also seen large gains when compared to 2019 (60.8%). Also of note this year as compared to last year, there were particularly large gains for those able to obtain maximum downstream service that is greater than or equal to 1 Gig (55.4% vs 45.1% in 2020).

With respect to *upstream* service availability, respondents indicated the following percentages of their customer base *can receive,* on average, maximum speeds of:

- Greater than/equal to 1 Gig: 52.3%
- Greater than/equal to 100 Mbps but less than 1 Gig: 21.3%
- Greater than/equal to 20 Mbps but less than 100 Mbps: 6.4%
- Greater than/equal to 10 Mbps but less than 20 Mbps: 5.2%
- Greater than/equal to 3 Mbps but less than 10 Mbps: 6.2%
- Less than 3 Mbps: 8.5%

In 2021, an average of 80.0% of respondents' customers can receive maximum upstream speeds of greater than or equal to 20 Mbps, while an average of 52.3% of respondents' customer base able to receive maximum upstream speeds of greater than or equal to 1 Gig.

[4] For purposes of this survey, broadband is defined as throughput equal to or exceeding 200 kilobits per second in at least one direction.

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In assessing what services customers are purchasing, respondents' customers, on average, *subscribe to* the following maximum speeds:

- 9.0% subscribe to speeds greater than/equal to 1 Gig.
- 28.3% subscribe to greater than/equal to 100 Mbps but less than 1 Gig.
- 34.9% subscribe to greater than/equal to 25 Mbps but less than 100 Mbps.
- 17.4% subscribe to greater than/equal to 10 Mbps but less than 25 Mbps.
- 10.4% subscribe to less than 10 Mbps.

The percentage of customers subscribing to speeds greater than or equal to 25 Mbps has increased steadily in the past four years. In 2020, this percentage was approximately 64%, while in 2019, the proportion was 50%, which was up from just under 40% in 2018. In 2021, this percentage has increased to approximately 72%. Additionally, the percentage of customers subscribing to higher levels of broadband speed increased in 2021 when compared to 2020, from 20.2% to 28.3% for speed greater than/equal to 100 Mbps but less than 1 Gig, and from 7.9% to 9.0% for speed greater than/equal to 1 Gig.

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Voice Grade Access Lines, Interconnected VoIP Lines and Fixed Broadband Connections

Fixed Voice and Broadband	Residential		Business	
	2020 Mean	2021 Mean	2020 Mean	2021 Mean
Number of voice grade access lines	3,385	2,890	1,197	1,040
Number of interconnected VoIP lines	1,945	1,450	279	437
Number of fixed broadband connections	3,978	4,467	456	469

Source: 2021 NTCA–Broadband/Internet Availability Survey

- The average respondent reports having 2,890 residential local exchange voice grade access lines in service in 2021, a decrease from 2020 (3,385) and 2019 (3,212). The average number of business local exchange voice grade access lines in service also decreased in 2021 to 1,040, compared to 1,197 in 2020 and 1,057 in 2019.
- The average respondent also reports having 1,450 residential interconnected VoIP lines, down from 1,945 reported in 2020, and 437 business interconnected VoIP lines in service, which is higher than the 279 reported in 2020.
- On average, respondents indicate having 4,467 residential fixed broadband connections in service in 2021, an increase from 2020 (3,978). The average number of business fixed broadband connections in service is 469, an increase from 2020 (456).
- Respondents report having an average of 7,581 serviceable locations within the respondents' ILEC service areas with 72.2% (average) of customers subscribing to broadband at any speed.
- The average ILEC service area is approximately 1,906 square miles. Nearly half (49.0%) report having a service area of less than 500 square miles. Just over one-quarter (29.7%) have a service area between 500-1,999 square miles, and approximately one-fifth (21.3%) have a service area of 2,000 square miles or larger.
- Just over half (56.5%) of the 2021 survey respondents receive support from the FCC's Universal Service Fund (USF) through cost-based (i.e., CAF-BLS and/or HCLS) mechanisms, while 18.4% receive ACAM 1 support, 24.6% receive USF support through ACAM 2, and 0.5% of 2021 respondents receive support via the Alaska Plan.
- The vast majority of respondents (91.2%) indicate that they have IP switching facilities for voice traffic in their networks. One-half of respondents (50.2%) still use TDM switching facilities for voice traffic within some portion of their ILEC networks.

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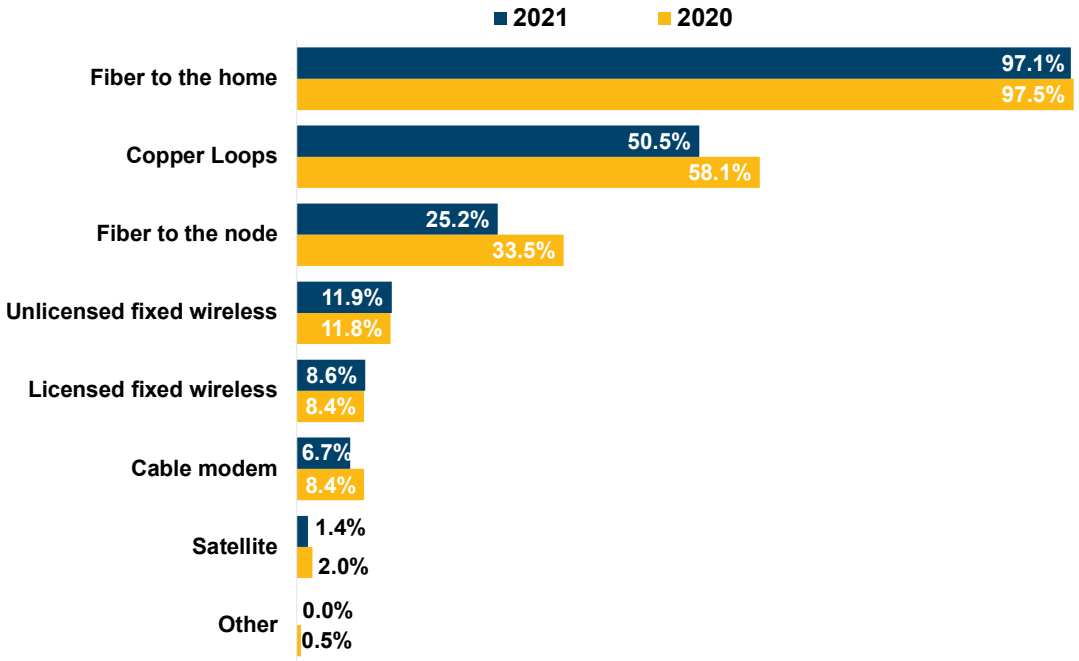
Network Platforms Used to Provide Fixed Broadband Service



Source: 2021 NTCA–Broadband/Internet Availability Survey

- Most respondents (97.1%) in 2021 report using fiber to the home to provide fixed broadband service to some portion of their service area, nearly the same as reported in 2020 (97.5%). Half (50.5%) still use copper loops for some customers in their service area, a percentage that has dropped steadily over the last three years (58.1% in 2020, 63.6% in 2019 and 65.8% in 2018).
- Approximately one-quarter (25.2%) use fiber to the node, which is considerably lower than the proportions reported in 2020 (33.5%), 2019 (33.2%) and 2018 (37.3%).
- The platforms that respondents used least often to provide fixed broadband service are licensed fixed wireless (8.6%), cable modems (6.7%) and satellite (1.4%).
- Percentages add up to more than 100% due to the presence and use of multiple technology platforms in individual respondents' networks.

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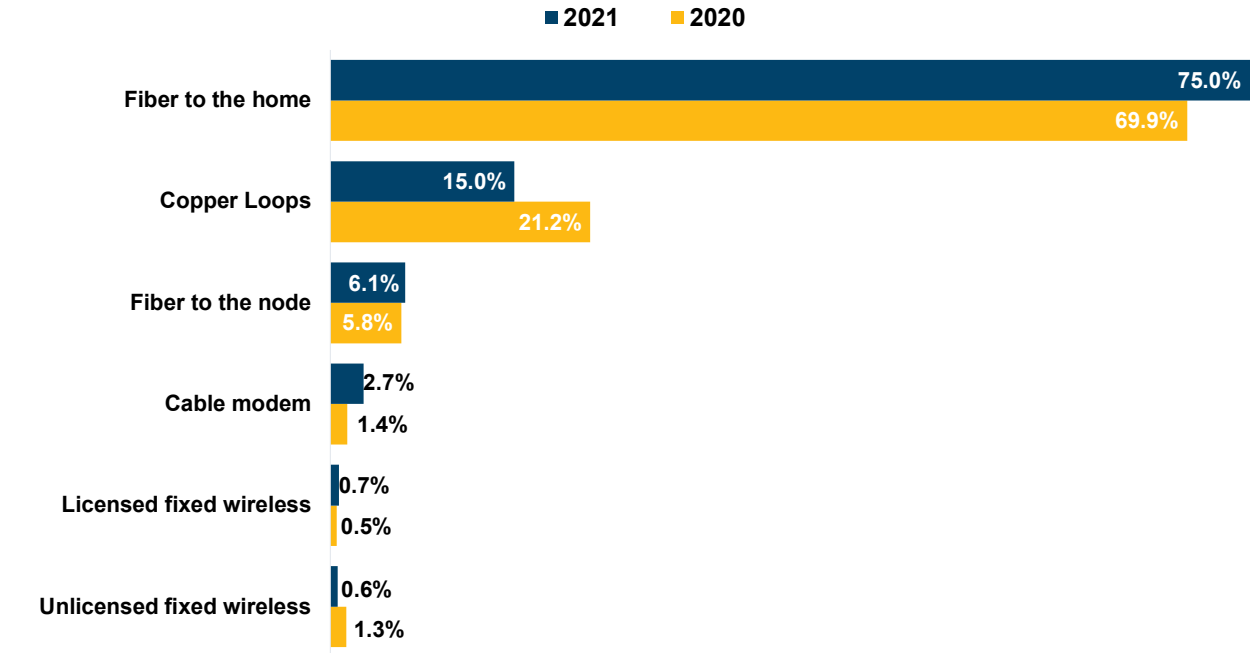
Average Percentage of Serviceable Locations for Network Platforms



Source: 2021 NTCA–Broadband/Internet Availability Survey

- Respondents indicate an average of 75.0% of their serviceable locations are served by fiber to the home, higher than in 2020 (69.9%). The average proportion connected by copper loops is 15.0%, dropping from 21.2% in 2020. The average served by fiber to the node is 6.1% in 2021, slightly higher than in 2020 (5.8%).
- The average percentage of respondents' serviceable locations served by cable modem (2.7%), licensed fixed wireless (0.7%) and unlicensed fixed wireless (0.6%) continues to be very small.

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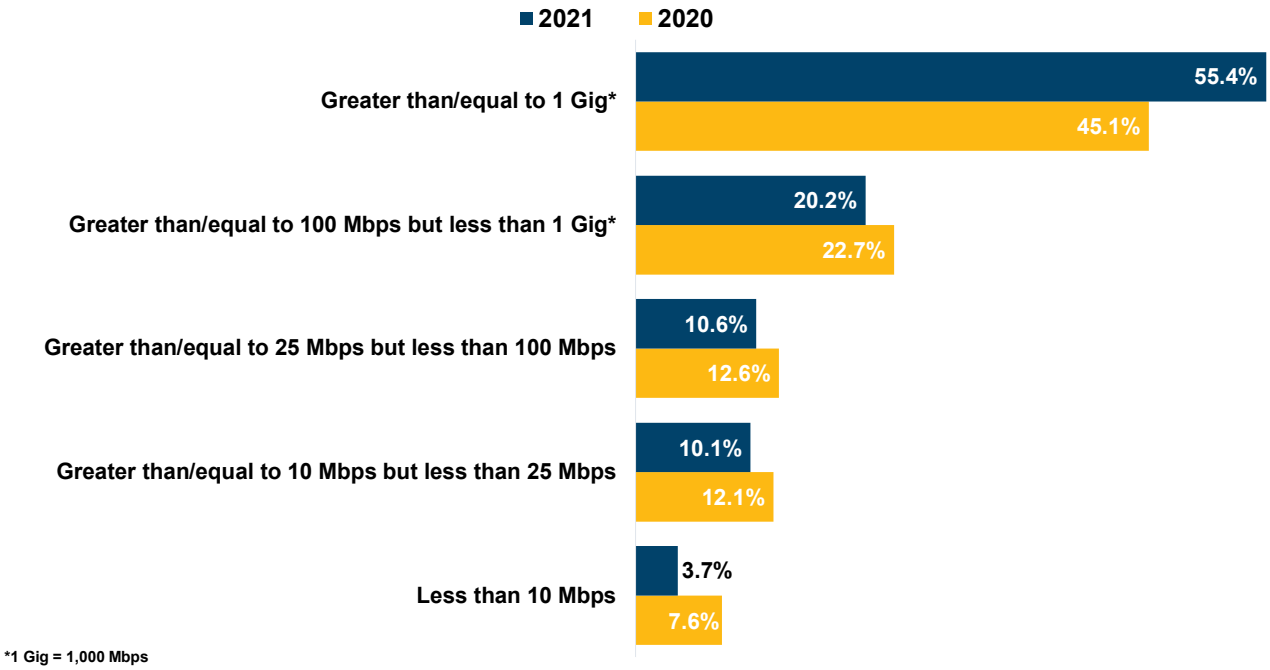
Maximum *Downstream* Speed Availability



*1 Gig = 1,000 Mbps

Source: 2021 NTCA–Broadband/Internet Availability Survey

- The survey results indicate increases in the availability of higher speed services, with respondents reporting that three-quarters (75.6%) of their customers are able to receive maximum *downstream* speed greater than or equal to 100 Mbps. The biggest increase again this year comes in the Gigabit tier, where respondents report that an average of 55.4% of their customer base can *receive* a maximum *downstream* speed for fixed broadband greater than or equal to 1 Gig, up from 45.1% reported in 2020 and 25.3% in 2019.
- By contrast, the proportion of customers identified as being able to receive slower maximum *downstream* speeds has declined. The average proportion who can receive a maximum *downstream* speed greater than or equal to 25 Mbps but less than 100 Mbps is 10.6%, lower than reported in 2020 (12.6%). Respondents also report that 10.1% of their customer base can receive a maximum *downstream* speed greater than or equal to 10 Mbps but less than 25 Mbps, and 3.7% can receive a maximum *downstream* speed of less than 10 Mbps. These averages are both lower than reported in 2020 (12.1% and 7.6%, respectively).

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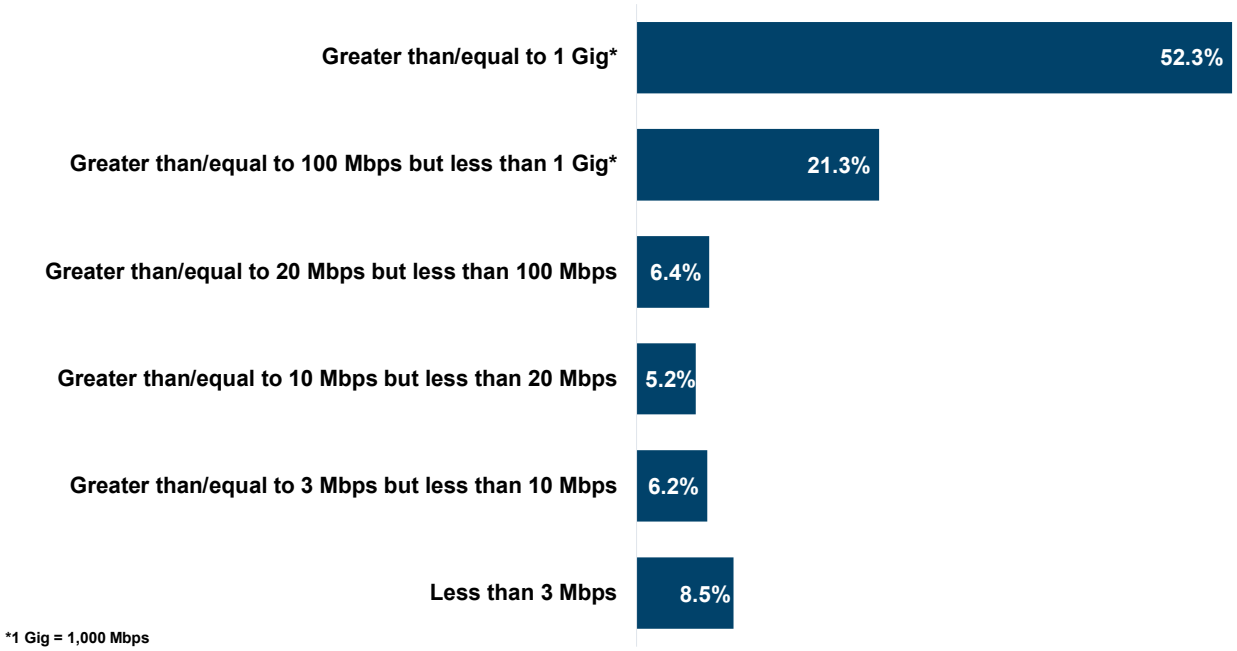
Maximum *Upstream* Speed Availability



*1 Gig = 1,000 Mbps

Source: 2021 NTCA–Broadband/Internet Availability Survey

- On average, more than half (52.3%) of respondents' customers can receive a maximum *upstream* speed of greater than or equal to 1 Gig, while another average of 21.3% can receive maximum *upstream* speed that is greater or equal to 100 Mbps but less than 1 Gig.
- In comparison to last year's survey, 2021 respondents report that an average of 91.4% of their customers can receive a maximum *upstream* speed of 3 Mbps or greater for fixed broadband service, up from 83.8% reported in 2020.
- Nearly three-quarters (73.6%) of respondents' ILEC customers can receive a maximum upstream speed of 100 Mbps or higher, while in 2020 the average was 68.6% of customers.

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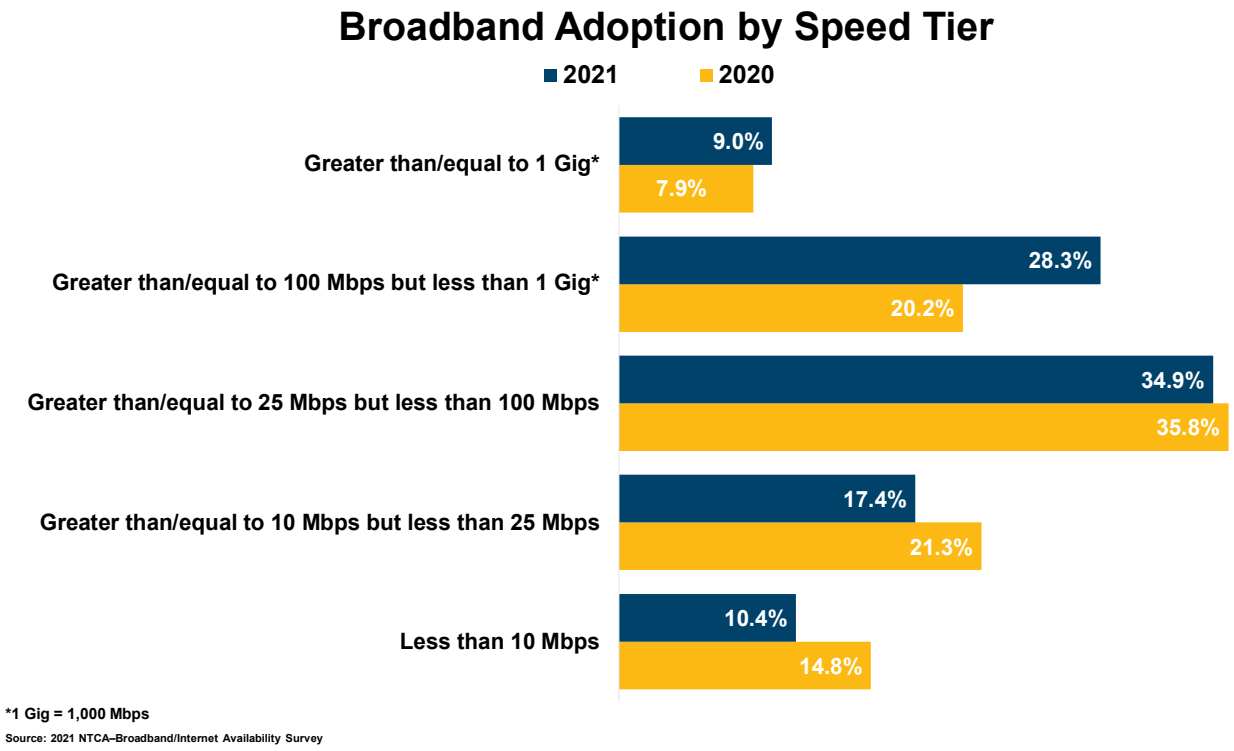

*1 Gig = 1,000 Mbps

Source: 2021 NTCA–Broadband/Internet Availability Survey

- The survey reflects that consumers continue to migrate steadily to higher speeds as those services become available. The percentage of respondents' customer base in 2021 that *subscribes* to a maximum speed for fixed broadband of greater than or equal to 1 Gig is 9.0%, nearly triple the percentage reported in 2019 (3.4%) and still higher than the 7.9% reported in 2020. Moreover, just over one-quarter (28.3%) of the average customer base subscribes to a speed greater than or equal to 100 Mbps but less than 1 Gig, up from an average of 20.2% reported in 2020.
- The largest average percentage of customers continues to subscribe to a speed greater than or equal to 25 Mbps but less than 100 Mbps (34.9%). The proportion subscribing to speeds that do not exceed 25 Mbps is 27.8%, compared with 36.1% in 2020 and 50.0% in 2019.
- More specifically, survey respondents indicate that an average of 17.4% of their customer base subscribe to a maximum speed of greater than or equal to 10 Mbps but less than 25 Mbps, and 10.4% subscribe to a speed less than 10 Mbps.

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Estimated Total Costs of Bringing Customers Up to Certain Speeds
(Upstream and Downstream)

Downstream Speed	Estimated Total Costs 2021 Mean
25 Mbps	$14,590,453
100 Mbps	$24,294,929
1 Gig	$26,006,042

Upstream Speed	Estimated Total Costs 2021 Mean
3 Mbps	$16,441,640
20 Mbps	$23,718,102
100 Mbps	$26,845,704
1 Gig	$25,859,494

Source: 2021 NTCA–Broadband/Internet Availability Survey

- Respondents estimate that it would cost an average of $26 million to bring all ILEC customers who are not already at 1 Gig of fixed broadband service (*downstream*) up to that speed. The average cost to bring all customers up to the 100 Mbps (*downstream*) level of service is estimated to be $24.3 million, while the average estimated cost to bring all customers up to the 25 Mbps (*downstream*) level of service is $14.6 million.
- The average estimated cost of bringing customers not at the level of 3 Mbps *upstream* up to this level is about $16.4 million, up from $14.2 million reported in 2020 but still less than the averages reported in 2019 ($21.1 million) and 2018 ($21.6 million). The estimated cost of bringing all customers up to 100 Mbps *upstream* who are not already at that speed is estimated to be an average of $26.8 million.
- To bring all customers up to 1 Gig *upstream* who are not already at that speed is estimated to be an average of $25.9 million, and the average cost to bring customers up to 20 Mbps upstream is $23.7 million.

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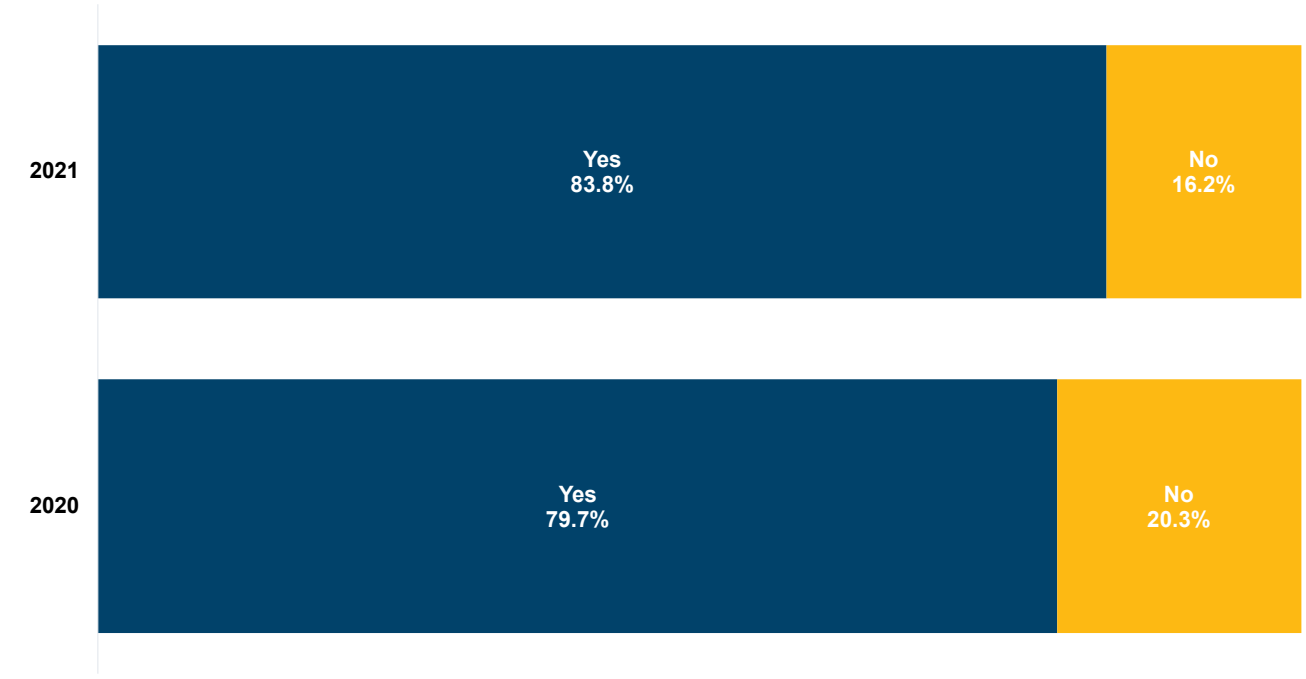
Offer Standalone Broadband



Source: 2021 NTCA–Broadband/Internet Availability Survey

- More than eight in 10 respondents (83.8%) report that they offer "standalone broadband," a slight increase from those saying the same in 2020 (79.7%). Of those respondents offering standalone broadband, an average of 37.0% of their ILEC subscribers currently take this service. For this survey/report, "standalone broadband" was defined as broadband service only, with *no regulated* voice component as an ILEC (i.e., broadband offered with *unregulated* interconnected VoIP service qualifies as standalone broadband).

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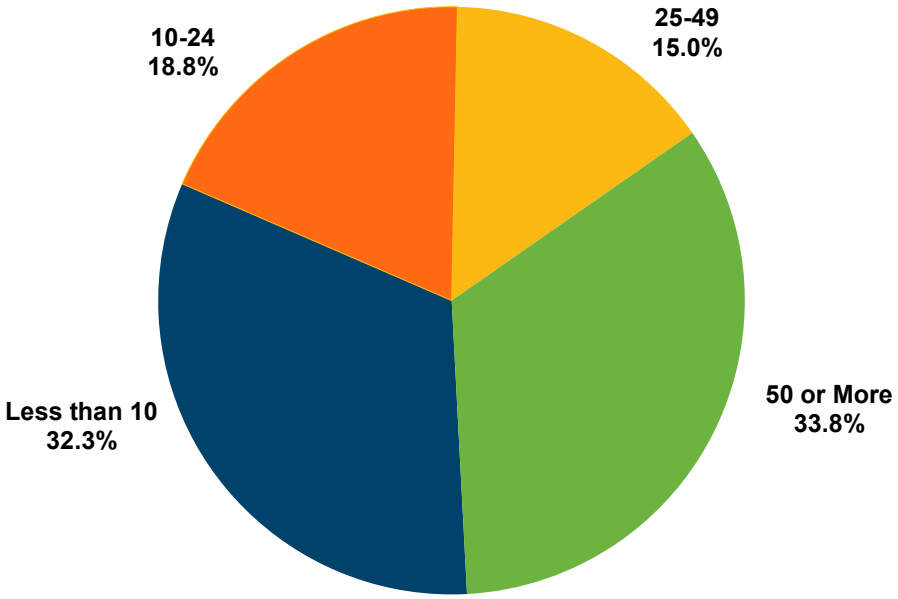
Number of Customers Who Signed Up for the Emergency Broadband Benefit if Offered



Source: 2021 NTCA–Broadband/Internet Availability Survey

- Approximately two-thirds of respondents (68.2%) report that they offer the Emergency Broadband Benefit (EBB) to their customers. Of those respondents offering the EBB, slightly more than one-third (33.8%) had 50 or more customers sign up for the discount, while another one-third (32.3%) had fewer than 10 customers do the same.

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Anchor Institution Connection via Fiber

Anchor Institution	% Connected to Network via Fiber 2021 Mean
Primary/secondary schools	83.7%
Public libraries	77.1%
Public safety entities (police, fire, etc.)	74.4%
Hospitals/medical clinics	71.5%
911 Call Centers	46.1%
Community colleges	27.4%
State universities and extensions	25.2%

Source: 2021 NTCA–Broadband/Internet Availability Survey

- In 2021, more than eight in 10 (83.7%) primary/secondary schools are connected to respondents' networks via fiber, up slightly from 81.2% in 2020.
- The proportion of public libraries that respondents to this year's survey identified as being connected via fiber has increased, to 77.1% from an average of 68.9% in 2020 and 72.9% in 2019.
- The proportion of other anchor institutions connected to respondents' networks via fiber has also increased. Specifically, an average of 74.4% of public safety entities are connected to respondents' networks via fiber, 71.5% of hospitals/medical clinics, 46.1% of 911 call centers, and 25.2% of state universities and extensions.
- The only decrease in the percentage of anchor institutions connected via fiber from the previous year was noted in community colleges, from 30.7% in 2020 to 27.4% in 2021.

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Number of Anchor Institutions in Service Area and Number Served With Fixed Broadband

Anchor Institution	Number in Service Area	Number Served
	2021 Mean	2021 Mean
Primary/secondary schools	8	7
Public libraries	3	3
Public safety entities (police, fire, etc.)	11	9
Hospitals/medical clinics	8	8
911 Call Centers	2	2
Community colleges	1	1
State universities and extensions	1	1

Source: 2021 NTCA–Broadband/Internet Availability Survey

- Respondents report that the average number of anchor institutions in the area they serve with fixed broadband include 11 public safety entities, eight primary/secondary schools, eight hospitals/ medical clinics, three public libraries, two 911 call centers, one community college and one state university and extension.
- On average, respondents serve with fixed broadband seven of eight primary/secondary schools and nine of 11 public safety entities as well as all the public libraries, hospitals/medical clinics, 911 call centers, community colleges and state universities and extensions located in their service area.

Anchor Institution Average Speed

Fixed Voice and Broadband	2018 Mean	2019 Mean	2020 Mean	2021 Mean
Maximum Speed of Broadband Available	1,233 Mbps	1,350 Mbps	1,428 Mbps	1,730 Mbps
Average Speed of Broadband Purchased	196 Mbps	147 Mbps	235 Mbps	313 Mbps

Source: 2021 NTCA–Broadband/Internet Availability Survey

- The average maximum speed of broadband available to anchor institutions has increased steadily since 2018. Respondents to the 2021 survey report that the maximum broadband speed they make available to anchor institutions in their area averages 1,730 Mbps. The average speed of broadband purchased by these institutions is 313 Mbps, which is also higher than observed in the past three years (235 Mbps in 2020, 147 Mbps in 2019 and 196 Mbps in 2018).

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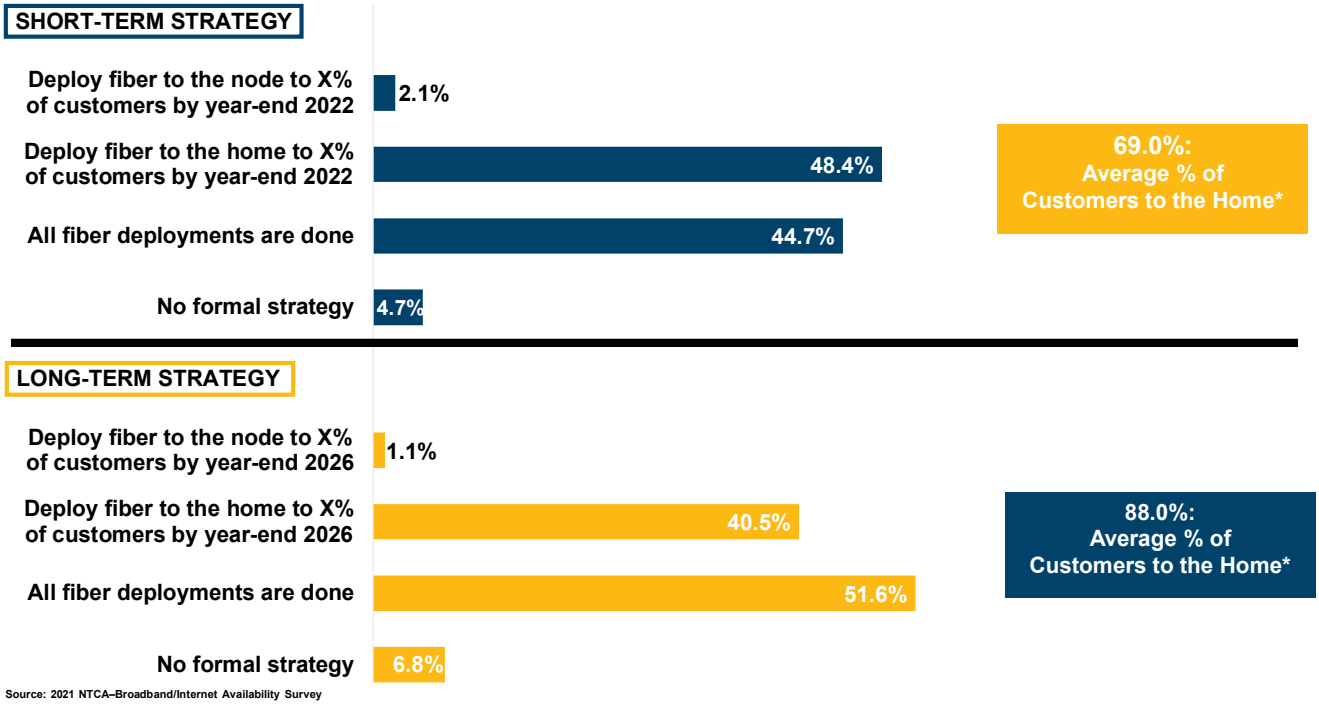
FIBER DEPLOYMENT

Short-Term and Long-Term Fiber Deployment Strategy



Source: 2021 NTCA–Broadband/Internet Availability Survey

*There was insufficient data to report average percentages of customers for Fiber to the Node.

- Nearly half of responding companies (48.4%) report that their short-term fiber deployment strategy is to deploy fiber to the home to an average of 69.0% of customers by year-end 2022. Four in 10 (40.5%) responding companies indicate that their long-term strategy is to deploy fiber to the home to an average of 88.0% customers by 2026. In 2020, 59.8% of respondents' short-term strategy was to deploy fiber to the home to an average of 69.9% of customers by 2021, and 51.2% planned to deploy fiber to the home to an average of 89.4% as a long-term strategy by 2026.
- Companies are far less likely to deploy fiber to the node as either a short-term (2.1%) or a long-term (1.1%) strategy.
- Short-term fiber deployment strategies were reported as done by 44.7% of responding companies while 51.6% reported the same for long-term strategies, both higher than reported in 2020. Few respondents report not having either a short-term (4.7%) or long-term (6.8%) formal fiber deployment strategy, proportions that have decreased somewhat from 2020 when 6.3% reported having no short-term formal strategy and 7.8% reported not having a long-term formal strategy.

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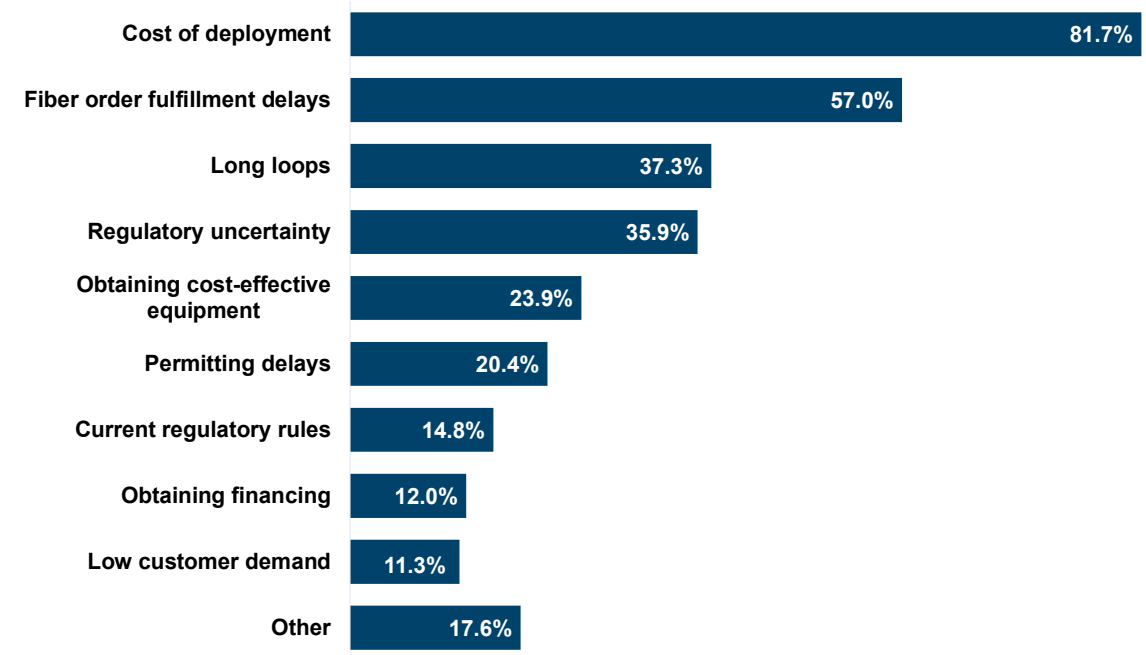
Significant Barriers to Widespread Fiber Deployment



Source: 2021 NTCA–Broadband/Internet Availability Survey

- The cost of deployment continues to be the most significant barrier to widespread fiber deployment as cited by 81.7% of companies. This is somewhat lower than 88.7% reporting this in 2020 as well as the 91.4% saying the same in 2019 and the 93.2% in 2018.
- More than half (57.0%) of respondents name fiber order fulfillment delays as their second-most significant barrier, a significant increase from 27.7% who said the same in 2020 and the 9.3% who said the same in 2019.
- Long loops drops to the third-most significant barrier after being named second for a few years, with 37.3% indicating this as a barrier in 2021. This proportion has fallen from 46.8% in 2020, 55.0% in 2019 and 46.6% in 2018. Over one-third of respondents continues to name regulatory uncertainty (35.9%) as a significant barrier, but this proportion is lower than it has been in the past (36.2% in 2020, 43.6% in 2019 and 59.4% in 2018).
- Companies are least likely to report that low customer demand is a significant barrier, with just 11.3% saying so, a slight increase from the 9.9% who indicated this was an issue a year ago. Other relatively infrequently named significant barriers are obtaining financing (12.0%) and current regulatory rules (14.8%).

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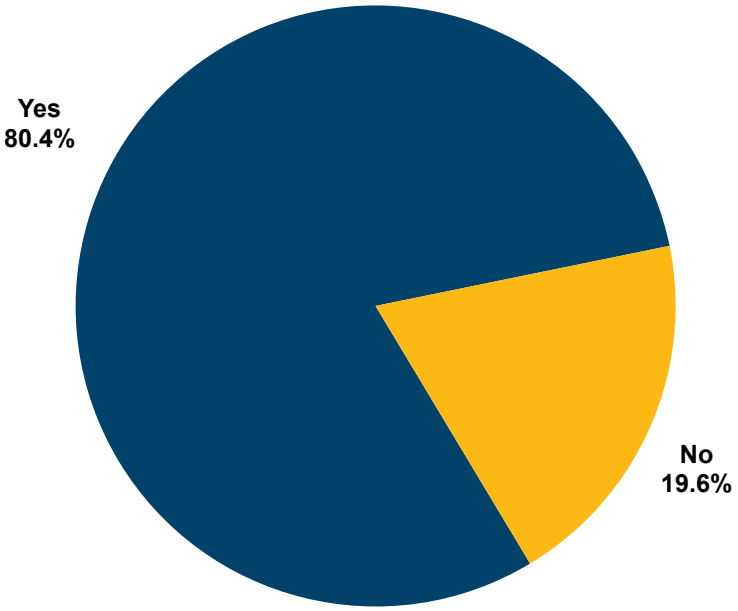
Experience Inability or Delay in Procuring Supplies for Communications Network Deployment



Source: 2021 NTCA–Broadband/Internet Availability Survey

- Eight in 10 (80.4%) reported that they are experiencing an inability or delay in procuring supplies needed for network deployment. Of this segment, 80.9% report that they are either unable to acquire or are delayed in procuring fiber. Of those experiencing issues, 78.9% report problems procuring Customer Premises Equipment (including ONTs and routers).
- Approximately seven in 10 (69.7%) are experiencing problems procuring network electronic components for fixed *wireline* service. Less than one in 10 (9.2%) reported issues procuring network electronic components for fixed *wireless* service, and 3.9% reported the same for network electronic components for *mobile service*.
- While 11.3% of those that have experienced issues procuring supplies report that there has been no impact on their operations, 46.0% report that it is taking longer to replace older equipment.
- Additionally, the impact of these delays or the inability to procure supplies has resulted in delayed installation of service at customer premises for 66.7% of responding companies, and delayed network construction for 64.0% of responding companies.

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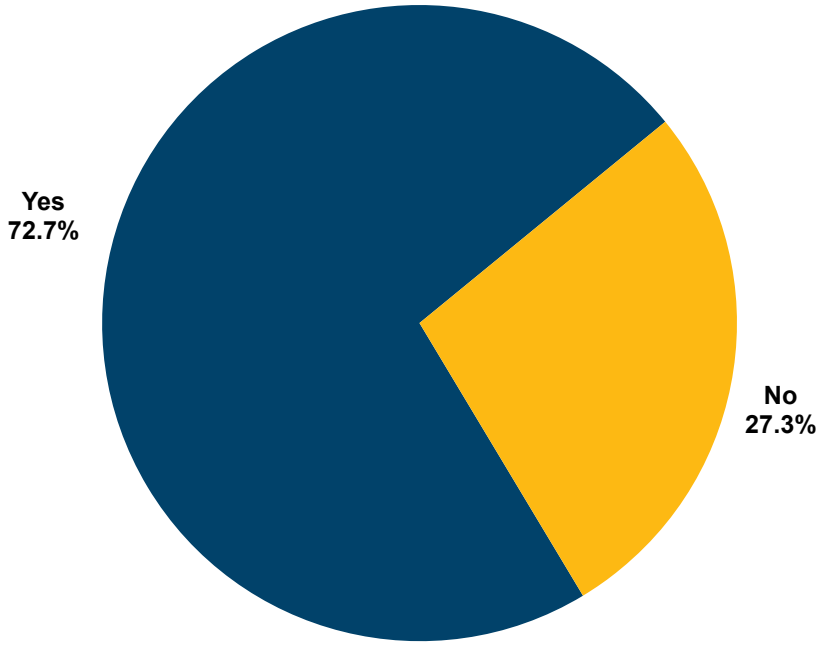
COMPETITIVE ISP BROADBAND SERVICES

Offer Competitive Broadband Service Outside of ILEC Service Area



Source: 2021 NTCA–Broadband/Internet Availability Survey

- Nearly three-quarters of respondents (72.7%) offer competitive broadband service outside of their ILEC service area, a percentage very similar to last year (71.1%).

Fixed Broadband Connections in Competitive ISP Operation

Competitive Broadband	2021 Mean	
	Residential	Business
Number of fixed broadband connections	1,831	377

Source: 2021 NTCA–Broadband/Internet Availability Survey

- Responding companies report that their competitive ISP operation has an average of 1,831 residential fixed broadband connections and 377 business fixed broadband connections in service outside of their ILEC service area.

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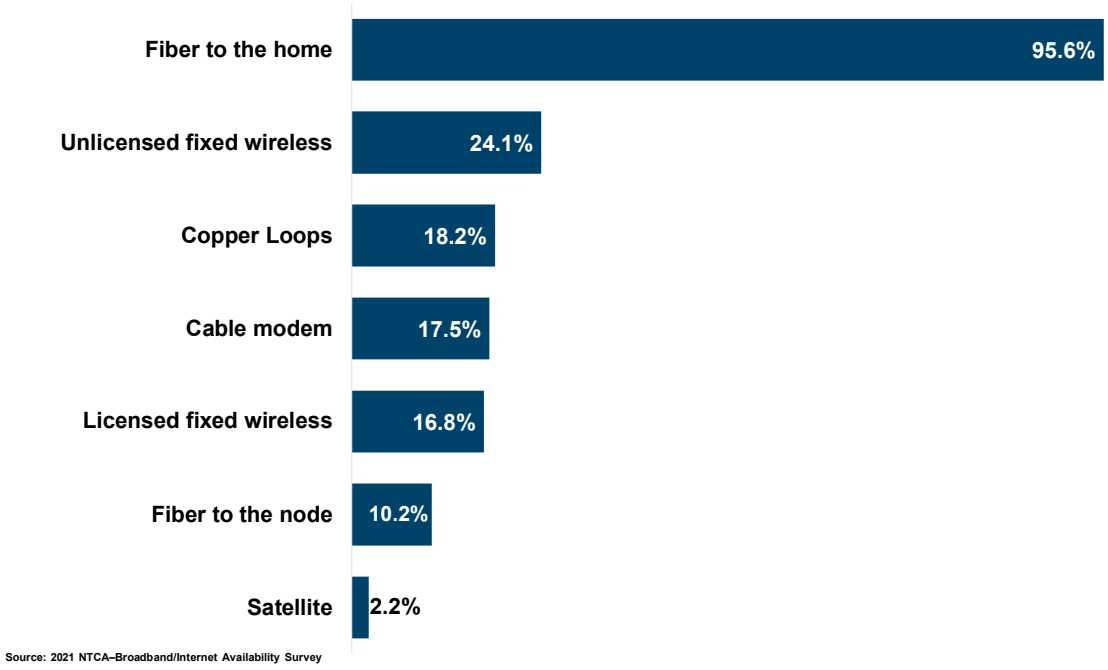
Network Platforms Competitive ISP Using to Provide Fixed Broadband Service Outside of ILEC Service Area



Source: 2021 NTCA–Broadband/Internet Availability Survey

- Nearly all respondents who offer competitive broadband service outside of their ILEC service area indicate that their competitive ISP is using fiber to the home (95.6%). A much smaller percentage say their competitive ISP is using unlicensed fixed wireless (24.1%), 18.2% are using copper loops, 17.5% are using cable modem, 16.8% are using licensed fixed wireless and 10.2% are using fiber to the node. Satellite is used very infrequently (2.2%).

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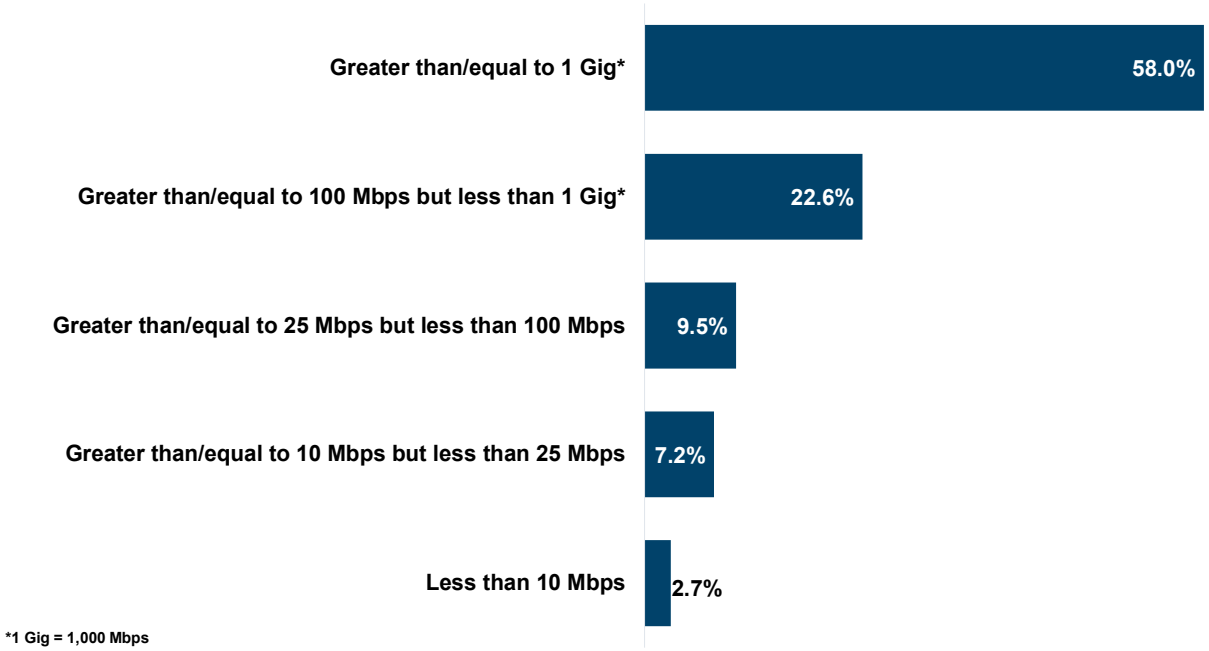
Maximum Downstream Speed Availability in Competitive ISP Service Area



*1 Gig = 1,000 Mbps

Source: 2021 NTCA–Broadband/Internet Availability Survey

- Responding companies who offer competitive broadband service outside their ILEC service area say that 58.0% (average) of their competitive ISP's customer base can receive maximum downstream service at a speed that is greater than or equal to 1 Gig and 22.6% can receive downstream service at a maximum speed greater than or equal to 100 Mbps but less than 1 Gig. Much smaller proportions can receive downstream service at a maximum speed that is greater than or equal to 25 Mbps but less than 100 Mbps (9.5%) and greater than or equal to 10 Mbps but less than 25 Mbps (7.2%). The remaining 2.7% can receive downstream service at a maximum speed of less than 10 Mbps.

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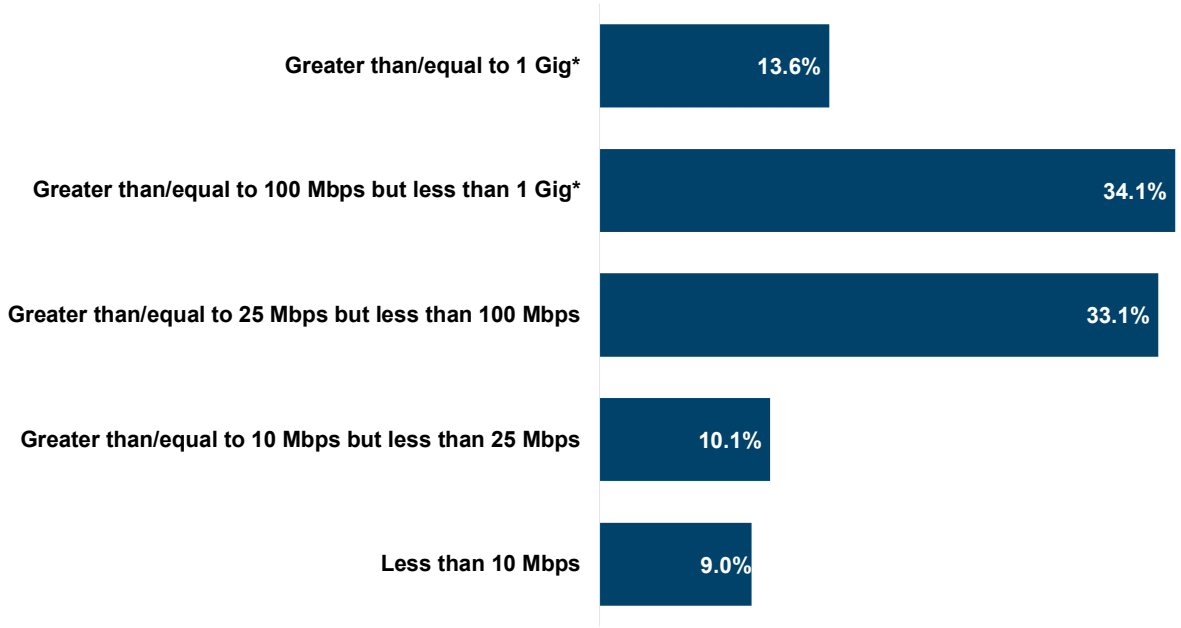
Broadband Adoption by Speed Tier in Competitive ISP Service Area



*1 Gig = 1,000 Mbps

Source: 2021 NTCA–Broadband/Internet Availability Survey

- An average of 13.6% of responding companies' competitive ISP customer base subscribe to a maximum service of greater than or equal to 1 Gig, 34.1% subscribe to maximum service greater than or equal to 100 Mbps but less than 1 Gig, and 33.1% subscribe to a maximum service that is greater than or equal to 25 Mbps but less than 100 Mbps. Smaller percentages subscribe to each of the slower ranges (10.1%, on average, subscribe to maximum service greater than or equal to 10 Mbps but less than 25 Mbps and 9.0% subscribe to maximum service of less than 10 Mbps).

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COMPETITION IN YOUR ILEC AREA

Competing Fixed Terrestrial Broadband Providers in Respondents' Service Area

Type of Providers	Fixed Terrestrial Broadband Providers in Service Area	
	Mean	% in Service Area
Cable Companies	1	69%
Electric Utilities	1	15%
Fixed Wireless ISPs (WISPs)	2	76%
Other	4	27%

Source: 2021 NTCA–Broadband/Internet Availability Survey

- Respondents were asked to identify the kinds of competitors, if any, that offer competing fixed terrestrial broadband services to even just a limited portion of their service areas. About three-quarters (75.8%) indicate that fixed wireless internet providers operate within some portion of their service area, and 68.9% said the same about cable companies. Just 14.9% identify electric utilities as offering broadband in some portion of their service areas and 26.7% said the same about other providers.

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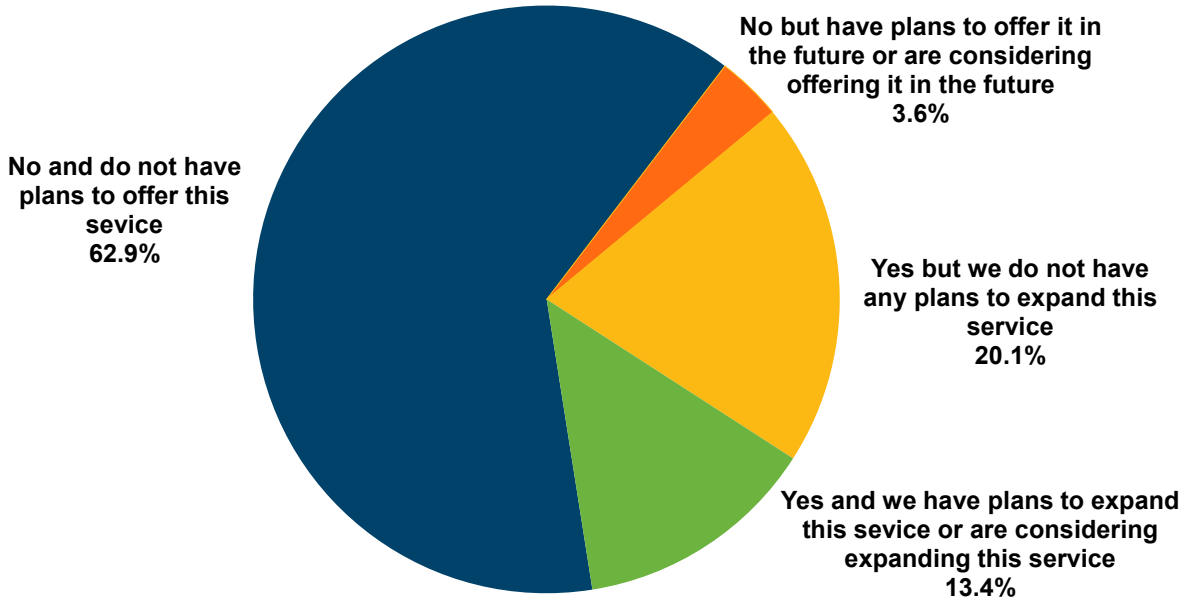
FIXED WIRELESS BROADBAND SERVICES

Offer Fixed Wireless Broadband Service



Source: 2021 NTCA–Broadband/Internet Availability Survey

- Slightly more than six in 10 respondents (62.9%) indicate that they *do not offer* fixed wireless broadband service and do not have plans to offer it in the future. A very small percentage (3.6%) report that they *do not offer* this service but have plans to offer it in the future or are considering offering it in the future.
- Approximately one in five respondents (20.1%) offer this service but do not plan to expand it in the future, while 13.4% offer this service and either have plans to expand it or are considering expansion.

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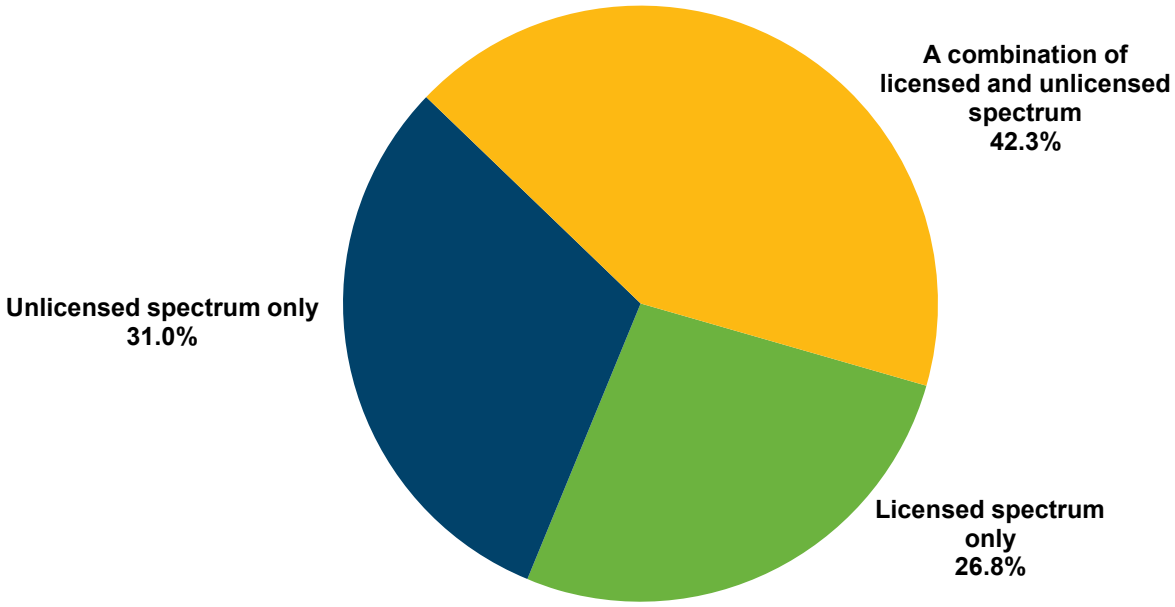
Use Licensed or Unlicensed Spectrum*

(*Percentages based on respondents offering fixed wireless broadband spectrum)



Source: 2021 NTCA–Broadband/Internet Availability Survey

- Among those using fixed wireless broadband spectrum, 42.3% use a combination of licensed and unlicensed spectrum, 31.0% use *unlicensed* spectrum *only* and 26.8% use *licensed* spectrum *only*.

Licensed Spectrum Bands Used

	2021 Mean
Low-band spectrum, less than 1 GHz (e.g., 600 MHz, 700 MHz, 800 MHz Cellular/SMR)	36.2%
Mid-band spectrum, 1-6 GHz (e.g., AWS, PCS, 2.5 EBS, 3.5 CBRS)	76.6%
High-band or mmWave spectrum, above 6 GHz (e.g., 24 GHz, 28 GHz)	4.3%

Source: 2021 NTCA–Broadband/Internet Availability Survey

- Respondents who offer fixed wireless broadband using *licensed* spectrum most often (76.6%) use mid-band spectrum, 1-6 GHz (e.g., AWS, PCS, 2,5 EBS, 3.5 CBRS). More than one-third (36.2%) use low-band spectrum, less than 1 GHz (e.g., 600 MHz, 700 MHz, 800 MHz Cellular/SMR). Only 4.3% use high-band or mmWave spectrum, above 6 GHz (e.g., 24 GHz, 28 GHz).

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Unlicensed Spectrum Bands Used

	2021 Mean
Low-band spectrum, less than 1 GHz (e.g., 600 MHz TV White Spaces, 900 MHz)	8.0%
Mid-band spectrum, 1-6 GHz (e.g., 2.4 GHz, 3.6 CBRS GAA, 5.8 GHz, 6 GHz)	94.0%
High-band or mmWave spectrum, above 6 GHz (e.g., 24 GHz or higher)	20.0%

Source: 2021 NTCA–Broadband/Internet Availability Survey

- Respondents who offer fixed wireless broadband using *unlicensed* spectrum most often use mid-band spectrum, 1-6 GHz (e.g., 2.4 GHz, 3.6 CBRS GAA, 5.8 GHz, 6 GHz), with 94.0% saying so. One in five (20.0%) offer fixed wireless broadband service using high-band or mmWave spectrum, above 6 GHz (e.g., 24 GHz or higher). Just 8.0% use low-band spectrum, less than 1 GHz (e.g., 600 MHz TV White Spaces, 900 MHz).

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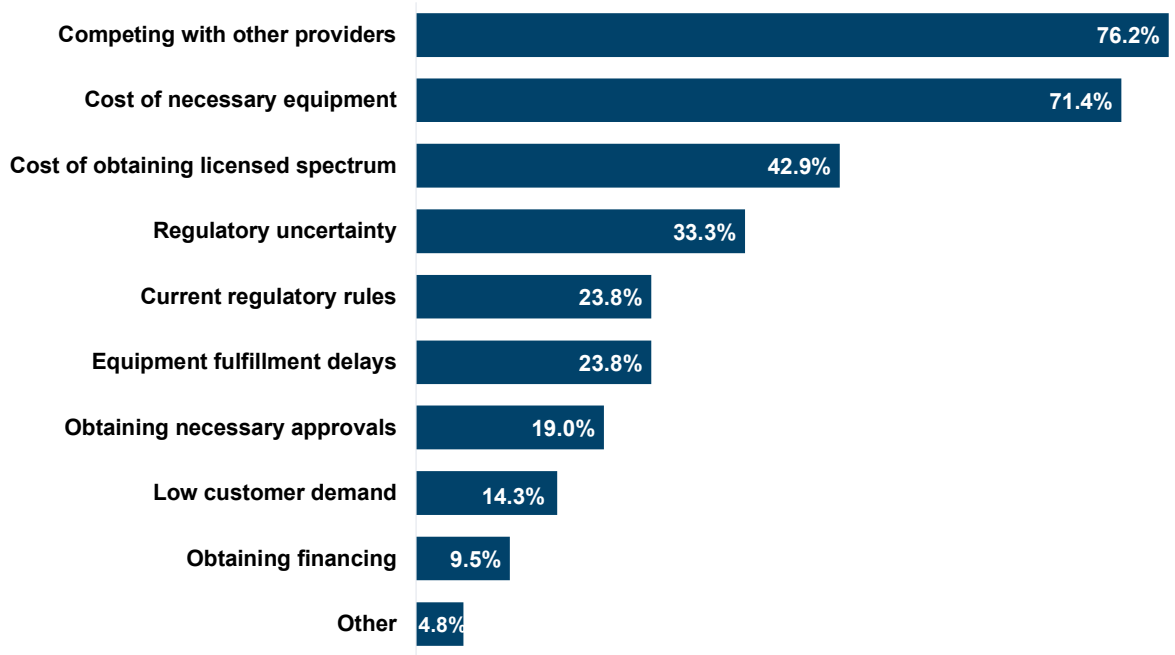
MOBILE VOICE AND BROADBAND DATA SERVICES

- Most respondents (86.1%) *do not offer* mobile wireless service directly or through an affiliate.

Primary Challenges in Offering a Mobile Broadband Data Service



Source: 2021 NTCA–Broadband/Internet Availability Survey

- For those respondents who do offer a mobile broadband data service, the top primary challenge is competing with other providers, as named by 76.2% of respondents, down from 85.7% in 2020. The cost of necessary equipment remains in second place at 71.4%, unchanged from 2020.
- More than four in 10 are challenged by the cost of obtaining licensed spectrum (42.9%, unchanged from 2020), and one-third name regulatory uncertainty (33.3%). Nearly one-quarter report current regulatory rules and equipment fulfillment delays (23.8% each) as primary challenges in offering a mobile broadband data service. (Note that respondents were permitted to select all challenges that applied to their operations.)
- Companies that offer a mobile broadband data service are challenged less often by obtaining necessary approvals (19.0%), low customer demand (14.3%) and obtaining financing (9.5%).

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INTERNET BACKBONE/MIDDLE MILE

Internet Backbone/Middle Mile

	2020 Mean	2021 Mean
Number of miles from primary internet backbone connection	95	85
Number of middle mile transport providers available	2	3

Source: 2021 NTCA–Broadband/Internet Availability Survey

- On average, respondents report being 85 miles from their primary internet backbone connection in 2021, which is less distance than the average reported in 2020 (95 miles). They also can choose to take service from an average of three middle mile transport providers, up from two reported in 2020.

Middle Mile Bandwidth

	2020 Mean	2021 Mean
Middle mile bandwidth (in GB) currently subscribe to	38 GB	32 GB
Number of years expect this capacity to remain sufficient	1.8 Years	2.0 Years

Source: 2021 NTCA–Broadband/Internet Availability Survey

- Respondents subscribe to an average of 32 GB of guaranteed middle mile bandwidth (compared to 38 GB in 2020 and 25 GB in 2019) and pay an average of $981 per gigabyte (compared to $1,145 in 2020 and $2,129 in 2019). They expect this capacity to remain sufficient for an average duration of 2.0 years.

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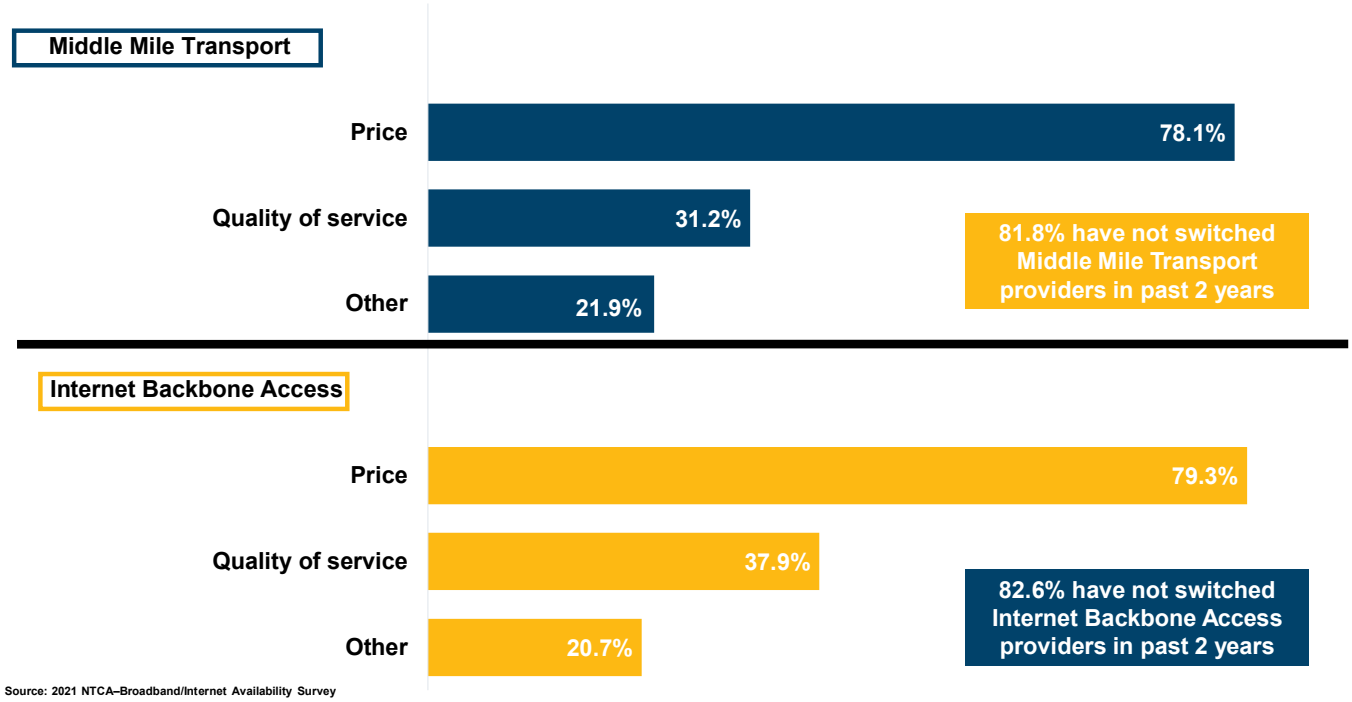
Reasons for Switching Providers



Source: 2021 NTCA–Broadband/Internet Availability Survey

- More than eight in 10 companies report that they have not switched middle mile transport providers (81.8%) or internet backbone access providers (82.6%) in the past two years.
- For those who have switched in the past two years, 78.1% named price as the reason for switching middle mile transport providers in both 2021 and 2020. Price was also the main reason for switching internet backbone access providers, with 79.3% citing this reason. While this is lower than the percentage reporting this reason in 2020 (86.7%), it is on par with 2019 (79.3%).
- The percentage switching middle mile transport providers because of quality of service is 31.2%, down from a high of 37.5% in 2020 (31.0% in 2019, 24.0% in 2018, and 29.6% in 2016). Similarly, the proportion switching internet backbone providers for quality of service is 37.9%, lower than recently observed (43.3% in 2020 and 41.4% in 2019).

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Video Service(s)

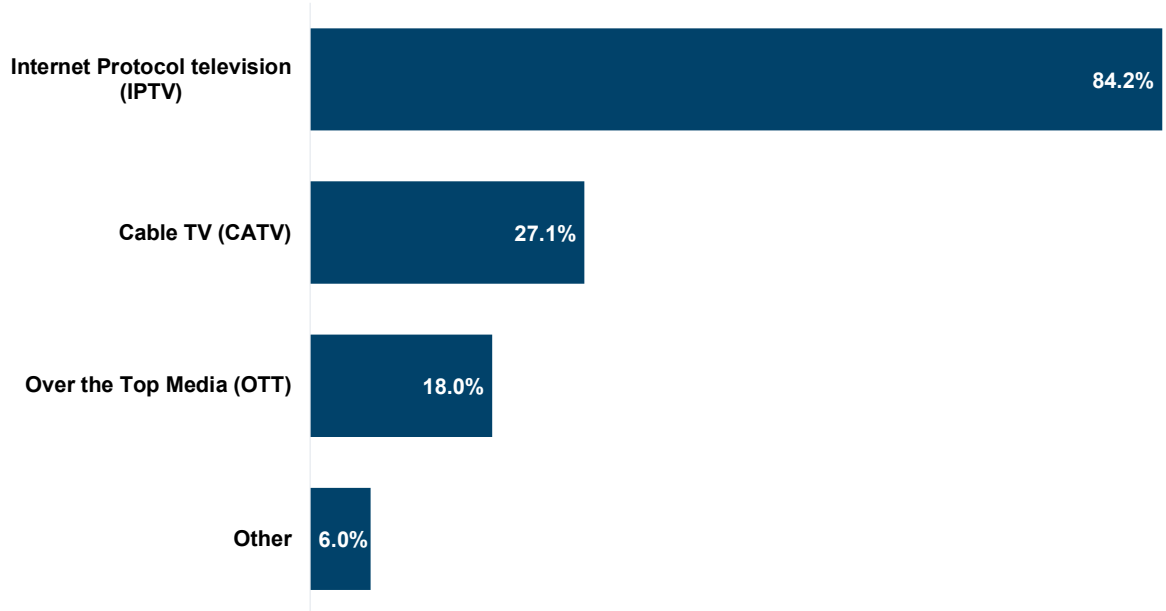
	Mean
Number of customers that currently subscribe to video service(s)	2,680
Number of homes passed or otherwise capable of connecting with video service(s)	8,775

Source: 2021 NTCA–Broadband/Internet Availability Survey

- Responding companies report that an average of 2,680 customers currently subscribe to their video service(s), while an average of 8,775 homes are passed or otherwise have the ability to connect with their video service(s).
- Using predetermined ranges, respondents report the approximate percentage of households within their service area that *cannot receive* over-the-air broadcast signals. Approximately three in 10 (30.2%) indicate that this percentage is less than 10, 9.3% say it is 11 to 25% of households, 7.8% say it is 26 to 50%, 9.3% say it is 51 to 75%, and 20.2% indicate that more than 75% of service area households cannot receive over-the-air broadcast signals. Just under one-quarter (23.3%) say this percentage is unknown.

Types of Video Services Offered*

(*Percentages based on respondents currently offering video service)



Source: 2021 NTCA–Broadband/Internet Availability Survey

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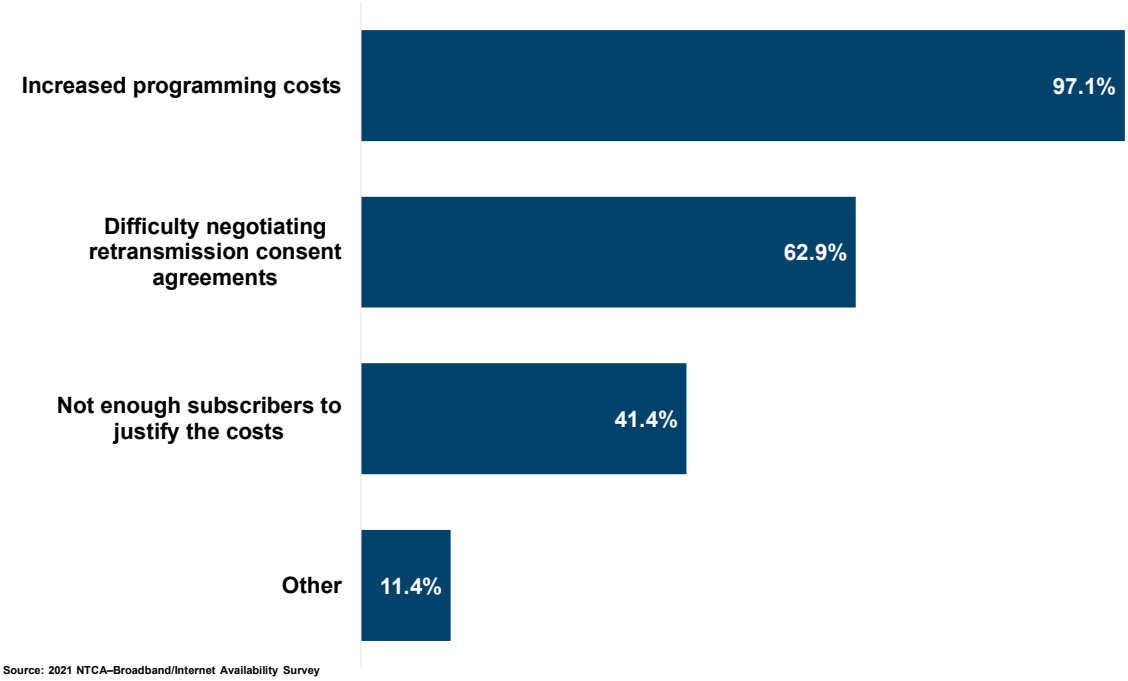
- Respondents who currently offer video service to their customers most frequently (84.2%) offer internet protocol television (IPTV).
- Cable TV (CATV) is offered by 27.1% of responding companies that offer video service, and another 18.0% report offering over the top media (OTT). Respondents were asked to select all of the types of video services that they offer. Some respondents report offering multiple types of video services, resulting in the combined percentage of all types of video services offered exceeding 100%. Less than one-third (31.1%) of responding companies *do not offer* video service to their customers.

Reasons for Discontinuing CATV or IPTV Services



Source: 2021 NTCA–Broadband/Internet Availability Survey

- The primary reason for discontinuing video service is increased programming costs (97.1%), although more than six in 10 also cite difficulty negotiating retransmission consent agreements (62.9%) and four in 10 report not having enough subscribers to justify the costs (41.4%).
- Of those that currently offer CATV or IPTV service, 79.0% say they will likely continue to do so for the foreseeable future; more specifically, 43.8% say they are very likely to continue and 35.2% say they are somewhat likely. Only 10.9% say they are not very likely to continue offering CATV or IPTV service, and 8.6% report that they already have plans to discontinue this service.

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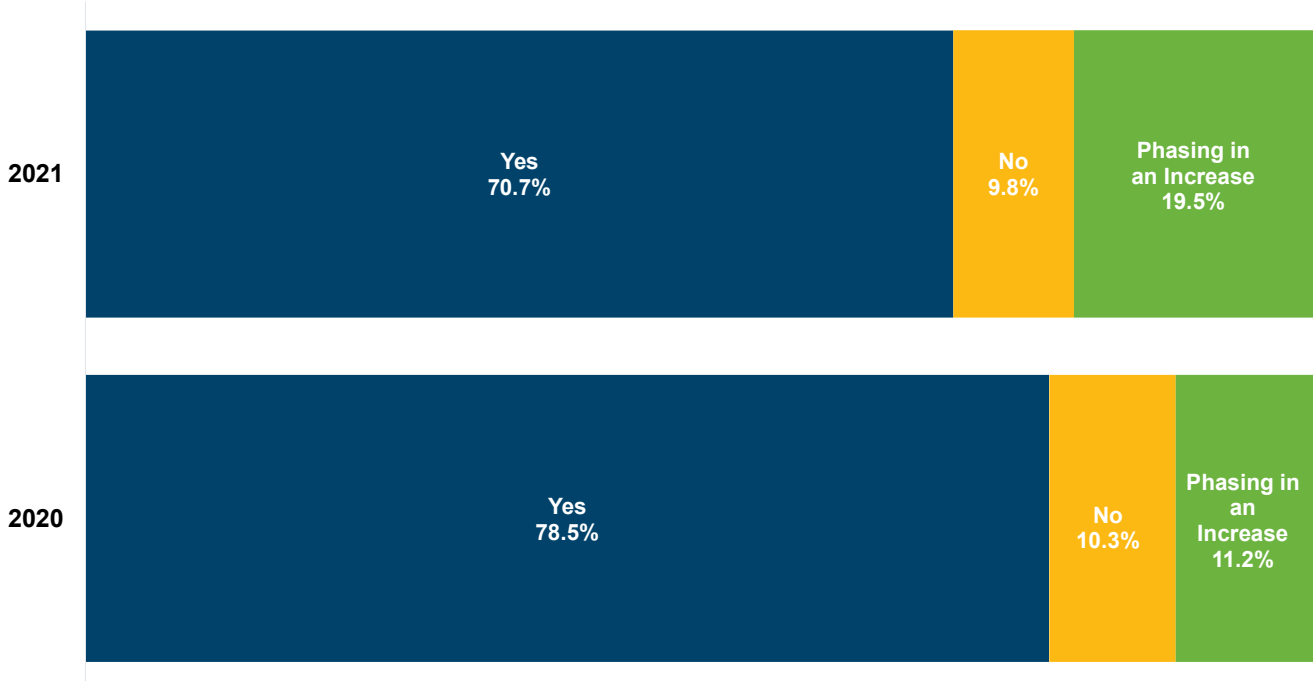
Total Retransmission Fee Increase Passed on to Video Subscribers



Source: 2021 NTCA–Broadband/Internet Availability Survey

- Nearly three-quarters (70.7%) of responding companies report that they passed the increase in retransmission consent fees on to their subscribers, lower than reported in 2020 (78.5%) and in 2019 (76.5%). Almost one in five (19.5%) are phasing in an increase, compared with 11.2% who reported the same in 2020 and 13.4% who said the same in 2019.
- The average percentage of total operating expenditures that went toward retransmission consent fees in 2021 was 35.0%, a slight increase when compared to the 31.4% reported in 2020.
- In the most recent consent agreement, the retransmission consent fees increased by an average of $63,609 total dollars. In 2020, the average amount in total dollars by which the retransmission consent fees increased was $55,452.

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CONCLUSIONS

- **NTCA members continue to expand their fiber-to-the-home deployments at higher broadband speeds.** The average proportion of customers served by fiber-to-the-home connections has increased from 69.9% in 2020 to 75.0% in 2021. Moreover, more respondent companies are offering higher broadband speeds than before, and more consumers are demanding higher speeds. About three-quarters of customers (75.6%), on average, now have access to 100 Mbps or higher downstream broadband speed, compared to 67.8% in 2020. The biggest increase this year comes in the Gigabit tier, where respondents report that an average of 55.4% of their customer base can receive a maximum downstream speed for fixed broadband greater than or equal to 1 Gig, up from 45.1% reported in 2020. The higher speed adoption rate also continues to increase. The percentage of respondents' customers who subscribe to a maximum broadband downstream speed of 100 Mbps or higher has increased from 28.1% in 2020 to 37.3% in 2021.
- **NTCA members continue to face barriers to widespread fiber deployment in rural America.** Top challenges include cost of deployment, fiber order fulfillment delays, long loops, and regulatory uncertainty. Notable this year is the increase in the percentage of respondents citing fiber order fulfillment delays as a barrier, up from 27.7% in 2020 to 57.0% in 2021, which is likely due in part to pandemic-driven supply chain disruptions. Equally notable is the high percentage of respondents (80.4%) experiencing an inability or delay in procuring supplies for network deployment, including fiber and customer premises equipment, among others. The impact of these delays or inability to procure necessary equipment has led to delayed installation of service at customer premises and delayed network construction for approximately two-thirds of responding companies.
- **NTCA members continue to provide critically important broadband service to anchor institutions in their communities.** Respondents provide robust levels of fixed broadband service to all of the public libraries, community colleges, state universities and extensions, 911 call centers, and hospitals/medical clinics located within their communities, and nearly all primary/secondary schools and public safety entities (police, fire department, etc.). These are critical lifelines for residents of their community and benefit the overall health and well-being of residents. Moreover, the average maximum speed of broadband available to anchor institutions in respondents' service area has increased from 1,428 Mbps in 2020 to 1,730 Mbps in 2021, and the average speed purchased by those institutions increased from 235 Mbps in 2020 to 313 Mbps in 2021.
- **Many NTCA members offer the Emergency Broadband Benefit ("EBB") to their customers.** Of the 68.2% that offer the EBB to their customers, one-third reported that 50 or more of their customers signed up for the discounted service.

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