NTCA 2016 BROADBAND/INTERNET AVAILABILITY SURVEY REPORT

July 2017

DISCLAIMER: Data from the survey has been presented as reported.

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EXECUTIVE SUMMARY

For nearly two decades, NTCA–The Rural Broadband Association has conducted its annual Broadband/Internet Availability Survey to gauge the deployment rates of advanced services by its member companies. In the spring of 2017, NTCA sent an electronic survey form to each of the companies (as reflected at the holding company level) in NTCA's email database; 172 members (29%) responded.

One hundred percent of the 2016 survey respondents offer broadband to some part of their customer bases, compared with the 58% of the year 2000 survey respondents who offered the then-lower definition of broadband service.[1] Respondents indicated that they use a variety of technologies within their respective serving areas to provide at least basic levels of broadband to their customers. Forty-one percent of respondents' broadband customers are served via fiber to the home (FTTH), 36% via copper loops, 12% cable modem, 9% fiber to the node (FTTN), 1% licensed and unlicensed fixed wireless, and 0.2% satellite.

Fifty-two percent of those survey respondents currently deploying fiber serve at least 50% of their customers with FTTH, while 24% serve 20% of their customers or less via such technology. Eighty-two percent of survey respondents indicated they had a long-term fiber deployment strategy. Thirty-nine percent of those respondents with a fiber deployment strategy plan to offer fiber to the node to more than 75% of their customers by year-end 2019, while 66% plan to offer fiber to the home to at least 50% of their customers over the same time frame. An additional 31% have already completed fiber deployments to all customers.

Deployment cost remains the most significant barrier to widespread deployment of fiber, followed by regulatory uncertainty, long loops, current regulatory rules, low customer demand, obtaining financing, fiber order fulfillment delays, and obtaining cost-effective equipment. Throughout the history of the survey, deployment cost has been respondents' most significant concern.

Approximately 0.3% of respondents' customers can receive a maximum downstream speed of between 768 kilobits per second (kbps) and 1.0 megabits per second (Mbps); 0.8% 1.0 to 1.5 Mbps; 2% 1.5 to 3.0 Mbps; 1% 3.0 to 4.0 Mbps; 3% 4.0 to 6.0 Mbps; 7% 6.0 to 10.0 Mbps; 20% 10.0 Mbps to 25.0 Mbps; and 67% greater than 25.0 Mbps.

Forty-one percent of survey respondents' customers taking broadband subscribe to service greater than or equal to 10 Mbps downstream. The next most popular speed tiers

[1] Beginning with the 2015 survey, broadband was defined as throughput of at least 3 Mbps in one direction. This was an update from earlier NTCA Broadband Surveys, which defined broadband as throughput of at least 768 kbps (from 2009 through 2014) or 200 kbps (from 2000 through 2008) in one direction.

are 6.0 Mbps to 10.0 Mbps (10%), and 4.0 Mbps to 6.0 Mbps (9%). The overall take rate for broadband service is 72% (virtually unchanged from 73% last year).

The average respondent is 68 miles from its primary internet connection; the median respondent is 38 miles away. Eighty-eight percent of those who recently changed backbone providers did so for price reasons. Seventy-three percent of respondents indicated they are generally satisfied with their current backbone access provider, while 27% are generally dissatisfied.

Survey respondents indicated they face some type of competition for broadband in limited portions of their serving areas from national internet service providers (ISPs), cable companies and fixed and/or mobile wireless internet service providers (WISPs.) Respondents are taking numerous marketing steps to increase broadband take rates, including free customer premise equipment installation, bundling of services, price promotions, free introductory service, free education and training, discounted computers or tablets, and free modems.

Thirty-three percent of respondents currently offer voice over internet protocol (VoIP) service, unchanged from last year. Forty-seven percent of respondents not currently offering VoIP have plans to do so in the foreseeable future, up from 38% last year. Seventy percent of respondents offer video service to their customers, down slightly from 72% last year.

INTRODUCTION

In the spring of 2017, NTCA–The Rural Broadband Association surveyed its members on their activities in the areas of providing broadband services and internet availability to their members/customers. NTCA is a national association representing nearly 850 rural rate-of-return regulated operating company telecommunications providers in 45 states. All NTCA members are small carriers that are "rural telephone companies" as defined in the Communications Act of 1934, as amended by the Telecommunications Act of 1996. Only four NTCA member study areas comprise 40,000 lines or more; the largest is just over 58,000. Population density in most member service areas is generally in the 1 to 5 customers per square mile range.

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.[2] This year's survey asked about technologies used to provide broadband service, broadband availability and subscription rates, prices charged, quantity and type of competition, broadband marketing

[2] Copies of this and previous NTCA survey reports may be downloaded from the NTCA web site, www.ntca.org/survey-reports/survey-reports.html.

efforts, fiber deployment, emerging technologies, internet backbone connections, finance and availability of capital. The survey also provided an opportunity for respondents to provide any specific comments they wished to share.

OVERVIEW OF SURVEY

The 2016 NTCA Broadband/Internet Availability Survey was conducted online. Every effort was made to minimize the reporting burden on the survey respondents.

The survey was composed of general questions about the respondents' current operations, competition/marketing and current and planned fiber deployment. Additional questions dealt with the internet backbone, voice over internet protocol (VoIP) and video. The survey also provided an opportunity for respondents to offer any miscellaneous thoughts.

SURVEY RESULTS

The survey URL for each part of the survey was distributed via email to all member companies in NTCA's email database. The message contained instructions for online access to the survey. Responses were received from 172 member companies, a 29% response rate.[3]

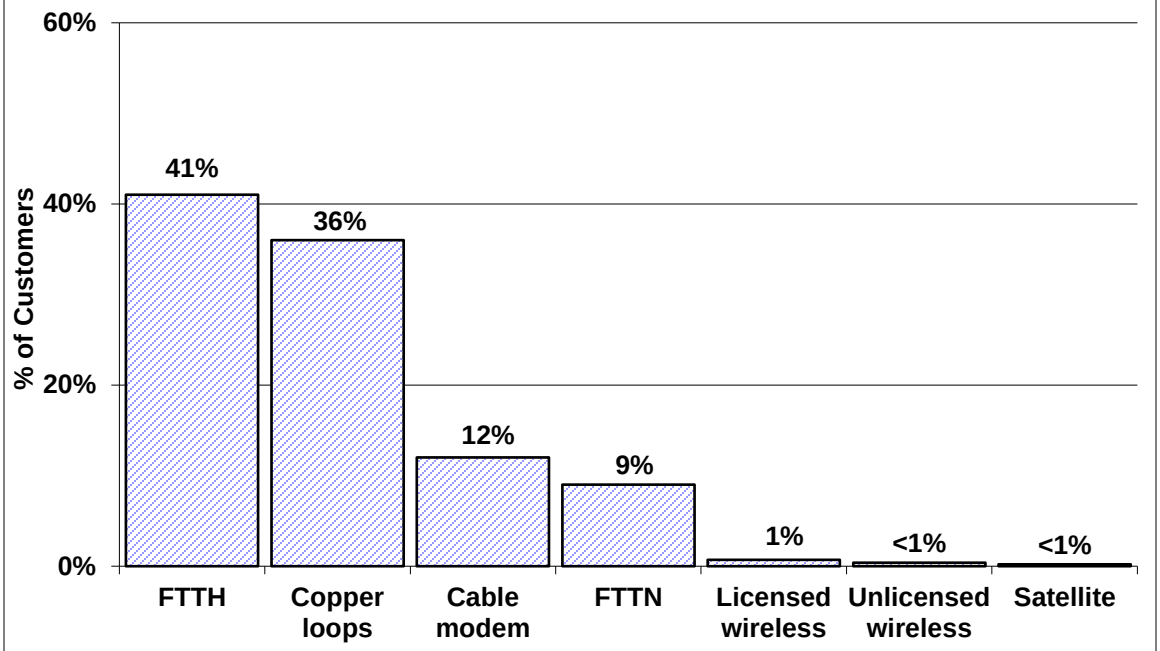
Fifty-seven percent of survey respondents' service areas are 500 square miles or larger; 25% are at least 2,000 square miles. Half—51%—have customer densities in their service area of 10 residential customers per square mile or less. More than one-fifth—22%—have customer densities of two residential customers per square mile or less.

The average survey respondent serves 4,723 residential and 1,463 business voice grade access lines; a few larger companies skew these numbers upward, hence the median respondent serves 2,227 residential and 611 business lines. One hundred percent of survey respondents offer broadband service to some part of their customer base.[4] Respondents indicated that they use a variety of technologies, even within individual serving areas, to offer at least basic levels of broadband to their customers: 41% of respondents' broadband customers are served via fiber to the home (FTTH), 36% via copper loops, 12% cable modem, 9% fiber to the node (FTTN), 1.1% licensed and unlicensed wireless, and 0.2% satellite. (See Figure 1.)

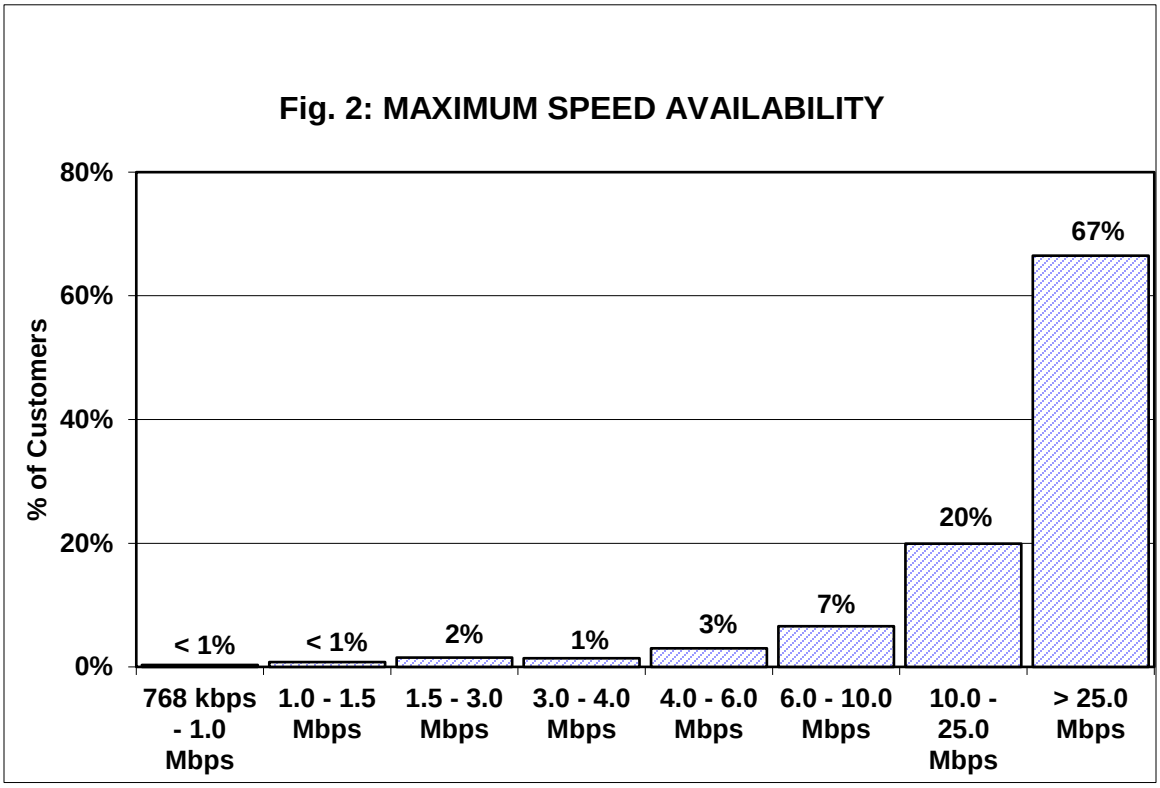
[3] Based on the sample size, results of this survey can be assumed to be accurate to within ± 6% at the 95% confidence level.

[4] For the purpose of this survey, broadband is defined as throughput of at least 3 Mbps in one direction.

Fig. 1: BROADBAND CUSTOMERS SERVED BY NETWORK PLATFORM

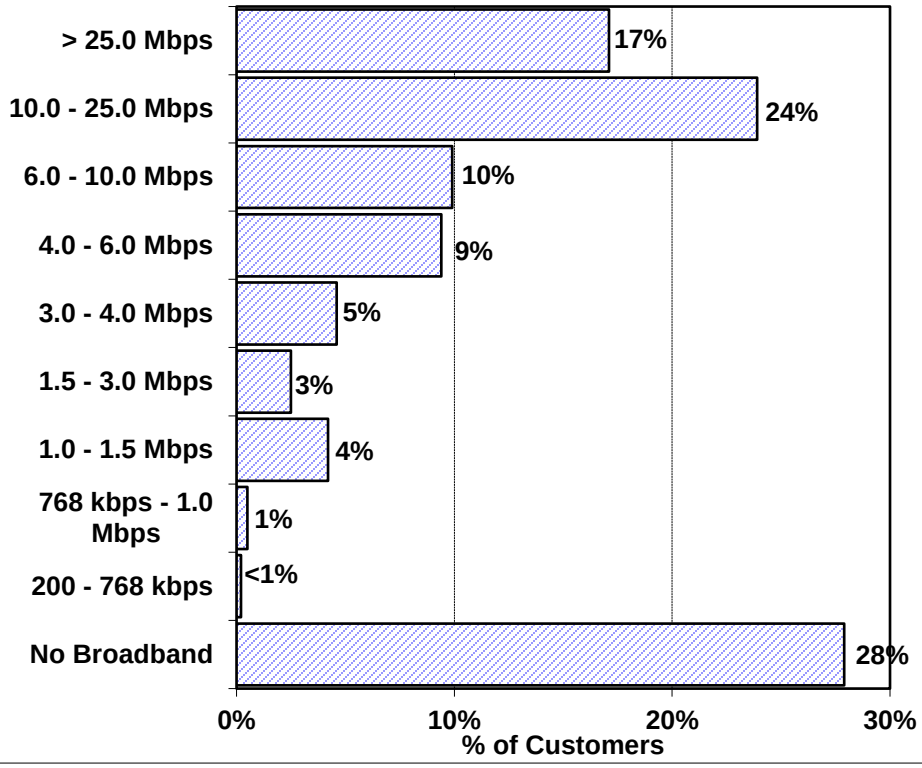


Approximately 0.3% of respondents' customers can subscribe to a maximum speed 768 kbps to 1.0 megabits per second (Mbps) service; 0.8% to 1.0 to 1.5 Mbps; 2% to 1.5 to 3.0 Mbps; 1% to 3.0 to 4.0 Mbps; 3% to 4.0 to 6.0 Mbps; 7% to 6.0 to 10.0 Mbps; 20% to 10.0 to 25.0 Mbps; and 67% to greater than 25 Mbps service. (See Figure 2.)



Survey results indicate an overall broadband take rate from NTCA member companies of 72%, approximately the same as 73% a year ago. By far, the most popular speed tier among survey respondents' broadband subscribers is between 10.0 Mbps and 25.0 Mbps—24% of survey respondents' customers subscribe to this level of service. Next most popular is greater than 25.0 Mbps (17%), followed by 6.0 Mbps to 10.0 Mbps (10%), 4.0 Mbps to 6.0 Mbps (9%), 3.0 to 4.0 Mbps (5%), 1.0 Mbps to 1.5 Mbps (4%), and 1.5 Mbps to 3.0 Mbps (3%) Non-broadband subscribers make up 28% of survey respondents' customer base. (See Fig. 3.)

Fig. 3: BROADBAND TAKE RATES BY SPEED TIER



Typical prices charged range from $34.95 to $44.95 for cable modem service, $29.95 to $49.95 per month for DSL service, $39.95 to $49.95 for wireless broadband service, and $39.95 to $59.95 for fiber-based broadband service.

Forty-two percent of survey respondents indicated their customers may purchase so-called "stand-alone DSL"—broadband service without a voice component. Take rates for stand-alone DSL service are relatively low, however, with the majority of those respondents offering stand-alone DSL reporting take rates of 10% or less, although some have take rates between 15 and 25%.

Twenty-seven percent of respondents estimate that they could bring all of their customers currently receiving service below 25 Mbps up to that speed for between $1 million and $10 million in additional capital investment. An additional 27% could do so for between $20 million and $50 million, 21% at a cost of $10 to $20 million, 18% for $1 million or less, and 7% estimate the total cost would be more than $50 million.

Survey respondents provide critically important broadband service to anchor institutions in their communities. The median respondent serves four public service entities (police,

fire, etc.); three primary/secondary schools; one public library; one hospital or medical clinic; as well as 911 call centers, post offices and city halls.

Fiber Deployment

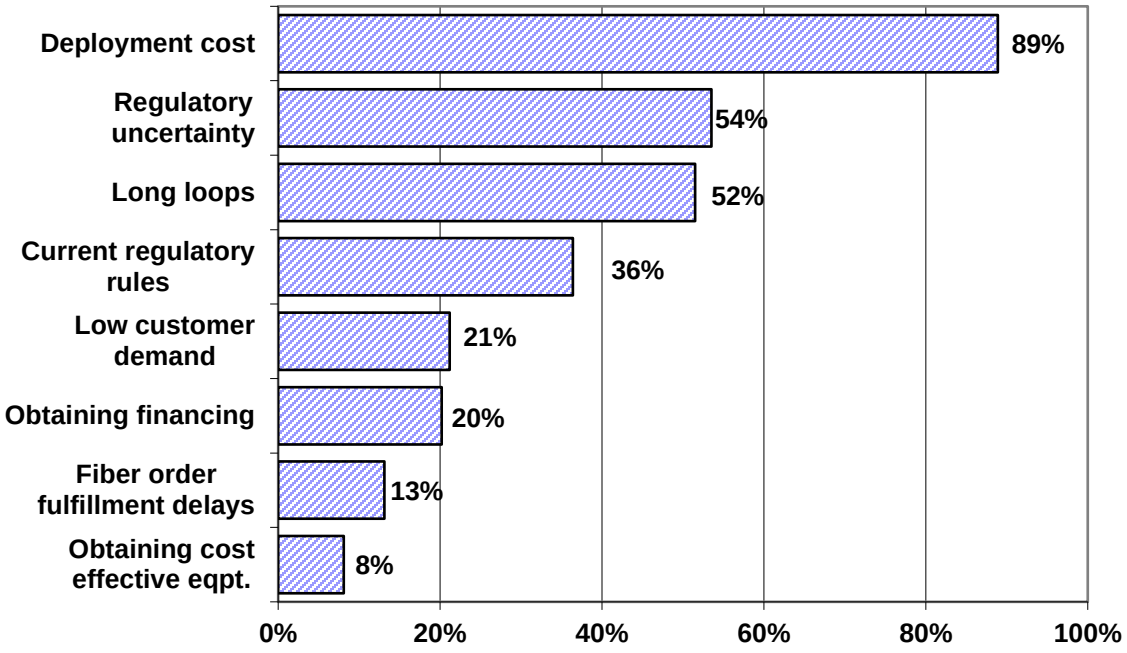
Fifty-two percent of those survey respondents currently deploying fiber serve at least 50% of their customers using fiber to the home (down from 55% last year), while 24% serve 20% of their customer base or less with fiber to the home (FTTH) technology (down from 26%.)

Survey respondents described their companies' plans to deploy fiber to the node (FTTN) and/or FTTH to their customers. Eighty-two percent of survey respondents indicated that they have a long-term fiber deployment strategy. Thirty-nine percent of those survey respondents with a fiber deployment strategy expect to offer fiber to the node to more than 75% of their customers by the end of 2019. Sixty-six percent of respondents expect to be able to provide FTTH to at least half of their customers by year-end 2019. An additional 31% have already completed fiber deployment to all of their customers.

Eighty-nine percent of survey respondents identified the cost of fiber deployment as a significant barrier to widespread deployment. Regulatory uncertainty was the number two barrier (54%, down from 79% last year), followed by long loops (52%), current regulatory rules (36%, down from 56%), obtaining financing (20%), low customer demand (21%), fiber order fulfillment delays (13%) and obtaining cost-effective equipment (8%).[5] (See Figure 4.)

[5] Totals exceed 100% as respondents were allowed to select more than one barrier.

Fig. 4: BARRIERS TO FIBER DEPLOYMENT



Internet Backbone

Survey respondents are, on average, 68 miles from their primary internet connection; the median distance is 38 miles. Eighty-eight percent of those respondents who recently switched internet backbone access providers did so for price reasons, while 25% switched due to quality of service concerns and 25% for other reasons, such as the ability to add redundant routes.[6] Seventy-three percent of respondents indicated they are generally satisfied with their current backbone access provider, while 27% are generally dissatisfied. Fifty-five percent of all survey respondents expect to need additional backbone capacity in one year or less.

Competition/Marketing

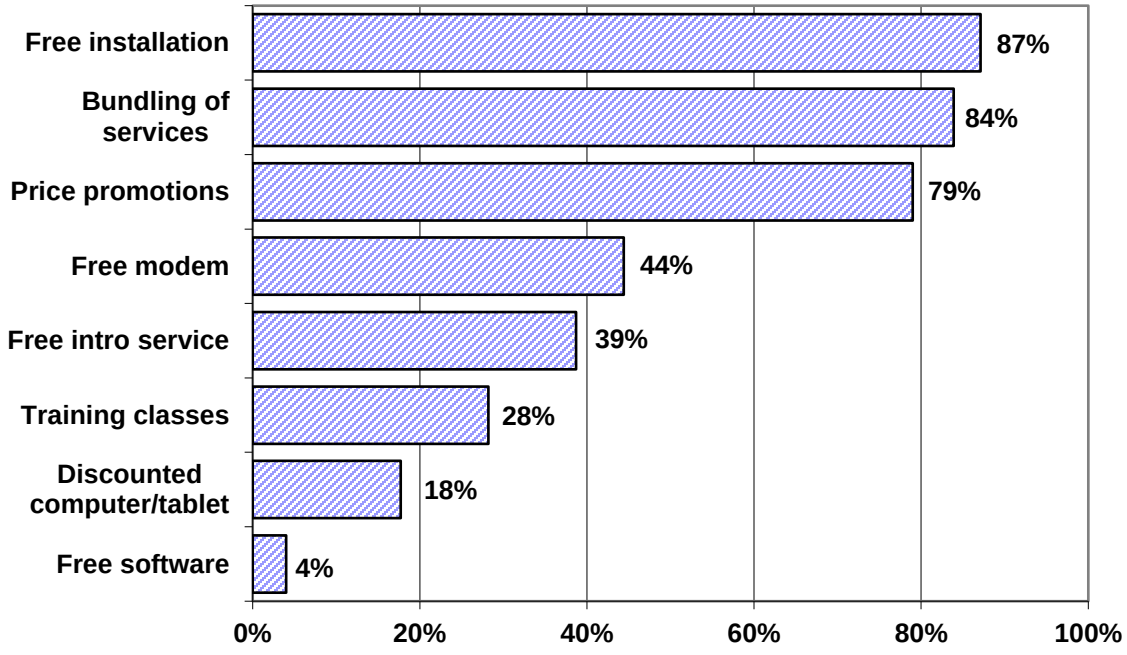
Virtually all survey respondents indicated that they face competition from at least one other service provider in some portion of their service area. Survey respondents typically compete with national ISPs, fixed and/or mobile wireless internet service providers

[6] Totals exceed 100% as respondents were allowed to select more than one reason for switching providers.

(WISPs) and satellite broadband providers. Other potential competitors include cable companies, electric utilities, local ISPs and neighboring cooperatives.

Rural incumbent local exchange carriers are taking numerous steps in the marketing arena to increase broadband take rates. Eighty-seven percent are offering free installation, 84% are bundling services, 79% are offering price promotions, 44% are offering free modems, 39% are offering free service for an introductory time period (such as 30 days), 28% are offering free education/training classes, 18% are offering discounted computers or tablets, and 4% are offering free software.[7] (See Figure 5.) Respondents consider their price promotions, bundling of services, and free installation to be their most effective marketing promotions.

Fig. 5: BROADBAND MARKETING PROMOTIONS



[7] Totals exceed 100% as respondents' companies may be offering more than one marketing promotion.

Other Services

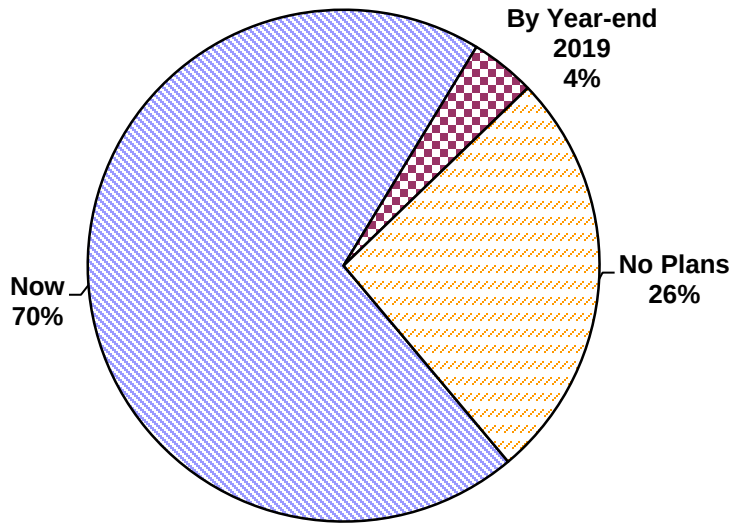
- **VoIP**

Thirty-three percent of survey respondents currently offer VoIP service to their customers, up slightly from 31% one year ago. Forty-seven percent of those respondents not currently offering VoIP have plans to do so in the foreseeable future, up from 38% last year.

- **Video**

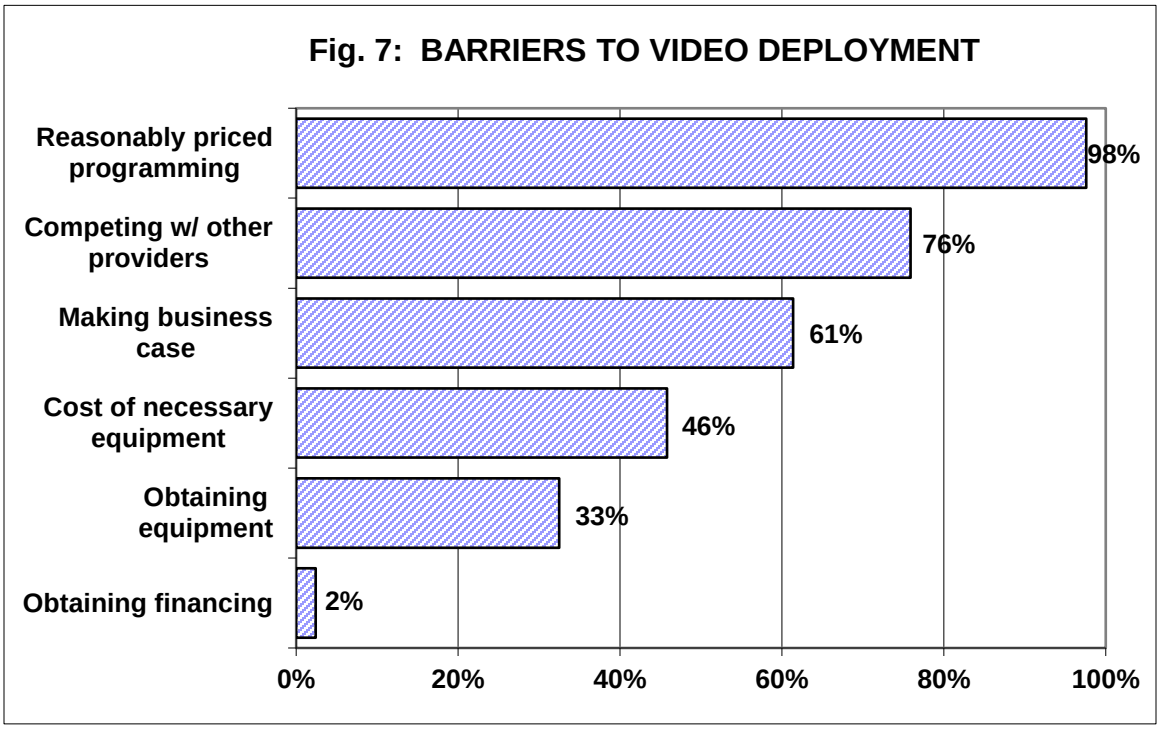
Seventy percent of survey respondents offer video service to their customers. Fourteen percent of those respondents not currently offering video (4% of all respondents) plan to do so by year-end 2019. The remaining 86% of those not currently offering video (26% of all respondents) currently have no plans to offer video service. (See Figure 6.) Seventy-eight percent of those planning a future video offering intend to offer internet protocol television (IPTV) service in the foreseeable future.

Fig. 6: OFFERING VIDEO SERVICE?



Of those respondents currently offering video services, 86% offer IPTV, and 51% offer legacy coax (CATV) service.[8] Twenty-nine percent of those providing CATV service use an analog system, while 71% use a digital system. The average respondent offers their customers three "tiers" of entertainment television packages from which to choose, unchanged from last year. Seventy-eight percent of the customers of those survey respondents offering video are able to watch programming on multiple devices, both inside and outside their home (i.e., "TV everywhere"), about the same as last year.

The main barrier facing those survey respondents providing video service is access to reasonably priced programming, as cited by 98% of survey respondents. Seventy-six percent cited difficulty competing with other providers, 61% the challenge of making a business case for video service, 46% the cost of necessary equipment, 33% difficulty obtaining necessary equipment, and 2% difficulty obtaining necessary financing.[9] (See Fig. 7.)



[8] Totals exceed 100% as respondents may offer more than one type of video service.
[9] Totals exceed 100% as respondents may be facing more than one barrier.

Miscellaneous

Survey respondents were asked what specific obstacles they have encountered in their efforts to deploy fiber to their customers, and how conditions would need to change to allow them to successfully overcome those obstacles. Their responses are presented in Appendix A of this report.

CONCLUSIONS

Respondents' customers are subscribing to faster broadband speeds. While the overall broadband take rate is generally the same (72% this year versus 73% last year), subscribers are moving up to higher speeds. This year, 17% of respondents' customers subscribed to broadband service in excess of 25 Mbps, versus 8% a year ago. Sixty percent subscribe to service of 4 Mbps or greater, versus 55% a year ago. And only 12% subscribe to service between 1 and 4 Mbps, versus 16%. Consumers are moving up the broadband speed chain; providers need to be prepared to offer them the level of service they demand.

While concerns about regulatory uncertainty have eased somewhat, they remain substantial. Fifty-four percent of survey respondents cited regulatory uncertainty as a significant barrier to broadband deployment, down from 79% in last year's survey. This is at least partially a result of steps taken by the FCC to attempt to ease the uncertainty. However, recent events have shown that small, rural providers are still subject to unforeseen and drastic changes to their support levels—clearly, much more remains to be done.

The pursuit of reasonably-priced video programming remains a nearly-universal struggle. Virtually all survey respondents offering video—98%—cited their ability to access affordably-priced programming as a significant impediment to their ongoing video operations. Unless this issue can be adequately addressed in the very near-term future, the ability of these providers to offer their customers high-quality, reasonably-priced video service will be seriously challenged.

Survey respondents provide critically important broadband service to community anchor institutions. These small providers serve public service entities (such as police and fire), primary and secondary schools, public libraries, hospitals and medical clinics, and numerous other important anchor institutions. In so doing, they make significant contributions to the safety, health and overall well-being of their customers. Their service helps facilitate the overall viability of rural America.

APPENDIX A

Q: What specific obstacles have you encountered in your efforts to deploy fiber to your customers, and how would conditions need to change to allow you to successfully overcome these obstacles?

New financial dynamics (viability) given new regulatory environment.

Cost of construction, regulatory environment

If grants were available to help with cost we would deploy fiber.

Cost of construction. We are ACAM so we are spending there, but without it we would have to have a business case and that is difficult in our very rural areas.

Less regulatory constraints.

Have been 100% FTTH since 2011. Very expensive to construct and operate, but delivers the bandwidth for future services.

We have completed fiber to all customers, trying to recover the build out costs, will take time, due to increasing expense cost to provide all services.

Length of subscriber loops and cost of fiber deployment.

Cost for deployment and customers don't want to pay more for higher speeds

Large service area. Lot of money to extend our fiber plant.

Reduced USF

It is expensive. Doing it in the rural area (2 customers/mile) has no hope on return on investment.

Some customers just don't want it because they feel a cell phone is enough

Cost and financing.

Once fiber is deployed, the cost of the customer premise equipment per location.

I have deployed 100% but construction costs are the biggest obstacle to deploying fiber. Increased penetration will justify costs eventually.

Time and money is issue. Selected ACAM and working to meet obligations and offer better service.

Rate of Return rules and FCC Obstacles

Reduction in support dollars due to fiber penetration. Broadband only support not realistic. Reduction in HCLS dollars.

Obtaining sufficient and sustainable cost recovery. You need the right people who support the availability of a wired network for the benefit of Rural Consumers.

I would like the FCC to stop chipping away at my recovery. Get more money in the USF budget to fund this. My other issue is pricing standalone broadband competitively and still being able to maximize recovery/profit.

The only way to deploy fiber in rural areas is to have some level of support for cost recovery.

We are a high cost area dependent on support for infrastructure build, at the time we need the support the most it has been reduced due to inaccurate data and insufficient challenge process giving no consideration for carriers in areas with COLR obligations as well as lack of choices for the rural consumer

Money, money, money. Shorter loops or un-capped USF programs.

Cost. Long loops.

Cost, Long Loops, Time to install

Money and time

Price barriers. Customers not interested in paying higher prices for fiber rate plans with greater speeds. Copper lines provide speeds with affordable plans.

High construction costs. TVA Electric Cooperatives have very high pole attachment rates and there needs to be some way for these costs to come down to reasonable levels.

Terrain adds to costs. Budget Control Mechanisms contained in the USF reforms have cut the amount of capital we have for fiber builds. These budget controls should be removed and the FCC should full fund the program to meet the demand of rural consumers and ensure they have services that are comparable and as affordable as urban Americans.

Money

Costs due to population density and number of subscribers

We have nearly 100% build out but financing was an issue. We received stimulus funds in the form of a grant and a loan. Without financial help, it wouldn't have been possible.

Financial cost to deploy

Not having the capital resources to deploy. However, the recent FCC A-CAM Model-based support will help us deploy fiber from 65% - 75% of our customer service base over 10 years. Would like to see the FCC extended the Model-based program to allow companies to be able to reach 100% of their customer service base.

We have built the lease expensive customers. Now faced by longer loop costs. Limited by FCC per location limit and effect of budget control mechanism

The cost of construction, conversion costs, and the cost of additional equipment.

We average 1/2 customer per square mile with extremely rough and rocky terrain. Cost of construction is prohibitive.

The sparse population in our service area when compared to the cost of deployment does not give us a business plan to do it. The regulatory environment would needs to change to cover those cost either through some mechanism.

Long loops.

We are 100% deployed

1. Difficult terrain 2. Existing utility congestion within easements. Changes needed: We need regulatory certainty that if one borrows money to complete the fiber build out, the support needed to repay that debt will not be taken away.

Regulatory uncertainty and cost recovery over time. Took the chance anyway, $10M for 973 customers for FTTH

Overall cost of the build and decreasing support dollars to pay back loans for that buildout

None

Having the cash flow to continue our phases of constructing and deploying FTTH. USF or any other support mechanism.

None

Increasing broadband adoption rates would help us (figuring out if it is on-line literacy, computer equipment in the home, or other factors that would increase take-rates)

Take rate and need for affordable financing options are our largest obstacles.
Cost. Additionally, as long as broadband only support remains broken we will continue to be unable to compete with encroaching cable companies like Time Warner/Spectrum.

Sufficient cost recovery is the biggest obstacle.

Rights of way is becoming harder to obtain.

Availability of fiber, cost, overcoming regulatory obstacles to serve other areas petitioning for fiber