

TABLE OF CONTENTS

SUMMARY iv

Introduction..... 3

Discussion..... 11

I. THE *TITLE II ORDER* CREATED DISPROPORTIONATE REGULATORY BURDENS AND UNCERTAINTY FOR SMALL BROADBAND PROVIDERS 11

 A. The *Title II Order* Has Discouraged Small Broadband Providers From Making Network Investments That Would Accelerate Broadband Deployment..... 11

 B. Eliminating The Regulatory Burdens Imposed On Small Providers In The *Title II Order* Will Benefit Consumers..... 16

 C. The Commission Should Exercise Its Statutory Authority To Ensure That Classifying Broadband As An Information Service Does Not Create Competitive Imbalance 19

II. THE COMMISSION HAS AND SHOULD EXERCISE ITS LEGAL AUTHORITY TO RESTORE BROADBAND INTERNET ACCESS SERVICE TO TITLE I “INFORMATION SERVICE” CLASSIFICATION 21

 A. The Commission Has Definitive Authority to Determine How To Regulate Broadband Providers Based On Its Analysis Of How Service Is Provided 21

 B. The Commission Has Separate Authority Under Section 706 To Establish A “Light Touch” Regulatory Approach To Promote Deployment Of Broadband Infrastructure 23

 C. The Commission Should Restore Broadband Internet Access Service To Title I Information Service Classification That Has Been Applied To It For Most Of The Past Four Decades..... 24

 D. Restoring Broadband Service to Information Service Classification, Especially For Small Providers, Would Be Consistent With The RFA 27

 E. The Commission Should Resolve The Uncertainty Over Section 222 Requirements by Restoring Broadband To Information Service Classification..... 28

 F. The Costs Of Retaining The Rules Adopted In The *Title II Order* Outweigh The Benefits To Consumers..... 31

III. THE COMMISSION SHOULD ELIMINATE THE GENERAL CONDUCT STANDARD..... 31

IV. THE COMMISSION SHOULD REAFFIRM ITS ADHERENCE TO THE FOUR INTERNET FREEDOMS, SUBJECT TO REASONABLE NETWORK MANAGEMENT..... 34

V.	THE COMMISSION SHOULD STREAMLINE THE ENFORCEMENT PROCESS FOR SMALL PROVIDERS.....	44
A.	The Commission Should Adopt A Comprehensive Enforcement Regime That Provides Greater Certainty	45
B.	The Commission Should Eliminate Advisory Opinions.....	48
	Conclusion	50

SUMMARY

This proceeding offers a golden opportunity for the Commission to right a wrong – the imposition of heavy-handed, “one-size-fits-all” regulations on small broadband providers that are less able to bear the costs, burdens, and uncertainties of the comprehensive Title II regime. Restoring broadband service to “information service” classification under Title I will provide fuel for small providers that are well-positioned and eager to help bridge the digital divide by bringing consumers in rural areas the benefits of broadband service. The Commission cannot have it both ways: it cannot impose disproportionate burdens on small broadband providers at the same time that it expects them to drive future deployment to our nation’s unserved communities and those where consumers lack competitive choice.

WISPA and its members have long believed that consumers are protected by an open and competitive Internet fundamentally rooted in the four “Internet freedoms” adopted by the Commission in 2005 and adherence to the “light touch” regulatory regime that existed before the *Title II Order* became effective. Small providers are poised to invest, innovate, and deploy new service to consumers if unshackled from stifling regulatory burdens. Unknown costs and burdens of overregulation impede small providers, who simply lack the resources to implement business plans that anticipate all of the potential pitfalls inherent in comprehensive common carrier regulation. A recent WISPA member survey reveals new costs imposed on small providers, with more than 80 percent of survey respondents reporting that Title II regulation has caused delay or reduction of network expansion and services, and/or allocation of significant financial resources to comply with the new rules.

The Commission has the legal authority to make an independent determination in this proceeding concerning the appropriate regulatory treatment of broadband Internet access service

based on its analysis of the facts concerning the present state of Internet technology and how these services are provided to the public. Restoring broadband service to “information service” classification and eliminating the “general conduct standard” will reduce regulatory burdens, compliance costs, enforcement risks, and uncertainty, and will increase the ability of broadband providers to reach unserved and underserved communities with affordable service.

In prior proceedings addressing the Commission’s role in Internet governance, WISPA has shown that Section 706 of the Act is a better basis than Title II to underpin Commission regulation of broadband access. In particular, Section 706(b) is affirmatively intended to encourage broadband deployment through targeted regulatory measures, whereas Title II is designed, in significant part, to constrain the market power of telephone monopolies, and necessarily requires significant and ongoing forbearance measures to adapt its terms to the much broader variety of providers that offer broadband access services. Jamming the square peg of Title II regulation into the round hole of the broadband marketplace has created harmful uncertainty that undermines regulatory consistency and investor confidence, thereby impeding salutary innovation and competition.

Any anti-competitive concerns can be addressed through a “light touch” regulatory regime that does not disproportionately penalize small broadband providers that lack market power. Small providers can be expected to expand into areas that currently do not have access to service and lie beyond the geographic footprints of large national providers. Such an approach will meet the Commission’s obligations under the Regulatory Flexibility Act to consider ways to minimize economic impacts on small businesses. Moreover, smaller providers will be better positioned to attract capital from outside investors that take into account the costs of regulation and regulatory uncertainty in determining their risk profiles. Consumers will benefit from

improved quality of service, service to more locations, and competition that will lower costs and trigger innovation in service plans.

The WISP industry, in particular, has succeeded because of the historical “light touch” approach. In the regulatory environment that prevailed during the nearly two decades beginning with the 1996 Telecom Act, WISPs have provided unsubsidized fixed wireless broadband services in urban, suburban and rural communities across the country. Many WISPs have established networks using spectrum previously dismissed as “junk” bands to cover large geographic areas in sparsely populated parts of the country that would otherwise be unserved, and are continuing to expand their coverage into other unserved areas, as well as to provide competitive services in more populous areas. In addition, removing broadband service regulation from Title II will restore the FTC’s jurisdiction over broadband privacy and data security, which provided successful oversight for decades prior to the *Title II Order*.

Any anti-discrimination rules, if retained under a “light touch” approach, must continue to account for the need of broadband providers to employ “reasonable network management,” which allows providers the freedom to address legitimate needs such as avoiding network congestion and combating harmful or illegal content. The Commission has correctly recognized that WISPs face unique challenges in this regard, juggling the management of networks using multiple unlicensed frequency bands that are often shared with other spectrum users. The Commission must take steps to ensure that small broadband providers and broadband providers that use unlicensed spectrum are not saddled with burdensome requirements that could undermine the Commission policies intended to encourage deployment of broadband services to all Americans and to reduce barriers to investment.

Small broadband providers are not a source of legitimate disputes arising from blocking, throttling or paid prioritization. In the event that such complaints are filed, even when frivolous or not relevant, a WISPA survey confirms that small providers redirect resources to addressing the allegations, and sometimes engage attorneys or other outside consultants to help resolve them. For these reasons, the Commission should eliminate the formal complaint process altogether. If the formal complaint process is retained, however, small providers should be exempt. The Commission also should streamline the informal complaint process by (1) requiring parties to attempt to resolve disputes during a mandatory 30-day period prior to the filing of a complaint; (2) requiring a complaint to be filed within one year of an alleged rule violation; (3) disallowing complaints where the broadband provider's network management practices are "*per se* reasonable," which should be defined under Commission rules consistent with WISPA's recommendations; (4) establishing a "shot clock" mandating that the Commission render a decision on any complaint within 60 days of the closing of the pleading cycle; and (5) amending Section 1.80 of the Commission's Rules to specify maximum forfeiture amounts for violations of Section 8 rules which take into account service provider size.

The digital divide in our country is real and persistent. Because of their cost-efficient model, WISPs can serve consumers in sparsely populated areas, where the cost to deploy wireline technologies is prohibitive. Title II has conferred some benefits on small providers, namely rights afforded under Sections 224 and 253 of the Act. The Commission, however, can maintain those benefits through its Section 706 authority. By ensuring that all broadband providers have the same infrastructure rights regardless of their regulatory classification or technology, the Commission can reduce delay and lower deployment costs, and thereby encourage broadband deployment to unserved and underserved areas.

disproportionate burdens and uncertainties on small broadband providers, and which have hindered their ability to invest in and expand their networks. Restoring broadband to “information service” classification and eliminating the “general conduct standard” codified in Section 8.11³ will substantially relieve these burdens and encourage new, better and more innovative broadband deployments, for the benefit of millions of consumers and small businesses.

To be clear, WISPA remains committed to basic “Internet freedoms” that the Commission established in 2005, but any regulations that may be adopted to secure these freedoms must remain subject to a proviso allowing “reasonable network management.” Such rules should be enforced though the streamlined and certain enforcement procedures WISPA proposes in Part V of these Comments.

As it reviews the record in this proceeding, the Commission must not lose sight of its obligations under the Regulatory Flexibility Act, as amended (the “RFA”),⁴ which require the Commission to discuss “significant alternatives” that would “minimize any significant economic impact of the proposed rule on small entities.”⁵ Consistent with these objectives, WISPA is pleased that the *NPRM* “emphasize[s] the outsize regulatory burdens that Title II reclassification has placed on small internet providers” and “seeks to reduce the compliance burdens of ISPs through the removal of unnecessary regulation.”⁶

In his April 26, 2017 speech previewing the *NPRM*, Chairman Pai reiterated that saddling small providers with burdensome Internet governance regulations negatively affects the ability of consumers to gain access to broadband: “Our nation’s smallest providers simply do not have the

³ 47 C.F.R. § 8.11.

⁴ 5 U.S.C. § 601 *et seq.*

⁵ 5 U.S.C. § 603(c).

⁶ *NPRM*, Appendix B, Initial Regulatory Flexibility Analysis (“*IRFA*”), at 4491.

means or the margins to withstand the Title II regulatory onslaught. And remember – these are the kinds of small companies who are critical to meeting consumers’ hope for a more competitive broadband marketplace and closing the digital divide.”⁷ These same concerns were echoed just last week by South Dakota Senator John Thune in an op-ed piece for the Recode website:

Today, 34 million Americans, mostly living in rural America, lack access to high-speed broadband services at home. As broadband service providers (and there are nearly 2,000 primarily small providers in the U.S.) weigh the profitability of making investments in high-cost areas, fear of future shifts in the political winds still loom large. Stated bluntly, investments to connect more Americans in states like mine may be slowed, or not made at all, if providers fear that regulators will pass new restrictions on their ability to recover costs and make fair profits from new infrastructure investments.⁸

In other words, the Commission cannot have it both ways: it cannot impose disproportionate burdens on small broadband providers at the same time it expects them to drive future deployment to our nation’s unserved communities and those where consumers lack competitive choice.

In these Comments, WISPA makes specific recommendations on measures the Commission should take consistent with its statutory obligations and the policy objectives of enabling investment, spurring innovation and balancing broadband deployment with consumer protection.

Introduction

About WISPA and its Members

WISPA represents the interests of wireless Internet service providers (“WISPs”) that provide IP-based fixed wireless broadband services to consumers, businesses, first responders,

⁷ Remarks of FCC Chairman Ajit Pai at The Newseum, *The Future of Internet Freedom*, Apr. 26, 2017, at 2.

⁸ Sen. John Thune, Op-Ed., *On this day of action, the internet needs a law, not a regulation*, Recode, July 12, 2017, available at <https://www.recode.net/2017/7/12/15949778/net-neutrality-day-of-action-open-internet-bipartisan-law-fcc-regulation> (last visited July 15, 2017).

and community anchor institutions across the country. WISPA's members include more than 800 WISPs, equipment manufacturers, distributors and other entities committed to providing affordable and competitive fixed broadband services. WISPs use unlicensed, lightly-licensed and licensed spectrum to deliver last-mile broadband and voice services to more than four million people, many of whom reside in unserved and underserved areas. Many WISPs also rely on underground and aerial fiber to deploy hybrid wireless/fiber broadband networks where it is economically feasible for them to do so.

A recent survey of WISPA's membership brings to light the very small size and rural focus of its operator members.⁹ The vast majority of respondents – 76.7 percent – reported serving 2,000 or fewer residential customers, and more than 56 percent reported having 1,000 or fewer residential customers. More than 75 percent of respondents indicated that they serve primarily rural areas. All respondents reported serving small businesses and more than 70 percent reported serving governments and first responders. More than half of the 196 respondents have one to five full-time employees, almost 70 percent have ten or fewer full-time employees, and 88 percent have 25 or fewer employees. These numbers are demonstrably less than the threshold size of 1,500 employees that the U.S. Small Business Administration uses to define “small entity” for Wireless Telecommunications Carriers (Except Satellite)¹⁰ and at or below the threshold of 25 employees that defines “small business concern” in the Small Business Paperwork Relief Act of 2002.¹¹

In addition to their small size, WISPs lack market power in other ways. First, they lack the capital necessary to consolidate and scale their networks to levels where they can exercise leverage over content providers. Second, unlike larger telco and cable broadband providers, they

⁹ The survey results are shown in Exhibit 1 hereto.

¹⁰ See 13 C.F.R. §121.201, NAICS Code 517210.

¹¹ See Small Business Paperwork Relief Act of 2002, 44 U.S.C. §§ 3501-20 (2002).

do not control the backbone transmission of the Internet and thus are at the mercy of the upstream provider from whom they must purchase connectivity at a price typically much higher than the cost to a telco or cable provider. Third, they do not control other access bottlenecks such as towers, utility poles, rights of way, conduits and other infrastructure which, if not available on fair and non-discriminatory terms, may preclude them from deploying service.

WISP Industry Support of the Four “Internet Freedoms”

WISPA and its members have long supported an open Internet fundamentally rooted in the four “Internet freedoms” adopted by the Commission in 2005 and adherence to the “light touch” regulatory regime that existed before the effective date of the 2015 *Title II Order*.¹² The WISP industry’s support is illustrated by a letter that 70 WISPs submitted to the Commission on May 9, 2017 in which they pledged fidelity to “freedom of consumers to access lawful content, freedom of consumers to use non-harmful applications of their choice, freedom of consumers to attach personal devices to broadband networks, and freedom of consumers to obtain service plan information.”¹³ In a letter submitted the next day, WISPA similarly stated that “WISPA supports and will continue to support the fundamental principles of openness, transparency and privacy protection for all consumers.”¹⁴ WISPA also has committed to a voluntary set of privacy and data security principles to ensure transparency, consumer choice and security based on the Federal Trade Commission’s (“FTC”) long-standing consumer protection framework.¹⁵

As further discussed herein, these Open Internet principles can be assured through “light touch” regulation. To quote Chairman Pai, “this is not a choice between Title II regulation or a

¹² See *Protecting and Promoting the Open Internet*, Report and Order on Remand, Declaratory Ruling, and Order, 30 FCC Rcd 5601 (2015) (“*Title II Order*”), *aff’d*, *United States Telecom Ass’n v. FCC*, 825 F.3d 674 (D.C. Cir. 2016) (“*US Telecom*”), *reh’g denied*, 855 F.3d 381 (D.C. Cir. 2017) (“*US Telecom Rehearing*”).

¹³ Letter from Mark Radabaugh, President of Amplex, *et al.*, to The Honorable Ajit Pai, FCC Chairman, *et al.*, WC Docket No. 17-108 (filed May 9, 2017) (“70 WISP Ex Parte Letter”), at 1.

¹⁴ Letter from S. Jenell Trigg, Counsel to WISPA, to Marlene H. Dortch, FCC Secretary, WC Docket No. 17-108 (filed May 10, 2017) (“WISPA Ex Parte Letter”), at 1.

¹⁵ See Joint Petition for Stay, WC Docket No. 16-106 (filed Jan. 27, 2017), at Appendix A.

Wild West in which ISPs can do whatever they please. There are other, proven paths to an Open Internet (like the Clinton-era approach) that are more market-friendly.”¹⁶ This is especially true in the case of small providers, who are poised to invest, innovate and deploy if unshackled from stifling regulatory burdens.

The Rural Broadband Problem

As Commissioner Clyburn has observed, many rural communities lack competitive choice in broadband access:

If the lack of fixed broadband is problem number one, the clear number two, is figuring out how to unleash greater opportunities for competition and choice. Today, a mere 24 percent of census blocks in the United States have competition, and in rural America, where the economics of building broadband make it a more difficult business case, choice is rare to non-existent. Only six percent of rural census blocks have fixed broadband competition....¹⁷

In a recent Fierce Telecom article, Jeff Kohler, co-founder and chief development officer of WISPA member Rise Broadband, described the rural broadband divide as follows: “The digital divide problem is not only just about speed, it’s about competition and choice. And we’re a long way from getting choice out to these rural areas.”¹⁸

The Commission’s *2016 Broadband Progress Report* confirms the lack of fixed broadband availability and competition in rural areas, reporting that five percent of rural Americans lack access to fixed broadband service at 4/1 Mbps, six percent lack access to 10/1

¹⁶ Ajit Pai, Op-Ed., *FCC chairman: Strict regulations stifle competition*, USA TODAY, May 17, 2017, available at <https://www.usatoday.com/story/opinion/2017/05/17/fcc-strict-internet-regulations-stifle-competition-editorials-debates/101802528/> (last visited July 14, 2017).

¹⁷ *Improving Competitive Broadband Access to Multiple Tenant Environments*, Notice of Inquiry, GN Docket No. 17-142, FCC 17-78 (rel. June 23, 2017), Statement of Commissioner Mignon L. Clyburn.

¹⁸ See Mike Dano, *Top 10 ISPs to watch: From C Spire to Redzone to Sonic*, FIERCE TELECOM, June 26, 2017, available at <http://www.fiercetelecom.com/special-report/top-10-isps-to-watch-from-c-spire-to-redzone-to-sonic> (last visited July 14, 2017) (“Fierce Telecom Article”).

Mbps service, and 39 percent (23 million people) lack access to 25/3 Mbps service.¹⁹ Rural Americans also lack choice – 48 percent have access to one provider and only 13 percent have access to more than one provider.²⁰ The *2016 Broadband Progress Report* also found a correlation between broadband access and household income, concluding that “[o]n average, the proportion of the population without access is highest in counties with the lowest median household population, the lowest population density, the highest rural population and the highest poverty rate.”²¹ According to the U.S. Department of Agriculture, 85.3 percent of persistent poverty counties – those that have been high in poverty over the last 30 years – are in nonmetro areas.²² Chairman Pai recently summed it up:

If you live in rural America, you are much less likely to have high-speed Internet service than if you live in a city. If you live in a low-income neighborhood, you are less likely to have high-speed Internet access than if you live in a wealthier area. The digital divide in our country is real and persistent.²³

As the above statistics and statements confirm, rural consumers are less likely to have access to affordable residential broadband service than their urban counterparts.

A primary reason for this ongoing gulf is that wired technologies such as fiber-to-the-premises (“FTTP”) and cable broadband cannot be cost-effectively deployed in areas with sparse

¹⁹ *2016 Broadband Progress Report*, 31 FCC Rcd 699, 731-32 (2016); see also *id.* at 738, n.261 (average land area of census tracts without 25/3 Mbps access is 84.8 square miles compared to 5.9 square miles for census tracts with access).

²⁰ See *id.* at 736, Table 6.

²¹ See *id.* at 740 (footnote omitted).

²² The United States Department of Agriculture, *Geography of Poverty* available at <https://www.ers.usda.gov/topics/rural-economy-population/rural-poverty-well-being/geography-of-poverty/> (March 1, 2017) (last visited July 15, 2017). “Persistent poverty also demonstrates a strong regional pattern, with nearly 84 percent of persistent-poverty counties in the South, comprising of more than 20 percent of all counties in the region.” *Id.*

²³ Remarks of FCC Chairman Ajit Pai at the American Enterprise Institute, *The First 100 Days: Bringing the Benefits of the Digital Age to All Americans*, May 5, 2017 (“Pai AEI Speech”), at 2. Chairman Pai also recently noted that “[i]n urban areas 98% of Americans have access to high-speed fixed service. In rural areas, it’s only 72%. 93% of Americans earning more than \$75,000 have home broadband service, compared to only 53% of those making less than \$30,000.” Remarks of FCC Chairman Ajit Pai at *Broadband for All Seminar*, Stockholm, Sweden, June 26, 2017 (“Pai Stockholm Speech”), at 1.

population density.²⁴ The *Wall Street Journal* reported just last month that “[r]ural America can’t seem to afford broadband: Too few customers are spread over too great a distance. The gold standard is fiber-optic service, but rural Internet providers say they can’t invest in door-to-door connections with such a limited number of subscribers.”²⁵ A new economic report provides the following example:

To illustrate, consider a neighborhood of 100 homes requiring a [fiber] network of 1,000 feet. If the average labor and materials for the labor was \$20/foot, then this network would cost \$20,000 to build, or \$200 per home passed. Now, consider the same neighborhood with 10 homes, but still has the same network requirements to reach them all – the cost per home increases to \$2,000, a decidedly less profitable and economically feasible arrangement. *Unless the cost structure or the revenue potential of an area changes, then all else equal, a more rural area will not be built with fiber.*²⁶

As the discussion above makes clear, the nation’s largest FTTP and cable broadband providers cannot be reasonably expected to have the wherewithal to provide fixed broadband service to rural communities that lack access. Rather, small providers will fill much of that void with high-quality and affordable fixed wireless service.

Solving the Rural Broadband Problem

According to the *2017 Internet Access Report*, residential fixed wireless connections quadrupled from June 2012 to June 2016, the largest increase of any terrestrial broadband

²⁴ See, e.g., Daisuke Wakabayashi, *Google Curbs Expansion of Fiber Optic Network, Cutting Jobs*, N. Y. TIMES, Oct. 25, 2016, available at https://www.nytimes.com/2016/10/26/technology/google-curbs-expansion-of-fiber-optic-network-cutting-jobs.html?_r=0 (last visited July 14, 2017) (“In June [2016], Google Fiber announced that it was acquiring Webpass, a company that beams high-speed internet into apartment buildings using a fiber-connected antenna. This and other wireless technologies provide a quicker and less expensive way to expand access to faster web speeds.”); see also Hal Singer, *Assessing the Impact of Removing Regulatory Barriers on Next Generation Wireless and Wireline Broadband Infrastructure Investment*, (June 2017) (“Singer Infrastructure Report”), at 32 (estimating that, even if infrastructure barriers are removed, only 71 percent of the nation’s premises will be economically viable for fiber).

²⁵ Jennifer Levitz and Valerie Bauerlein, *Rural America is Stranded in the Dial-Up Age*, WALL ST. J., June 16, 2017, at A1. The article estimates that it costs \$30,000 per mile to install optical fiber.

²⁶ Singer Infrastructure Report at 14 (emphasis added).

technology.²⁷ A new report prepared by The Carmel Group (“Carmel Report”) expects this trend to continue, forecasting a doubling of customer growth in the next five years.²⁸ Primary drivers of this expected growth include dramatically lower deployment costs (about one-seventh the capital expense of FTTP and about one-fourth the capital expense of cable broadband); declining equipment costs fueled by competition and global standards; improved technology that enables faster speeds and higher throughput; and rising consumer demand for video.²⁹ Quoting a study prepared by consulting firm Wireless 20/20, RCRWireless reported that “fixed wireless could reduce capital expenditures by more than 50% for many low-density CAF II funded high-cost rural broadband deployments.”³⁰ As Rise Broadband’s Jeff Kohler explained, “[t]he economics of the [fixed wireless broadband] business are very favorable ... because it costs somewhere between a fifth to a tenth of the cost of building a traditional wireline network, be it cable or fiber.”³¹ Because of the lower-cost model, WISPs can serve sparsely populated areas where the cost to deploy wireline technologies is prohibitive and can begin receiving a return on investment in less than one year,³² and therefore can re-invest capital into network deployment, upgrades and customer acquisition.

²⁷ See *Internet Access Services: Status as of June 30, 2016*, Industry Analysis and Technology Division, Wireline Competition Bureau (April 2017) (“*2017 Internet Access Report*”), at 18, Fig. 16 (speeds of at least 3 Mbps downstream and 768 kbps upstream as reported on FCC Form 477).

²⁸ See The Carmel Group, *Ready for Takeoff: Broadband Wireless Access Providers Prepare to Soar with Fixed Wireless*, (2017) (“Carmel Report”), at 10, Fig. 4. The Carmel Report is attached as Exhibit 2 hereto.

²⁹ See *id.* at 11-16.

³⁰ Berge Ayvazian, *Analyst Angle: 4G LTE leveraged for fixed wireless broadband in rural communities*, RCRWIRELESS, June 6, 2017, available at <http://www.rcrwireless.com/20170606/analyst-angle/20170606wireless4g-lte-leveraged-for-fixed-wireless-broadband-in-rural-communities-tag10> (last visited June 27, 2017).

³¹ Fierce Telecom Article.

³² See Carmel Report at 12.

Excessive and unnecessary regulations impose disproportionate costs and burdens on small providers, all of whom lack market power. Over the last several years, WISPA³³ and others³⁴ have pointed out the harmful effects that a “one-size-fits-all” regulatory approach will have on small providers. Although the Commission exempted providers with 100,000 or fewer connections from the “enhanced” disclosure obligations adopted in the *Title II Order*, it rejected other proposals that would have reduced regulatory burdens. In his statement dissenting from the *Title II Order*, then-Commissioner Pai summarized filings in the record:

[T]hese WISPs have deployed wireless broadband to customers who often have no alternatives. They rely heavily on unlicensed spectrum, take no federal subsidies, and often run on a shoestring budget with just a few people to run the business, install equipment, and handle service calls.³⁵

A solution is in sight, one that will both remove regulatory burdens and empower small broadband providers – “often the linchpin of a more competitive marketplace”³⁶ – to help bridge the digital divide. The discussion and proposals that follow will help achieve those goals.

³³ See, e.g., WISPA Comments, GN Docket No. 14-28 (filed July 16, 2014) (“WISPA Title II Comments”); WISPA Reply Comments, GN Docket No. 14-28 (filed Sept. 15, 2014); WISPA Comments Regarding the Initial Regulatory Flexibility Analysis, GN Docket No. 14-28 (filed July 16, 2014); WISPA Comments Regarding the Paperwork Reduction Act, GN Docket No. 14-28 (filed July 20, 2015); WISPA Comments Regarding the Paperwork Reduction Act, GN Docket No. 14-28 (filed Sept. 12, 2016).

³⁴ See, e.g., Regulatory Flexibility Act Comments of the National Cable & Telecommunications Association, GN Docket No. 14-28 (filed July 15, 2014); Comments of the American Cable Association, GN Docket No. 14-28 (filed July 17, 2014), at 32 n.79.

³⁵ *Title II Order* at 5931 (Dissenting Statement of Commissioner Ajit Pai) (“Pai Title II Dissent”).

³⁶ Pai AEI Speech at 3.

Discussion

I. THE *TITLE II ORDER* CREATED DISPROPORTIONATE REGULATORY BURDENS AND UNCERTAINTY FOR SMALL BROADBAND PROVIDERS

A. The *Title II Order* Has Discouraged Small Broadband Providers From Making Network Investments That Would Accelerate Broadband Deployment

The current Title II regulatory regime imposes a disproportionate and unfair burden on small broadband providers. Then-Commissioner Pai noted this specific problem in his lengthy dissent from the *Title II Order*:

Today there are thousands of smaller Internet service providers – wireless Internet service providers (WISPs), small-town cable operators, municipal broadband providers, electric cooperatives, and others – that don't have the means or the margins to withstand a regulatory onslaught. Imposing on competitive broadband companies the rules designed to constrain Cornelius Vanderbilt's railroad empire or the continent-spanning Bell telephone monopoly will do nothing but raise the costs of doing business. Smaller, rural competitors will be disproportionately affected, and the FCC's decision will diminish competition – the best guarantor of consumer welfare.³⁷

In some respects, the regulatory costs are out-of-pocket expenses to revise open Internet disclosure statements, to hire attorneys to explain the meaning and practical impact of the *Title II Order*, and to respond to customer complaints. In other respects, the costs cannot be quantified because of the substantial uncertainty the rules and other requirements impose. For instance, how would the Commission interpret the “general conduct rule,” especially in a case where a large edge provider was unreasonably interfering with a small provider's ability to ensure quality service to customers? What constitutes a “reasonable request” for service under Section 201 of the Act when a consumer requesting service can only be served with new infrastructure? Would the Commission sanction a formal complaint process that could bankrupt a small provider, or require it to diminish service that would lead to complaints from other consumers or edge providers? How can small providers plan for such contingencies? As the *NPRM* explains,

³⁷ Pai Title II Dissent at 5930.

“[r]egulatory uncertainty may have particularly significant effects on small Internet service providers, which may be poorly equipped to address the legal, technical, and financial burdens associated with an uncertain regulatory environment.”³⁸ It is the unknown costs and burdens of overregulation that impede small providers, who simply lack the resources to implement business plans that anticipate all of the potential pitfalls inherent in comprehensive common carrier regulation. As former FCC Chairman Michael Powell very recently observed: “The only thing that will slow down one’s internet experience is if overregulation robs internet builders of the incentives to pour more investment into the network.”³⁹

WISPA is pleased that the *NPRM* specifically acknowledges that the record in the *Title II Order* proceeding included concrete evidence that small providers “have been forced to reduce their investment and halt the expansion of their networks, and slow, if not delay, the development and deployment of innovative new offerings.”⁴⁰ Citing from declarations submitted by WISPs and other small broadband providers, the *NPRM* correctly observes that “[t]his depressed investment has had particularly strong impacts on the deployment of broadband to previously unserved and rural areas.”⁴¹ In other words, the rules and obligations adopted in the *Title II Order* do not exist in a vacuum, but inhibit the ability of our nation’s smallest broadband providers to accelerate the deployment of broadband to those that do not have access today.

The Commission asks “how the classification of broadband Internet access service as a telecommunications service has impacted smaller broadband Internet access service providers, many of whom lack the dedicated compliance staffs and financial resources of the nation’s

³⁸ *NPRM* at 4451.

³⁹ Michael Powell, *Today’s Misdirected Day of Action*, Medium, July 12, 2017, available at <https://medium.com/@chairmanpowell/todays-misdirected-day-of-action-faea1e112b63> (last visited July 14, 2017).

⁴⁰ *NPRM* at 4450.

⁴¹ *Id.* at 4450-51(footnote omitted).

largest providers.”⁴² The practical effects of the Title II era over the last two years demonstrate the pervasive and continuing impact on investment and deployment. The 70 WISP Ex Parte Letter, a joint letter submitted by 70 fixed wireless broadband providers that “are investing private, at-risk capital to build networks serving small businesses and residential customers in areas where others choose not to serve,”⁴³ makes clear that the harms identified in 2015 continue:

Our challenges are exacerbated by the Title II Order the FCC adopted in 2015, which has significantly increased compliance burdens and regulatory risk through heavy-handed regulation that is rife with uncertainty. Operating in an already difficult environment, these burdens, risks, and uncertainty combine with diminished access to capital to create a vicious cycle – the regulatory burdens make it more difficult to attract capital, and less capital makes it more difficult to comply with regulatory burdens.⁴⁴

WISPA and fixed wireless providers are not alone in asking the Commission to lift Title II burdens from small providers. In an April 25, 2017 letter, 22 other small providers explained that they lack “market power or ‘gatekeeper’ control over our customers or upstream Internet edge providers, to justify the imposition of utility-style regulation on our broadband service.”⁴⁵ Another letter, filed on behalf of 19 non-profit municipal broadband providers, affirmed that “[f]or the past two years, the substantial costs of the 2015 decision have harmed our businesses. Because the rules are so complex and so difficult to fathom, we must pay lawyers and consultants to provide advice and direction to minimize any risk that we will be judged after-the-fact to be out of compliance.”⁴⁶ The 70 WISP Ex Parte Letter similarly emphasizes that “[l]arger companies – many of which are our competitors, have large compliance departments and resources that can handle subscriber complaints in the ordinary course of business, and can pass

⁴² *Id.* at 4450.

⁴³ 70 WISP Ex Parte Letter at 1.

⁴⁴ *Id.*

⁴⁵ Letter from Herb Longware, President of Cable Communications of Willsboro, Inc., *et al.*, to The Honorable Ajit Pai, GN Docket No. 14-28 and WC Docket No. 16-106 (filed April 25, 2017) (“22 Small Provider Ex Parte Letter”), at 1.

⁴⁶ Letter from William Bottiggi, BELD Broadband General Manager, *et al.*, to the Honorable Ajit Pai, FCC Chairman, WC Docket No. 17-108 (filed May 11, 2017) (“Muni Ex Parte Letter”), at 2.

through such expenses to a large subscriber base to lessen any increase in costs to their subscribers. That is not true for small providers.”⁴⁷

In her dissenting statement, Commission Clyburn states that she has “not heard a single concrete example [of] a service or feature that was not offered because of the open internet rules.”⁴⁸ Yet the 22 Small Provider Ex Parte Letter noted above undercuts this point, stating that:

We can tell you that the 2015 Open Internet rules hang like a black cloud over us. . . . Further, because the Commission’s reach under the Open Internet rules appears to be virtually unlimited, each of us has slowed, if not halted, the development and deployment of innovative new offerings which would benefit our customers. In brief, for us and our customers, the rules have been all cost and no benefit.⁴⁹

The Muni Ex Parte Letter emphasizes that “we often delay or hold off from rolling out a new feature or service because we cannot afford to deal with a potential complaint and enforcement action. As a result, our customers lose out on having access to innovations and new capabilities.”⁵⁰ Moreover, the results of WISPA’s member survey illustrate that the *Title II Order* has imposed new costs on small providers, has curtailed services and barred the introduction of new ones. More than 80 percent of survey respondents reported that they had incurred additional expense in complying with the Title II rules, had delayed or reduced network expansion, had delayed or reduced services and had allocated budget to comply with the rules.

The costs and effects include the following:

- Modified web pages and terms of service
- Changes in network management
- Legal costs to assure compliance (including in one case a 300 percent increase in legal costs)
- “We will start charging a fee to cover the expense to all customers”
- Pulled out of two markets
- Cancelled VoIP service

⁴⁷ 70 WISP Ex Parte Letter at 2.

⁴⁸ *NPRM* at 4500 (Dissenting Statement of Commissioner Mignon L. Clyburn) (“Clyburn *NPRM* Dissent”).

⁴⁹ 22 Small Provider Ex Parte Letter at 2.

⁵⁰ Muni Ex Parte Letter at 2.

These are not “minor adjustments necessary to adapt to the new regulatory reality,” but concrete, tangible evidence that consumers and small businesses in unserved and underserved rural communities have seen service decline, innovation stall, and costs increase.⁵¹

In a June 27, 2017 letter, a group of 41 small Internet service providers indicated their support for continuing to regulate broadband Internet access service under Title II.⁵² These providers believe that common carrier regulation is necessary “to address the anticompetitive practices of the largest players in the market” and that restoring “information service” classification will “enhance their market power without any meaningful restraints on their ability to monopolize large swaths of the Internet.”⁵³ WISPA suggests that these anti-competitive concerns can be addressed through a “light touch” regulatory regime that does not penalize all broadband providers, those with market power and those without, in the same manner, and that

⁵¹ Clyburn *NPRM* Dissent at 4500. Commissioner Clyburn also questions statements made in a declaration submitted by Nathan Stooke, CEO of Wisper ISP, Inc. (“Wisper”), a rural WISP in the Midwest with about 13,000 residential and business customers. *See id.* She points to press releases stating that Wisper acquired two WISPs shortly after the *Title II Order* was adopted and implies that the acquisitions conflict with Mr. BELD statements that Wisper put its network expansion plans on hold. *See id.* Commissioner Clyburn’s conclusions are incorrect. First, Wisper’s acquisition of other, smaller WISPs is irrelevant to capital investment in its own existing network. Wisper reports that it continues to defer some network investment and expansion as a consequence of the risks attendant to the *Title II Order*. Second, the acquisition of the Lincoln County WISP was a distressed sale of a much smaller WISP. For less than \$25,000, Wisper acquired 124 customers from a company that was even less equipped than Wisper to handle the “regulatory onslaught” of the *Title II Order*. Wisper believes that if it had not acquired the Lincoln County WISP, that company would have closed its doors and its customers would have immediately been without service and with no competitive option for broadband access. Third, Wisper’s acquisition of the Stouffer network had been in the works for two years and, like the Lincoln County deal, involved the acquisition of a smaller WISP less able to absorb the additional costs of compliance.

⁵² Letter from A Better Wireless, NISP, LLC, *et al.*, to The Honorable Ajit Pai, FCC Chairman, WC Docket No. 17-108 (filed June 27, 2017).

⁵³ *Id.* WISPA disagrees with the letter’s statement that “federal courts have made it very clear that network neutrality depends on the FCC maintaining that broadband is a telecommunications service and that other approaches have failed as a legal matter.” *Id.* To the extent this general assertion refers to the *US Telecom* decision – the letter does not cite to any specific “courts” or decisions – this reflects a misunderstanding of the holding in that case. The *US Telecom* court determined that the Commission was entitled to deference in deciding whether to reclassify broadband Internet access service as a Title II “telecommunications” service. *See US Telecom*, 825 F.3d at 696-700. It did not make any policy judgment that broadband *should* be reclassified, only that the Commission had authority to do so. *See id.* To the extent that those “other approaches [that] have failed as a legal matter” refers to the *Verizon v. FCC* decision, the court provided a roadmap to adopting rules that did not require reclassifying broadband as a Title II service. *See Verizon v. FCC*, 740 F.3d 623 (D.C. Cir. 2014). The Commission elected to not take this approach in the *Title II Order*.

applying Title II across the board will impose disproportionate burdens on small providers. First, as WISPA recommends in Part IV, *infra*, the Commission should enforce principles and transparency requirements to codify the four “Internet freedoms.” Second, prohibiting certain paid prioritization practices will constrain the market power of larger broadband providers that have preferential access to content that small providers will never have. Third, just because a small sampling of companies have not yet experienced the burdens and may not appreciate the current or future uncertainties of the Title II regime is no guarantee that they will continue to be free from such costs if the Title II regime remains. In sum, the Commission can adopt “meaningful restraints” without crushing small broadband providers with a Title II regulatory scheme established to constrain the immense market power of early 20th Century telephone monopolies.

B. Eliminating The Regulatory Burdens Imposed On Small Providers In The *Title II Order* Will Benefit Consumers

The Commission asks for comment on “other consumer benefits that would result from restoring broadband Internet access service classification to an information service.”⁵⁴ Taken together, the declarations in the record underlying the *Title II Order*, the letters the Commission received in the days prior to adopting the *NPRM*, and the WISPA survey results demonstrate that granting relief from Title II and the general conduct standard will trigger investment and deployment of fixed broadband service. This will benefit consumers in a variety of ways. First, small providers – especially WISPs that can quickly deploy cost-effective service – will expand into areas that currently do not have access to service and lie beyond the geographic limits of areas where larger providers would install FTTP or cable plant. Second, by freeing up capital for marketing, network upgrade and improved customer service, small providers will be able to

⁵⁴ *NPRM* at 4451.

better compete with larger providers. Money set aside to address Title II regulatory contingencies will be re-allocated for network expansion and upgrade. Third, smaller providers will be better positioned to attract capital from outside investors that take into account the costs of regulation and regulatory uncertainty in determining their risk profiles. All in all, consumers will benefit from internal and external investment, service to more locations, improved service, and competition that will lower costs and trigger innovation in service plans.

In WISPA's view, consumers will not lose any benefits from restoring broadband Internet access service to its historical information service classification or from eliminating the general conduct rule. Consumers will still benefit, at a minimum, from the four "Internet freedoms" and rules that ensure transparency in commercial terms.⁵⁵ Consumers can still file informal complaints if they believe that their provider has violated those rules. But most importantly, there is little or no evidence that small providers have acted in a way that suggests that the rules are necessary to protect consumers. Whatever "predictive" harm the Commission envisioned when it adopted the *Title II Order* simply has not materialized despite the greatly expanded set of rules and requirements embodied in that document. If anything, the two-year Title II period has demonstrated that Title II is not just unnecessary, but has pulled back the reins on investments and deployments critical to advancing the Commission's consistent and long-standing bipartisan universal broadband service objectives.

Unleashing WISPs from unnecessary regulation will help bridge the digital divide, but there are other steps that the Commission can take to encourage pro-consumer investment in wireless infrastructure serving underserved communities. Without significant scale, WISPs typically rely on their own money, family and friends and, in some cases, local bank financing. Private equity is available to very few WISPs, though there is increasing interest in investing in

⁵⁵ See Part IV, *infra*.

those companies that use licensed spectrum or have invested in new technology to densify and expand networks. WISPs have historically been ineligible for federal Universal Service Fund support, though there is significant interest among WISPA members in participating in the upcoming Connect America Fund Phase II reverse auction.

In addition to a lack of access to capital, WISPs also lack access to sufficient spectrum.

In the *2010 Open Internet Order*, the Commission acknowledged the limitations of fixed wireless broadband networks:

We also recognize the unique network management challenges facing broadband providers that use unlicensed spectrum to deliver service to end users. Unlicensed spectrum is shared among multiple users and technologies and no single user can control or assure access to spectrum. We believe the concept of reasonable network management is sufficiently flexible to afford such providers the latitude they need to effectively manage their networks.⁵⁶

The Commission has taken steps to make more unlicensed, licensed, and “license by rule” spectrum available in rural areas.⁵⁷ Recently, WISPA, as a co-founder of the Broadband Access Coalition, filed a petition for rulemaking asking the Commission to enable fixed wireless point-to-multipoint service in the 3700-4200 MHz band under Part 101 of the Commission’s Rule.⁵⁸ The Coalition’s proposal can be implemented simply and soon to facilitate licensed spectrum as infrastructure in areas where fixed wireless may be the only reasonable and expeditious means to deliver broadband service.

⁵⁶ *Preserving the Open Internet*, Report and Order, 25 FCC Rcd 17905, 17953-54 (2010) (“*2010 Open Internet Order*”), *aff’d in part and vacated in part, remanded, Verizon v. FCC*, 740 F.3d 623 (D.C. Cir. 2014) (“*Verizon*”).

⁵⁷ *See, e.g., Unlicensed Operations in the TV Broadcast Bands*, 21 FCC Rcd 12266 (2008) (making vacant TV band spectrum available for unlicensed operations); *Amendment of the Commission’s Rules with Regard to Commercial Operations in the 3550-3650 MHz Band*, 30 FCC Rcd 3959 (2015) (making 100 megahertz of spectrum available under three-tier spectrum access model).

⁵⁸ *See* Petition for Rulemaking filed by the Broadband Access Coalition, RM-11791 (filed June 21, 2017); *see also Public Notice*, Report No. 3080 (rel. July 7, 2017) (establishing pleading cycle for Petition).

C. The Commission Should Exercise Its Statutory Authority To Ensure That Classifying Broadband As An Information Service Does Not Create Competitive Imbalance

The Commission asks about “further steps the Commission should take to maximize facilities-based investment and competition.”⁵⁹ In two ongoing proceedings, WISPA has recommended that the Commission exercise its statutory authority to extend the benefits of Sections 253 and 332(c)(7) of the Act to all broadband providers, regardless of regulatory classification.⁶⁰ These benefits include not just the existing benefits of those statutes and the implementing rules, but also new wireless and wireline infrastructure rules such as streamlined local consideration of tower sites, non-discriminatory fees for transmission equipment siting, and prohibitions on zoning moratoria. WISPA also acknowledges that as a consequence of the *Title II Order*, all broadband providers have rights to poles, conduits, and rights-of-way equivalent to those that providers of “telecommunications” and cable service have under Section 224 of the Act.

If the Commission restores broadband to information service status, the benefits of these Title II provisions would disappear for some, but not all, broadband providers. Smaller information service providers – WISPA’s members – would be most affected. As WISPA explained in an ex parte letter in the *Title II Order* proceeding urging the Commission to not forbear from Section 224 if the Commission reclassified broadband as a “telecommunications” service, “[p]reservation of a system that gives only well-heeled incumbents a statutory right of access to utility poles would, in a Title II world, maintain an unfair business environment and would serve as yet another market entry barrier for small broadband providers and new

⁵⁹ *NPRM* at 4451.

⁶⁰ See Comments of WISPA, WC Docket No. 17-84 (filed June 15, 2017); Comments of WISPA, WT Docket No. 17-79 (filed June 15, 2017); Reply Comments of WISPA, WT Docket No. 17-84 and WC Docket No. 17-79 (filed July 17, 2017).

entrants.”⁶¹ That same situation would be presented if the Commission adopts its proposal to restore broadband service to an information service.

To remedy the disparate treatment that would result, the Commission should exercise its statutory authority under Section 706 of the Act. Because Section 706 expressly mandates “immediate action to accelerate deployment” of broadband service “by removing barriers to infrastructure investment and by promoting competition in the telecommunications market,”⁶² it provides a strong basis for the Commission to take regulatory steps that promote the expansion of opportunities to implement competitive broadband Internet access technologies. Among the proactive steps that the Commission can take to achieve these goals is extending the availability of access rights to infrastructure under Sections 224 and 253 to broadband providers that would not otherwise be covered by their terms, affording these providers the same access and pricing rights that telecommunications and cable providers enjoy, but without the classification of these providers under Title II.

As more and more broadband providers combine wireless and wireline technologies into hybrid networks, it is imperative for the Commission to facilitate fairness by eliminating regulatory barriers that are premised on outdated statutory classifications. By ensuring that all broadband providers have the same rights to infrastructure regardless of their regulatory classification or technology, the Commission can reduce delay and lower deployment costs and thereby encourage broadband deployment to unserved areas and introduce competition in other areas. Such action will promote regulatory parity and foster competition, both of which confer substantial public interest benefits.

⁶¹ Letter from Stephen E. Coran, Counsel to WISPA, to The Honorable Tom Wheeler, GN Docket No. 14-28 (filed Feb. 3, 2015), at 14.

⁶² 47 U.S.C. § 1302(b).

II. THE COMMISSION HAS AND SHOULD EXERCISE ITS LEGAL AUTHORITY TO RESTORE BROADBAND INTERNET ACCESS SERVICE TO TITLE I “INFORMATION SERVICE” CLASSIFICATION

A. The Commission Has Definitive Authority to Determine How To Regulate Broadband Providers Based On Its Analysis Of How Service Is Provided

In the *NPRM*, the Commission emphasizes that it is “free to change its approach” with respect to the applicability of Title II regulation, and to restore the statutory information service designation to broadband service, “so long as it acknowledges that it is doing so and justifies the new approach.”⁶³ Indeed, as the *NPRM* carefully details, for most of the period commencing with the *Computer II* proceeding,⁶⁴ the Commission reasonably and appropriately declined to regulate Internet access service under Title II.⁶⁵ The principal exception to this long-standing, bipartisan treatment has come during the relatively brief period from the adoption of the *Title II Order* in early 2015 to the present. Accordingly, there is more than ample precedent for the treatment of broadband as an information service, as that term is defined under the Telecommunications Act of 1996 (“1996 Telecom Act”).⁶⁶

Most significantly, the Commission’s predominant approach during the several decades before 2015 was expressly validated by the Supreme Court in the 2005 *Brand X* decision, where the Court made plain that the Commission had broad discretion to determine that provision of Internet access was an information service lying outside the scope of Congressionally-mandated Title II telecommunications carrier regulation.⁶⁷ This broad discretion arises from the fact that the Act itself is silent on the specific regulatory treatment of advanced services that are distinct

⁶³ *NPRM* at 4452 (citing *FCC v. Fox Television Stations, Inc.*, 556 U.S. 502, 515-16 (2009)).

⁶⁴ See generally *Regulatory and Policy Problems Presented by the Interdependence of Computer and Communications Services*, 7 FCC Rcd 11 (1966).

⁶⁵ *NPRM* at 4436-41.

⁶⁶ Pub L. No. 104-104, 110 Stat. 56 (1996).

⁶⁷ See *National Cable & Telecomms. Ass’n v. Brand X Internet Services*, 545 U.S. 967 (2005) (“*Brand X*”).

from traditional Title II-regulated point-to-point or person-to-person telephony, and which afford consumers access to a much broader range of online content.

This substantial deference to the Commission’s predictive judgment was most recently affirmed in *US Telecom* itself, the very decision that permitted the Commission to exercise its discretion in the *Title II Order* to impose Title II regulation on entities falling within the definition of “broadband internet access service.”⁶⁸ Following *Brand X*, the court reasoned that resolving the question of the appropriate statutory classification for broadband service “requires the Commission to determine whether the information service and the telecommunications components ‘are functionally integrated . . . or functionally separate,’” and that question “‘turns not on the language of [the Act], but on the factual particulars of how internet technology works and how it is provided, questions *Chevron* leaves to the Commission to resolve in the first instance.’”⁶⁹ Consistent with this deference to the Commission’s judgment, the court emphasized “we do not ‘inquire as to whether the agency’s decision is wise as a policy matter; indeed, we are forbidden from substituting our judgment for that of the agency.’”⁷⁰ In the D.C. Circuit’s more recent *en banc* denial of rehearing in *US Telecom*, the concurring opinion of Judge Srinivasan echoed these same points, stating that “the question then is whether the agency clearly has authority under the Act to make that choice,” and reiterating that in *Brand X*, “the Supreme Court definitively – and authoritatively, for our purposes as an inferior court – answered that question yes.”⁷¹ Accordingly, the Commission has the power to make an independent determination in this proceeding concerning the appropriate regulatory treatment of

⁶⁸ *US Telecom*, 825 F.3d 674.

⁶⁹ *Id.* at 692.

⁷⁰ *US Telecom*, 825 F.3d at 697 (citation omitted).

⁷¹ *US Telecom Rehearing*, 855 F.3d 381, 385 (D.C. Cir. 2017) (Srinivasan, J., Concurring Opinion).

broadband service based on its analysis of the facts concerning the present state of Internet technology and how these services are provided to the public.

B. The Commission Has Separate Authority Under Section 706 To Establish A “Light Touch” Regulatory Approach To Promote Deployment Of Broadband Infrastructure

An ultimate conclusion in this proceeding that the provision of high-speed Internet access falls outside the scope of Title II regulation would not, however, preclude the Commission from exercising appropriate, “light-touch” oversight of the market for delivery of broadband access services to the extent that it determines that such oversight is necessary to ensure a competitive marketplace. In *Verizon*, which struck down the Commission’s earlier effort to impose a Title II-like regulatory scheme on broadband service providers while at the same time maintaining their nominal classification as information service providers, the U.S. Court of Appeals for the D.C. Circuit found that the Commission has “affirmative authority” under Section 706 of the 1996 Telecom Act “to enact measures encouraging the deployment of broadband infrastructure.”⁷² This authority could be exercised in this proceeding to prevent broadband providers that possess market power from exercising that power to the detriment of competing broadband providers, edge providers, and consumers alike.

Insofar as the Commission posits in the *NPRM* that Section 706 may be merely hortatory,⁷³ Section 706(b) is substantially less so as compared to Section 706(a). As detailed by the *Verizon* court, Section 706(b) imposes an affirmative duty on the Commission “to conduct a regular inquiry ‘concerning the availability of advanced telecommunications capability.’”⁷⁴ And in the event that it determines that such capability is not “being deployed to all Americans in a reasonable and timely fashion,” the statute compels it to “take immediate action to accelerate

⁷² See *Cellco P’ship v. FCC*, 700 F.3d 534 (D.C. Cir. 2012).

⁷³ See *NPRM* at 4466.

⁷⁴ See *Verizon*, 740 F.3d at 635 (citing 47 U.S.C. § 1302(b)).

deployment of such capability by removing barriers to infrastructure investment and by promoting competition in the telecommunications market.”⁷⁵

WISPA has consistently shown in the prior proceedings addressing the Commission’s role in Internet governance that Section 706 is a better authority than Title II to underpin Commission regulation of broadband access.⁷⁶ Section 706 is affirmatively intended to encourage broadband deployment through targeted regulatory measures, whereas Title II is designed, in significant part, to constrain the market power of telephone monopolies, and necessarily requires significant and ongoing forbearance measures to adapt its terms to the much broader variety of service providers that currently offer Internet services.⁷⁷ As a result, jamming the square peg of Title II regulation into the round hole of the broadband marketplace has created harmful uncertainty that undermines both regulatory consistency and investor confidence, thereby impeding salutary innovation and competition. As Commissioner O’Rielly has previously stated, “[b]road forbearance would prove that Title II is ill-suited for the dynamic broadband market.”⁷⁸

C. The Commission Should Restore Broadband Internet Access Service To Title I Information Service Classification That Has Been Applied To It For Most Of The Past Four Decades

In the *NPRM*, the Commission seeks comment on the future direction of its regulation of broadband service, and whether Title II classification of broadband service remains appropriate. In particular, the Commission questions whether providers can reasonably be construed to fall within the definitional parameters of “telecommunications service,” as defined under the Act.⁷⁹

⁷⁵ *Id.* “The statute defines ‘advanced telecommunications capability’ to include ‘broadband telecommunications capability.’” *Id.* (citing 47 U.S.C. § 1302(d)(1)).

⁷⁶ See WISPA Title II Comments at 38-42.

⁷⁷ This fact is highlighted by the lengthy discussion of forbearance in the *Title II Order*, which covers some 64 pages. See *Title II Order* at 5804-5867.

⁷⁸ *Title II Order* at 5997 (Dissenting Statement of Commissioner Michael O’Rielly) (“O’Rielly Title II Dissent”).

⁷⁹ See *NPRM* at 4443.

WISPA concurs with the Commission’s preliminary analysis that broadband “consumers want and pay for ... functionalities that go beyond mere transmission,” and that accordingly the provision of this service does not fit comfortably within the definition of “telecommunications,” which is defined in part by the limitation that transmission occur “without change in the form or content of the information as sent and received.”⁸⁰

More fundamentally, as stated in the *NPRM*, Section 230 of the Act unambiguously defines an interactive computer service to mean “*any information service, system, or access software provider that provides or enables computer access by multiple users to a computer server, including specifically a service or system that provides access to the Internet.*”⁸¹ This language makes plain that Internet access service was presumed by Congress as of 1996 to be an information service. Although the *US Telecom* court did not find this definition determinative of the issue, it is nonetheless a strong indicator that Congress was more comfortable with the prevailing view that provision of Internet access is not a telecommunications service, and should not be subject to the array of Title II statutory provisions.

Nothing identified in the *Title II Order* justified the conclusion that differences in broadband marketing and pricing strategies from the late 1990s to 2015 constituted “changed circumstances” that provided a basis for Title II re-classification. The premise of that assertion was that broadband providers today “market distinct service offerings primarily on the basis of the transmission speeds associated with each offering” such that the reasonable consumer is given “the impression that a certain level of transmission capability – measured in terms of ‘speed’ or ‘reliability’ – is being offered in exchange for the subscription fee, even if

⁸⁰ 47 U.S.C. § 153(50).

⁸¹ 47 U.S.C. § 230(f)(2) (emphasis added).

complementary services are also included as part of the offer.”⁸² Notwithstanding the D.C. Circuit Court’s affirmation of the Commission’s authority to adopt the *Title II Order*, the factual underpinning of this conclusion was absent, in that the facts found related only to contemporaneous advertising emphasizing speed and reliability without comparison to earlier advertising campaigns by Internet service providers, which largely emphasized these same metrics. This failing was pointed out in then-Commissioner Pai’s dissent from the *Title II Order*.⁸³

As Chairman Pai commented more recently in remarks delivered at the “Broadband for All” Seminar in Stockholm, the best means to achieve the important goal of universal broadband availability is “to restore the decades-long, cross-party consensus on light-touch Internet regulation” as a means to “maximize investment in next-generation networks.”⁸⁴ The WISP industry, in particular, has developed from this historical “light touch” approach. In the regulatory environment that prevailed during the nearly two decades beginning with the 1996 Telecom Act, WISPs have provided unsubsidized fixed wireless broadband services in a broad variety of communities across the country – urban, suburban and rural. Many WISPs have established networks using spectrum previously dismissed as “junk” bands⁸⁵ to cover large geographic areas in sparsely populated parts of the country that would otherwise be unserved by wireline technologies, and are continuing to expand their coverage into other unserved areas, as well as to provide competitive services in suburban and urban areas.

⁸² *Title II Order* at 5757.

⁸³ See Pai Title II Dissent, *supra* note 35, at 5991.

⁸⁴ Pai Stockholm Speech, *supra* note 23, at 3.

⁸⁵ See FCC, *Connecting America: The National Broadband Plan*, Section 5.6 (rel. March 16, 2010), at 94 (“Notably, and not coincidentally, innovation sometimes occurs in bands that conventional wisdom had at one time considered to be ‘junk’ spectrum”).

D. Restoring Broadband Service to Information Service Classification, Especially For Small Providers, Would Be Consistent With The RFA

The RFA requires federal agencies to adopt an Initial Regulatory Flexibility Analysis that, among other things, “*shall* also contain a description of any significant alternatives ... which accomplish the stated objectives of applicable statutes and which minimize any significant economic impact of the proposed rule on small entities.”⁸⁶ The required discussion of these alternatives includes:

- (1) the establishment of *differing compliance or reporting requirements or timetables* that take into account the resources available to small entities;
- (2) the clarification, consolidation, or *simplification of compliance and reporting requirements* under the rule for small entities;
- (3) the use of performance rather than design standards; and
- (4) *an exemption from coverage of the rule, or any part thereof, for such small entities.*⁸⁷

Coincident with the *NPRM*, the Commission released an IRFA (“*IRFA*”) seeking comment on the effects the proposed rules will have on small providers.⁸⁸ The *IRFA* concludes that because the *NPRM* “seeks to reduce the compliance burdens of ISPs through the removal of unnecessary regulation, it does not propose any alternative methods of reducing those burdens.”⁸⁹ The Commission invited comment on other ways it can reduce compliance burdens.⁹⁰

⁸⁶ 5 U.S.C. § 603(c) (emphasis added).

⁸⁷ *Id.* (emphases added); see also Presidential Memorandum of January 18, 2011, *Regulatory Flexibility, Small Business, and Job Creation, Memorandum for the Heads of Executive Departments and Agencies*, 76 Fed. Reg. 3827, 3828 (Jan. 21, 2011) (when initiating a rulemaking give “serious consideration to whether and how it is appropriate, consistent with law and regulatory objectives, to reduce regulatory burdens on small businesses, through increased flexibility”) (“Presidential Memorandum”). The Presidential Memorandum was issued concurrently with Executive Order 13563, which reinforced the importance of compliance with the RFA for all federal agencies. 76 Fed. Reg. 3821 (Jan. 21, 2011). President Obama issued subsequent Executive Order 13579 that expressly imposed the obligations of Executive Order 13563 on independent regulatory agencies. 76 Fed. Reg. 41587, § 1(c) (July 14, 2011) (“Executive Order 13563 set out general requirements directed to executive agencies concerning public participation, integration and innovation, flexible approaches, and science. To the extent permitted by law, independent regulatory agencies should comply with these provisions as well.”).

⁸⁸ See *NPRM*, Appendix B, *IRFA*. WISPA notes that the *IRFA* appended to the *NPRM* is an improvement over the *IRFA* included with the draft *NPRM* the Commission publicly made available before it adopted the *NPRM*. See WISPA Ex Parte Letter, *supra* note 14 (suggesting ways in which the draft *IRFA* could be improved through more comprehensive and current data). However, the *IRFA* relies on old and inadequate data that should be updated.

⁸⁹ *IRFA* at 4491.

⁹⁰ See *id.*

WISPA agrees that restoring broadband service to information service classification and eliminating the “general conduct standard” will significantly eliminate regulatory burdens, reduce compliance costs, reduce enforcement risks and uncertainty, and increase the ability of broadband providers to reach unserved and underserved communities. Forbearance from Title II is not an adequate substitute for restoring broadband to information service classification and eliminating the “general conduct standard.” First, as Commissioner O’Rielly stated, the *Title II Order* forbears from a number of rules but then “points to available protections in other provisions that effectively gut the forbearance.”⁹¹ In other words, as conceived in the *Title II Order*, forbearance is an illusory concept. Second, the Commission can reverse its “massive forbearance” in the future, subjecting providers to new Title II burdens that could, if the rationale employed in the *Title II Order* is utilized, without “findings that the forbearance is justified by competitive conditions.”⁹² Third, small providers desiring further relief from Title II’s restrictions would be required to make the Section 10 public interest case, something that takes significant time and cost to prosecute with an outcome that is uncertain. Fourth, forbearance arguably does not apply to the vague and undefined “general conduct standard,” which exposes broadband providers to enormous enforcement risk without preemptive recourse.

E. The Commission Should Resolve The Uncertainty Over Section 222 Requirements by Restoring Broadband To Information Service Classification

Removing broadband service regulation from Title II will restore the FTC’s jurisdiction over broadband privacy and data security, where it existed for decades prior to the *Title II*

⁹¹ O’Rielly Title II Dissent at 5996.

⁹² *US Telecom*, 825 F.3d at 775 (Williams, J., Concurring in Part and Dissenting in Part).

Order.⁹³ Not only does the FTC have far more enforcement experience regarding Internet consumer privacy and data security,⁹⁴ but the FCC *and* FTC have acknowledged that the FTC’s authority under Section 5 of the FTC Act is comparable to the FCC’s authority under Title II’s Section 201(b).⁹⁵ If the two statutes are comparable, Title II is not necessary and there is no harm in returning broadband service to information service classification under the full authority of the FTC pursuant to Section 5 of the FTC Act. It is also possible that matters such as service discrimination, which could occur with some types of traffic prioritization, would again fall within the Commission’s purview, in circumstances where a large provider with market power abuses its leverage. Accordingly, consumers and edge providers would not be without protection from anti-competitive conduct.

In its recent Order implementing the Joint Resolution of Congress under the Congressional Review Act, the Commission reminded broadband providers that they currently remain subject to the Title II obligation to protect customer proprietary network information

⁹³ See generally Comment of the Staff of the Bureau of Consumer Protection, *Protecting the Privacy of Customers of Broadband and Other Telecommunications Services*, WC Docket No. 16-106 (filed May 27, 2016), at 4 (referring to FTC history of “over 500 cases protecting the privacy and security of consumer information”)(citation omitted); see also Opening Remarks of Terrell McSweeney, Commissioner, U.S. Federal Trade Commission, *The Future of Broadband Privacy and the Open Internet: Who Will Protect Consumers?*, Open Technology Institute, New America Foundation (April 17, 2017) (“FTC McSweeney OTI Remarks”), at 2 (“For more than two decades, the FTC has done a remarkable job protecting consumers as they have migrated from an analog world to a digital one”).

⁹⁴ See Joint Statement of Acting FTC Chairman Maureen K. Ohlhausen and FCC Chairman Ajit Pai on Protecting Americans’ Online Privacy (March 1, 2017) (“The FTC has a long track record of protecting consumers’ privacy and security throughout the Internet ecosystem. It did not serve consumers’ interests to abandon this longstanding, bipartisan, successful approach.”); see also Remarks of Maureen K. Ohlhausen, Commissioner, U.S. Federal Trade Commission, *Privacy Regulation in the Internet Ecosystem*, Free State Foundation, Eight Annual Telecom Policy Conference (March 23, 2016), at 2 (“I respectfully suggest that our 150+ privacy and data security-related enforcement actions, our key international role including Safe Harbor and Privacy Shield enforcement, and our Congressional mandate to implement and enforce a number of privacy laws, including COPPA, FCRA, GLB and others, actually make the FTC one of the most active and effective data protection agencies in the world.”); and FTC McSweeney OTI Remarks at 4”) (“The FTC is at the forefront of these [Internet-related] issues because it recognizes that consumer data is both driving valuable innovation to the benefit of consumers – and creating some potential risks”).

⁹⁵ *Protecting the Privacy of Customers of Broadband and Other Telecommunications Services*, Notice of Proposed Rulemaking, 31 FCC Rcd 2500, 2596 (2016) (“both Commissions have found that Section 201 of the Communications Act and Section 5 of the FTC Act can be read as prohibiting the same types of acts or practices”) (citation omitted).

(“CPNI”).⁹⁶ As Congress intended Section 222 to apply to traditional telephone services, however, it is not clear what types of use and/or disclosure would be acceptable in the broadband access context under Section 222. Indeed, the Commission has previously acknowledged that Section 222’s telephone-centric implementing regulations are not germane to IP-based routing technology.⁹⁷ An IP address itself is not appropriately considered proprietary consumer information, but is instead an integral part of the basic routing protocol of the Internet, and can be easily ascertained by unregulated entities (i.e., edge providers), as well as by end users. If an IP address is misclassified as CPNI under Title II, such designation would disrupt the normal functioning of the IP ecosystem.⁹⁸ For example, provision of broadband service could be substantially impaired by the restriction on disclosure of CPNI to a third party without authentication and the express consent of an account holder (subject to certain exceptions).⁹⁹ Despite this fact, the Commission has stated on one hand “that source and destination IP addresses constitute CPNI in the broadband context because they relate to the destination, technical configuration, and/or location of a telecommunications service,”¹⁰⁰ while stating at the same time that an IP address is “roughly analogous” to a telephone number.¹⁰¹ If the latter is correct, which is a logical legal conclusion, then Section 222(h)’s exemption of telephone numbers from the CPNI classification not only contradicts the Commission’s finding, but is

⁹⁶ *Protecting the Privacy of Customers of Broadband and Other Telecommunications Services*, Order, WC Docket No. 16-106, FCC 17-82 (rel. June 29, 2017), at ¶ 2 (“We also remind ISPs that they remain subject to Section 222 but need not comply with the Commission’s implementing rules as a result of the forbearance granted in the Title II Order.”).

⁹⁷ *Title II Order* at 5823 (“Insofar as rules focused on addressing problems in the voice service context are among the central underpinnings of our CPNI rules, we find the better course to be forbearance from applying all of our CPNI rules at this time” (emphasis added). At the same time, the Commission emphasized that the statutory provision itself was applicable to broadband providers. *See id.*

⁹⁸ *See, e.g.*, Letter from S. Jenell Trigg and Stephen E. Coran, Counsel to WISPA, to Marlene H. Dortch, FCC Secretary, WC Docket No. 16-106 (filed Oct. 20, 2016), at 2-4.

⁹⁹ *See* 47 U.S.C. § 222(c)-(d).

¹⁰⁰ *Protecting the Privacy of Customers of Broadband and Other Telecommunications Services*, Report and Order, 31 FCC Rcd 13911, 13936 (2016).

¹⁰¹ *Id.*

potentially legally dispositive,¹⁰² as Commission has no authority to change the statutory classification. The best way for the Commission to eliminate this present uncertainty is to rescind the imposition of any Section 222 requirements for broadband service by restoring broadband service to Title I information service.

F. The Costs Of Retaining The Rules Adopted In The *Title II Order* Outweigh The Benefits To Consumers

WISPA commends the Commission's commitment to conduct an analysis of the costs and benefits of retaining Title II and the rules promulgated under the *Title II Order*.¹⁰³ These Comments make clear that the compliance costs, regulatory burdens and uncertainty encompassed by the *Title II Order* impose substantial costs on small broadband providers, have harmed investment and innovation and delayed deployment, to the detriment of consumers that face rising costs and a continuing lack of access to fixed broadband service.

WISPA understands that Title II has conferred some benefits on small providers, namely rights afforded under Sections 224 and 253. However, WISPA has proposed here and in the wireline and wireless infrastructure proceedings that the Commission can and should maintain those benefits through its Section 706 authority.

III. THE COMMISSION SHOULD ELIMINATE THE GENERAL CONDUCT STANDARD

The Commission seeks comment on its proposal to eliminate the “general conduct standard” adopted in the *Title II Order* and codified in Section 8.11.¹⁰⁴ As acknowledged in the *NPRM*, the general conduct standard is a “catch-all standard” to prohibit “current or future practices that cause the type of harms the Commission's rules are intended to address.”¹⁰⁵ The Commission also observes that the “roving mandate”¹⁰⁶ gives it “discretion to prohibit any

¹⁰² See 47 U.S.C. § 222(h)(1)(B), (h)(3).

¹⁰³ See *NPRM* at 4468.

Internet service provider practice that it believes violates any one of the non-exhaustive list of factors adopted in the *Title II Order*.”¹⁰⁷

WISPA strongly agrees with the Commission that the general conduct standard should be eliminated and that the Commission should not adopt any alternatives. Together with subjecting small providers to Title II regulation, the vague and amorphous general conduct standard creates an environment of substantial and unquantifiable uncertainty that chills investment, innovation and deployment. If the Commission determines that broadband service should be restored to an information service, the overlapping general conduct standard would immediately be subject to an even broader reading that would enable back-door Title II-like enforcement down the road. Significantly, this “catch-all” provision¹⁰⁸ exposes all broadband provider activities, whether under Title II or not, to unquantifiable risk. In other words, both Title II regulation *and* the general conduct standard must be eliminated to restore “light touch” regulation and return to the certainty of the regulatory regime that existed prior to the *Title II Order*.

To affirm that the general conduct standard is an incomprehensible crapshoot, one need look no further than the observation of the previous Commission Chairman who touted the standard’s adoption: “We don’t really know” what is prohibited behavior.¹⁰⁹ In his *US Telecom* separate statement, Judge Williams characterized the general conduct standard as “a major source of uncertainty” with factors that “are vague and unhelpful at resolving the uncertainty.”¹¹⁰

¹⁰⁴ *See id.* at 4458-59.

¹⁰⁵ *Id.* at 4458.

¹⁰⁶ *Id.* at 4459,

¹⁰⁷ *Id.* at 4458.

¹⁰⁸ *Id.*

¹⁰⁹ *See* FCC Open Meeting, Feb. 26, 2015, Chairman Wheeler Press Conference, *available at* <https://www.fcc.gov/news-events/events/2015/02/february-2015-open-commission-meeting> (last visited July 5, 2017).

¹¹⁰ *US Telecom*, 825 F.3d at 755 (Williams, J., Concurring in Part and Dissenting in Part).

The uncertainty resulting from the general conduct standard does not exist in the abstract but has proved to be a significant factor in the decisions that small providers have made to reduce investment in network upgrade and expansion. As stated in the 70 WISP Ex Parte Letter, “the ‘general conduct rule’ is in some ways the most problematic aspect of the *Title II Order* because it can be subject to differing and inconsistent interpretations of ‘reasonableness.’”¹¹¹

Other small broadband providers agree, stating that:

the General Conduct rule represents perhaps the worst of government regulation. It is so vague and open-ended that we are concerned that the Commission would invoke it to sanction conduct for which we have no advance warning. Moreover, the mere threat that the Commission may use the General Conduct rule affects our ability to obtain financing.¹¹²

Regulation of business activities that trigger a formal inquiry, subpoena or other enforcement action by the FCC cannot be vague nor subject to the whims of a given Administration. Small providers that are currently subject to a vague and broad general conduct standard and may find themselves “with an enforcement action just around the corner.”¹¹³

Consumers, in turn, are not well served by such uncertainty because they do not receive the benefits of new innovative products or services, or discounts and incentives. Moreover, broadband providers that are required to defend themselves against arbitrary enforcement actions and/or frivolous complaints will not have the time or financial resources to invest in their business. The costs of such compliance will likely be passed onto consumers via higher prices and/or limited service offerings and upgrades. The high costs of compliance with the general conduct standard far outweigh the benefits.

¹¹¹ 70 WISP Ex Parte Letter, *supra* note 13, at 2.

¹¹² 22 Small Provider Ex Parte Letter, *supra* note 45, at 2.

¹¹³ *NPRM* at 4459.

IV. THE COMMISSION SHOULD REAFFIRM ITS ADHERENCE TO THE FOUR INTERNET FREEDOMS, SUBJECT TO REASONABLE NETWORK MANAGEMENT

In connection with its consideration of returning to a “light touch” regulatory approach, the Commission poses a series of questions regarding the need for “bright line” rules governing Internet service provider conduct. It asks “whether *ex ante* regulatory intervention in the market is necessary in the broadband context,” as well as whether the specific rules adopted in 2015 are “necessary in light of ... other regulatory regimes,” such as antitrust law.¹¹⁴ The Commission also asks whether “the purported benefits of the existing rules [are] more illusory than they initially appear” in light of the potential for providers to avoid Title II regulation “by picking a limited set of websites to carry and offering that service as a curated internet experience.”¹¹⁵

In addressing these questions, WISPA notes that the existing bright line rules are firmly rooted in the four “Internet freedoms” originally set forth by the Commission under Chairman Powell in 2005.¹¹⁶ Because WISPA has always adhered to these principles, it supports continued Commission protection of these essential consumer freedoms. These principles constitute basic consumer protections, which WISPs have always honored because of their importance to the subscribers and communities WISPA members serve. Collectively, they should be viewed as basic foundations upon which consumer expectations regarding Internet access are premised.

With respect to the existing no-blocking rule, the Commission seeks comment “on the appropriate means to achieve” protection of the freedom to receive lawful content “consistent with the goals of maintaining internet freedom, maximizing investment, and respecting the rule

¹¹⁴ *Id.* at 4460.

¹¹⁵ *Id.*

¹¹⁶ *Appropriate Framework for Broadband Access to the Internet Over Wireline Facilities*, Internet Policy Statement, 20 FCC Rcd 14986 (2005).

of law.”¹¹⁷ The Commission also queries whether it should “consider modifying the existing no-blocking rule to better align with our proposed legal classification of broadband internet access service as an information service?”¹¹⁸ The Commission similarly inquires as to the need for a separate throttling rule.¹¹⁹

In the 2014 *Verizon* decision, the D.C. Circuit found that the Commission, by requiring broadband providers “to serve all edge providers without ‘unreasonable discrimination,’” was effectively compelling “those providers to hold themselves out ‘to serve the public indiscriminately.’”¹²⁰ Because this requirement constituted *per se* common carrier regulation, the Commission could not impose it under Section 706, as then applied, while maintaining that broadband service providers continued to be categorized as less-regulated information service providers. Conversely, the court noted that a rule does not impose “per se common carriage requirements” where it leaves “substantial room for individualized bargaining and discrimination in terms.”¹²¹ Accordingly, where the Commission does not impose a flat ban on discrimination, it has the latitude to regulate under Section 706 to “promot[e] competition in the telecommunications market.”

The difficulty in updating the Commission’s no blocking and no throttling regulations lies in creating an enforceable commitment that is well-defined and therefore simple to apply, but without creating a *de facto* common carrier obligation, which is impermissible under the Commission’s Section 706 authority. In crafting a solution to this challenge, WISPA urges the Commission *not* to revisit its earlier proposal contained in the Notice of Proposed Rulemaking in

¹¹⁷ *NPRM* at 4461.

¹¹⁸ *Id.*

¹¹⁹ *Id.* at 4461-62.

¹²⁰ *Verizon*, 740 F.3d at 655-56 (citing *National Association of Regulatory Utility Commissioners v. FCC*, 525 F.2d 630, 642 (D.C. Cir. 1976)).

¹²¹ *Id.* at 652 (citing *Cellco P’ship v. FCC*, 700 F.3d 534, 548 (D.C. Cir. 2012)).

GN Docket 14-28. There, the Commission sought comment on establishing a “minimum level of access” to broadband networks “that is sufficiently robust, fast, and effectively usable,”¹²² and also on a definition of “commercially reasonable” in the context of individualized arrangements for service exceeding the “minimum.”¹²³ The problem with any scheme based on inherently subjective standards such as these is that any practical understanding of the terms, no matter how painstakingly established, would result in benchmarks that become quickly outdated as technology and network management approaches evolve, and which would also likely fail to offer sufficient flexibility to in the first instance to address the substantial variations in the technology and network architecture through which broadband service is and may be provided. Such an outcome would provide no certainty to WISPs or other small service providers in their efforts to comply with the rule, and would therefore undermine some of the key goals of this proceeding.

Reasonable Network Management

Since the *2010 Open Internet Order*, the Commission has acknowledged that broadband providers may face circumstances when it will be necessary for them to employ “reasonable network management” to block or throttle Internet traffic.¹²⁴ With respect to WISPs, the Commission specifically observed that “[u]nlicensed spectrum is shared among multiple users and technologies and no single user can control or assure access to the spectrum.”¹²⁵ The Commission further recognized that fixed wireless broadband providers face “unique network management challenges” that may require network management practices that differ from larger broadband providers or those that control their own exclusive distribution networks, and that the

¹²² *Protecting and Promoting the Open Internet*, Notice of Proposed Rule Making, 29 FCC Rcd 5561, 5596 (2014).

¹²³ *Id.* at 5602-10.

¹²⁴ *See 2010 Open Internet Order*, *supra* note 56.

¹²⁵ *Id.* at 17953-54.

rules should be flexibly applied to afford such providers the latitude to effectively manage their networks.¹²⁶

In the *NPRM*, the Commission again acknowledges that any effective “no blocking” and “no throttling” rules must nonetheless take into account the need for service providers to employ “reasonable network management” to “allow service providers the freedom to address legitimate needs such as avoiding network congestion and combating harmful or illegal content’ without running afoul of the rules.”¹²⁷ WISPs, in particular, juggle the daily challenges of managing networks of multiple unlicensed frequency bands that are often shared with Wi-Fi devices, utility applications such as SCADA, industrial devices and consumer electronics such as baby monitors and garage door openers. Given the small business and network management challenges WISPs face, the critical role they play in delivering broadband to rural areas, and the requirements of Section 706 and the RFA, the Commission must ensure that small broadband providers and broadband providers that use unlicensed spectrum are not saddled with burdensome requirements that could undermine the Commission policies intended to encourage the deployment of broadband services to all Americans and to reduce barriers to investment.¹²⁸ The Commission therefore should maintain “reasonable network management” as an exception to any “no blocking” and “no throttling” principles or rules that it may continue to enforce.

The Commission asks whether it should retain the existing definition of “reasonable network management” adopted in the *Title II Order*, or if it should use the definition adopted in the *2010 Open Internet Order*.¹²⁹ WISPA urges the Commission to return to the more flexible definition adopted in 2010, which excludes the clause “a practice that has a primarily technical

¹²⁶ *Id.* at 17953.

¹²⁷ *NPRM* at 4465 (quoting *Title II Order* at 5622).

¹²⁸ See 47 U.S.C. § 1392(a), (b).

¹²⁹ See *NPRM* at 4465.

management justification, but does not include other business practices.”¹³⁰ There may be cases where a “legitimate network management purpose” includes both “technical management justification” *and* “other business practices” that cannot be separated. For example, broadband providers may engage in certain congestion management practices – clearly “technical justification” – as a result of intentionally oversubscribing their networks – which may be deemed to be a business practice. Because any business practice could be construed as negating the “reasonable network management” exception, providers may be forced to never oversubscribe their networks, meaning fewer end users can gain access to the network, or users could be limited to a much lower speed, representing a fraction of available capacity. Oversubscription is vital to the *individual* user experience; management of oversubscription is likewise vital to the *collective* user experience. The Commission therefore should amend Section 8.2(f) by deleting the first sentence thereof.

As a further means to create certainty for broadband providers and their customers, the Commission should specify certain network management practices as “*per se* reasonable” so as to avoid subjecting WISPs and other small providers to lengthy enforcement proceedings to establish the validity of these approaches, which are particularly critical for management of networks that serve smaller numbers of users using unlicensed spectrum. Practices that fall outside of the *per se* reasonable categories would be subject to case-by-case adjudication.

Consistent with WISPA’s proposals in the *Title II Order* proceeding,¹³¹ the following types of network management practices should be deemed to be “*per se* reasonable” if disclosed by the broadband provider in accordance with the applicable transparency requirements:

¹³⁰ 47 C.F.R. § 8.2(f).

¹³¹ See *e.g.*, WISPA Title II Comments, *supra* note 33, at 31-32.

- temporarily limiting bandwidth available to users that are using substantially disproportionate amount of bandwidth compared to and to the detriment of others at times when the network is experiencing unusual congestion;
- establishing service levels so that those subscribers who desire to use more bandwidth or are willing to pay an additional fee for more bandwidth can be free to do so;
- allowing temporary restriction of an individual user’s bandwidth in the event of a violation of the provider’s acceptable use policy, such as uploading or downloading multiple large video or data files simultaneously or in succession, or utilizing protocols that do not behave cooperatively in sharing network capacity;
- responding proactively to address capacity constraints outside the direct control of provider (e.g., upstream conditions); and
- providing subscribers with the option to pay different rates for accessing the service at peak times or non-peak times, thereby incentivizing a subscriber to pay a reduced fee by reducing congestion by downloading bandwidth-incentive content and applications during non-peak times.

These network management practices are essential for WISPs and others to operate their networks efficiently. The Commission therefore should designate these practices as “*per se* reasonable” so that broadband providers have a clear understanding of what practices they can legally utilize to manage their networks.

Paid Prioritization Presents Unique Concerns

The Commission asks a series of questions concerning the existing rule prohibiting broadband providers from engaging in paid prioritization.¹³² Section 8.9 defines “paid prioritization” as “the management of a broadband provider’s network to directly or indirectly favor some traffic over other traffic . . . (1) in exchange for consideration (monetary or otherwise) from a third party, or (2) to benefit an affiliated entity.”¹³³ WISPA is concerned that preferential traffic management techniques that are anti-competitive can be used to disadvantage

¹³² See *NPRM* at 4462-63.

¹³³ 47 C.F.R. § 8.9(b). The Commission may waive the rule if the practice would provide “some significant public benefit and would not harm the open nature of the Internet.” 47 C.F.R. § 8.9(c).

providers that are unable to secure access to certain content or lack the leverage to obtain commercial terms afforded to broadband access providers with regional and national scope.

Small broadband providers, such as WISPs, lack market power to negotiate traffic prioritization agreements with edge providers and content delivery networks, and have no incentive to withhold content from their subscribers because they do not themselves own or have preferential access to popular video and other online content. As the Chairman correctly notes, “[t]hey have no ability and no incentive to take on commercial giants like Netflix.”¹³⁴ Unlike the large broadband providers that have nationwide or regional footprints, market power and very substantial financial and human resources, WISPs are typically small, locally owned businesses with limited financial resources and small staff. Some are one-person shops in which the owner handles sales, marketing, billing, customer service, customer premises installation and, in some instances, even tower climbing for the deployment of wireless infrastructure.

Indeed, it is powerful edge service providers that often have the ability to leverage small Internet access providers by refusing to deal or seeking to extract onerous terms. In some cases, an edge provider might negotiate an agreement with a larger broadband provider that could lead to the edge provider delivering a lower level of video quality to subscribers of smaller broadband companies. Where the large provider and the small provider compete, the large provider may even have the incentive to enter into an exclusive arrangement under which an edge provider would deny content to the larger provider’s smaller competitor altogether.

WISPA believes that discriminatory paid prioritization is *per se* anti-competitive. While large broadband providers may have the market size and financial wherewithal to enter into paid prioritization agreements or negotiate advantageous content deals, this is simply not the case

¹³⁴ Pai Title II Dissent, *supra* note 35, at 5931.

with smaller providers. Paid prioritization only becomes feasible when the broadband provider has market power over entities that seek to transmit substantial amounts of online content.

In addition, if it's true, as outlined in the foregoing paragraph, that large broadband providers have the ability to discriminate unfairly against small edge providers, it also follows that large edge providers will have the ability to unfairly discriminate against small broadband providers. That is, a small provider has no leverage against a popular content delivery service such that the content provider could deny access as a means of gaining favorable treatment from the service provider.

The threat posed by market advantages for affiliated content can only be expected to increase as the latest manifestation of “cord cutting,” the trend for users to eliminate their fixed Internet connection and rely entirely on mobile Internet access, gains momentum.¹³⁵ In this emerging environment, the ability of a vertically-integrated company such as an AT&T/DirecTV/Time Warner Entertainment, which would combine content and multi-platform distribution, to favor its own affiliated content (*e.g.*, through “zero rating”) while at the same time leveraging the availability of this content to attract more mobile subscribers has potentially dire consequences for small fixed providers that have neither the access to popular content from sister companies nor the leverage to negotiate fair, reasonable and non-discriminatory access to

¹³⁵ See Aaron Pressman, *How Unlimited Wireless Plans Aid Cord Cutting Consumers*, FORTUNE, April 12, 2017, available at <http://fortune.com/2017/04/12/unlimited-wireless-cord-cutting/> (last visited July 15, 2017) (“After cord cutting hit the cable TV market, consumers may be ready to snap the wired Internet cable to save money and rely on just wireless online connectivity”). According to Cisco’s Visual Networking Index, mobile data traffic will grow two times faster than U.S. fixed IP traffic from 2016 to 2021, and mobile video traffic will grow five-fold from 2016 to 2021, a compound annual growth rate of 40%. See Cisco VNI Forecast Highlights, available at http://www.cisco.com/c/m/en_us/solutions/service-provider/vni-forecast-highlights.html# (last visited July 15, 2017).

content.¹³⁶ Indeed, the recently reported joint venture discussions among Charter Communications, Comcast Corporation and Sprint are, in part, a product of this increasing convergence of Wi-Fi access and mobile wireless networks, whereby companies increasingly seek to control both fixed and mobile broadband markets.¹³⁷

To be sure, there may be some forms of paid prioritization that would not be objectionable if the broadband access market consisted solely of competitive mobile wireless carriers that have access to content and the means to obtain it on an exclusive or preferred basis. But the nationwide mobile carriers have market power over small providers, and can exercise that market power in ways that are anti-competitive. While WISPA has not yet formulated specific recommendations for confronting these issues, it intends to review carefully proposals for modifying the existing rules in light of these market realities and provide further input as this proceeding moves forward.

The Need for the Transparency Rule

The Commission seeks comment on the scope of its transparency rule, codified in Section 8.8 and “enhanced” in the *Title II Order*.¹³⁸ Earlier this year, and consistent with WISPA’s advocacy, the Commission made permanent a temporary exemption for broadband providers with 250,000 or fewer connections from the “enhanced” disclosure obligations and eliminated

¹³⁶ See WISPA Press Release, *Wireless Internet Service Providers Raise Concerns About Impacts of AT&T-Time Warner Merger; Call on Federal Authorities to Reject It*, Dec. 5, 2016 (“Allowing any ISP to favor certain content has a direct, harmful impact on thousands of small, competitive ISPs that do not own content and lack the ability to negotiate fair, reasonable and non-discriminatory access to content”).

¹³⁷ Chris Isidore, *Comcast and Charter are Working Together on a Wireless Offering*, CNN, May 8, 2017, available at <http://money.cnn.com/2017/05/08/technology/comcast-charter-wireless/index.html> (last visited July 14, 2017) (“Each company, which competes with Verizon on cable and internet service, has an interest in stemming the tide of cord cutting. One way to do that: get a foothold in the booming world of [mobile] wireless, which is how many customers are consuming the majority of video and internet”).

¹³⁸ See *NPRM* at 4463.

the “safe harbor” format for open Internet disclosure statements.¹³⁹ WISPA believes that the Commission should maintain the exemption and such that the rule adopted in 2010 applies without the unnecessary and burden enhancements adopted in the *Title II Order*.

The rule provides small broadband providers with flexibility to inform consumers of broadband performance and network management practices in ways that can be adapted to the providers’ business practices and consumer expectations. Disclosure statements can be drafted with a minimum of time and outside legal counsel. By contrast, and as the record in the Commission’s Paperwork Reduction Act proceedings demonstrate, the “enhancements” require substantially more time and increased costs and burdens, and for very little, if any, incremental benefit to consumers. For those providers wishing to avail themselves of the “safe harbor” format, they must completely revise statements deemed compliant under the 2010 rules, at significant cost. Moreover, the format has proved to create complexity, not clarity, relative to the flexible approach adopted in the *2010 Open Internet Order*.

WISPA does not object to the Commission providing periodic guidance regarding the transparency rule.¹⁴⁰ However, the guidance should not require small broadband providers to revise compliant open Internet disclosure statements or subject them to enforcement liability for failing to follow the guidance. While individual providers have an ongoing obligation to keep their statements current and disclose, for example, any new network management practices, the broadband industry as a whole should not be required to revise their statements based on Commission guidance in the absence of any opportunity for public comment.

¹³⁹ See *Small Business Exemption From Open Internet Enhanced Transparency Requirements*, Order, 31 FCC Rcd 1772 (2017).

¹⁴⁰ See *NPRM* at 4463.

V. THE COMMISSION SHOULD STREAMLINE THE ENFORCEMENT PROCESS FOR SMALL PROVIDERS

WISPA supports streamlining the existing enforcement process. The Commission acknowledged that only one formal complaint has been filed since the rules adopted in 2015 became effective¹⁴¹ and there have been no reported Commission enforcement cases that have produced a finding that any small broadband provider violated the Commission's Rules prohibiting blocking, throttling or paid prioritization. In a member survey conducted by WISPA, slightly less than one-in-five reported that they had been the subject of a customer complaint filed through the FCC under the current rules. Where a complaint was filed against a WISPA member, however, the majority of the complaints were resolved without any enforcement action being taken, and most of the remaining complaints remain pending or have otherwise produced no government sanction to date. Many of the complaints involve not alleged violations of the Commission's Part 8 regulations, but relate instead to routine customer service issues, such as availability, reliability, customer service, and technical support, which lie outside the scope of the matters the Commission seeks to regulate under Part 8.

Small broadband providers have never been a source of blocking, throttling and paid prioritization disputes that these rules are intended to address. Nonetheless, if such complaints are filed, even when frivolous or not germane to these issues, small providers will need to redirect resources to addressing the allegations, and sometimes engage attorneys or other outside consultants to help resolve them. Thus, as to small providers, the Commission's predictive judgment in the *Title II Order* concerning the need for such formal complaint procedures has been proven wrong and the existence of current procedures has had a negative impact on small providers.

¹⁴¹ See *id.* at 4466 and n.219 (citing formal complaint of Alex Nguyen against Cellco Partnership & Affiliated Entities d/b/a/Verizon Wireless, Docket No. 16-242, Bureau ID Number EB-16-MD-003 (filed July 6, 2016)).

The Commission also stated in its *Title II Order* that although its process for filing complaints of its Part 8 Rules was comparable to its Section 208 formal complaint process, “the open Internet rules are less burdensome on complainants, who in this context are likely to be consumers or small edge providers *with limited resources*.”¹⁴² Small broadband providers also have limited resources and are often at the mercy of consumers with baseless complaints and anti-competitive actions of larger providers or edge providers.

If transparency is one of the important principles of the day, there should be transparency at all stages and among all participants. It is the antithesis of transparency and simply unfair for a complainant to not first inform its broadband provider that there is a problem with a service, the bill, or any aspect of the service, and to allow a reasonable time for the provider to address and try to resolve the problem.

A. The Commission Should Adopt A Comprehensive Enforcement Regime That Provides Greater Certainty

WISPA reiterates its call for an enforcement regime that encourages private resolution of disagreements, adopts specific time frames for filing and resolving complaints filed with the Commission and establishes clearly stated forfeiture amounts for violations of the Commission’s Part 8 rules.¹⁴³ By implementing this approach, the Commission can ensure greater certainty for all involved and reduce the Commission’s administrative burdens in resolving the smaller number of complaints that are filed. With greater certainty comes the ability of providers to better assess and quantify risk, which will enable them to better allocate their own resources and attract capital from investors that need to understand and quantify risk in determining whether and how much to invest.

¹⁴² *Title II Order* at 5713 (emphasis added).

¹⁴³ See WISPA Title II Comments, *supra* note 33, at 32-38.

WISPA recommends several specific actions the Commission can take to streamline and improve the enforcement process for Section 8 complaints. First, the Commission should eliminate the formal complaint process altogether. As the Commission suggests, the lack of formal complaints – only one since the 2010 rules became effective – demonstrates that the formal complaint process is not an effective tool for those alleging violations.¹⁴⁴ However, if the formal complaint process is retained, small providers should be exempt. As emphasized above, small broadband providers are typically self-funded with few employees, and compliance with the discovery and hearing process is onerous and time-consuming. This seriously disrupts a small provider's ability to serve its customers, maintain its network and expand to new service areas.

Second, the Commission should require end users and providers to attempt to resolve disputes for a 30-day period before an informal complaint can be filed with the Commission. The *2010 Open Internet Order* emphasized the importance of direct negotiations between a provider and its customer due to the potential technical nature of the disputes.¹⁴⁵ WISPA's member survey showed that of the few complaints received, the vast majority allege service delays, slower speeds or connectivity issues that are due to the customer's own usage habits or network congestion during peak usage periods. These issues can be easily explained and/or resolved quickly and efficiently by the broadband provider,¹⁴⁶ a benefit to consumers as well. Given that private good faith discussions have proved to be useful, WISPA proposes that the Commission codify a common-sense process in which consumers must first communicate any problems with their service provider and to require both the provider *and* its consumer to

¹⁴⁴ See *NPRM* at 4466.

¹⁴⁵ See *2010 Open Internet Order*, *supra* note 56, at 17986.

¹⁴⁶ See WISPA Title II Comments at 36 (suggesting private remedies, such as refunds if desired).

participate in good faith discussions for a minimum of 30 days in an effort to resolve the problem prior to the filing of any complaint with the Commission.

Third, WISPA requests that the Commission place a time-limit on when complaints must be filed, ideally with one year of the alleged rule violation. Broadband providers in general should not have to retain traffic records for any long period of time and one year is a sufficient period of time for a consumer to register a complaint.

Fourth, the rules should clearly prevent the filing of complaints where the broadband provider's network management practices are "*per se* reasonable" as described in Part IV. The Commission should expressly state that these network management practices are not complaint-worthy, which will foster an efficient and effective process for small broadband providers, as well as efficiently manage limited Commission resources by eliminating the filing of frivolous complaints. As WISPA stated in 2014, "there is an inherent unfairness in penalizing broadband Internet access providers that make a good faith effort to comply with the rules only to fall short because of an honest misunderstanding of the Commission's requirements."¹⁴⁷

Fifth, WISPA recommends that the Commission render a decision on any complaint within sixty (60) days of when the broadband provider files its response to the Commission or any required supplemental information. A shot clock is beneficial to all broadband providers, but especially important to small providers because it provides certainty and mitigates risk from long, indefinite and thus, expensive inquiries.

Finally, the Commission should amend Section 1.80 to specify maximum forfeiture amounts for violations of Section 8 rules. The existing rules provide no guidance on the range of sanctions or forfeitures the Commission may impose. As a result, providers have no idea how to

¹⁴⁷ *Id.* at 37.

quantify a violation of a rule – is it a \$1,000 forfeiture or a \$1 million dollar forfeiture? Without any certainty or range of potential exposure, providers cannot know the extent of any penalty and investors cannot reasonably assess the risk. And if an investor cannot assess risk, it will simply back away from the investment opportunity.

In addition to the mitigating and aggravating factors in Section 1.80, the Commission should make clear that the size of the provider will be taken into account. It would be inappropriate to treat small providers like large providers when the ability to pay, for example, a \$50,000 forfeiture would be a rounding error for a large nationwide broadband provider but would impose a significant hardship on a provider with a few hundred customers.

B. The Commission Should Eliminate Advisory Opinions

In the *Title II Order*, the Commission adopted the use of Advisory Opinions issued by the Enforcement Bureau as a means to gauge in advance whether a proposed activity or service is acceptable under the Commission’s Open Internet rules, including the general conduct standard.¹⁴⁸ However, the actual rules allow the Bureau, at its sole discretion, to refuse to consider a request for an Advisory Opinion.¹⁴⁹ Moreover, there is no deadline for the Bureau to inform the requesting provider of such refusal nor is there a deadline for the Bureau to issue an opinion once accepted.

In his dissent to the *Title II Order*, Commissioner O’Rielly opined that Advisory Opinions “appear[] utterly useless: they are only available in certain circumstances and are not binding. (I’m not sure why any party would want to refer itself to the Enforcement Bureau when

¹⁴⁸ See *Title II Order* at 5706-08; 47 CFR § 8.18.

¹⁴⁹ 47 CFR § 8.18(a)(2).

its request could be used against it later.)”¹⁵⁰ Likewise, in his separate statement in *US Telecom*, Judge Williams observed that the Advisory Opinion process imposes disproportionate costs on small providers:

For the smaller fry, the internet service provider firms whose growth is likely to depend on innovative business models . . . , the slow and costly advisory procedure will provide only a mild antidote to those prescriptions’ negative effect. *This of course fits the general pattern of regulation’s being more burdensome for small firms than for large, as larger firms can spread regulation’s fixed costs over more units of output.*¹⁵¹

The absence of specific timeframes for the Bureau to act makes the value of Advisory Opinions illusory and essentially unavailable to small providers. This “Mother, May I” approach should be repealed.

¹⁵⁰ O’Rielly Title II Dissent at 5999; *see also US Telecom*, 825 F.3d at 755 (Williams, J., Concurring in Part and Dissenting in Part) (“the Bureau is free to change its mind at will, and as the opinions will be issued only at the staff level, the Commission reserves its freedom to act contrary to the staff’s conclusions at any time”).

¹⁵¹ *US Telecom*, 825 F.3d at 755-56 (citation omitted) (emphasis added).

Conclusion

This proceeding presents the Commission with a golden opportunity to right a wrong – the imposition of heavy-handed, “one-size-fits-all” regulations on small broadband providers that are least likely to accommodate the costs, burdens and uncertainties. Restoring broadband service to information service classification will provide fuel for those small providers that are well-positioned and eager to help bridge the digital divide and bring consumers in unserved and underserved areas the benefits of fixed broadband service.

Respectfully submitted,

WIRELESS INTERNET SERVICE PROVIDERS ASSOCIATION

July 17, 2017

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/s/ Mark Radabaugh, FCC Committee Chair
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Exhibit 1

WISPA Membership Survey Results

How many full-time employees does your WISP have?		
Answer Options	Response Percent	Response Count
1 - 5	53.6%	105
6 - 10	15.8%	31
11 - 15	8.7%	17
16 - 20	6.1%	12
21 - 25	4.1%	8
26 - 30	3.1%	6
31 - 40	2.6%	5
41 - 50	2.6%	5
51 - 75	2.6%	5
76 - 100	0.0%	0
More Than 100	1.0%	2
<i>answered question</i>		196
<i>skipped question</i>		0

How many residential customers does your WISP serve?		
Answer Options	Response Percent	Response Count
1 - 200	17.8%	19
201 - 300	6.5%	7
301 - 500	10.3%	11
501 - 1,000	21.5%	23
1,001 - 2,000	20.6%	22
2,001 - 3,500	9.3%	10
3,501 - 6,000	6.5%	7
6,001 - 7,500	2.8%	3
7501 - 10,000	0.9%	1
10,001 - 20,000	1.9%	2
More Than 20,000	1.9%	2
<i>answered question</i>		107
<i>skipped question</i>		89

What kind of area do you primarily serve?		
Answer Options	Response Percent	Response Count
Rural	75.9%	82
Suburban	13.0%	14
Urban	11.1%	12
<i>answered question</i>		108
<i>skipped question</i>		88

Do you serve the following customers (check all that apply):

Answer Options	Response Percent	Response Count
Small businesses	100.0%	107
Schools	48.6%	52
Government, police, fire departments	71.0%	76
	<i>answered question</i>	107
	<i>skipped question</i>	89

Exhibit 2

The Carmel Group Report

“Ready for Takeoff: Broadband Wireless Access Providers Prepare to Soar with Fixed Wireless”

2017



Ready for Takeoff:

Broadband Wireless Access Providers
Prepare to Soar with Fixed Wireless

THE BWA INDUSTRY REPORT: 2017



Table of Contents

About This Report	2
Executive Summary	4
What is Broadband Wireless Access?	5
How Does BWA Work?	7
BWA: A Solution to the Broadband Gap	8
International Proof of Concept	8
U.S. BWA Growth Forecast	9
Seven Key Growth Drivers	11
<ul style="list-style-type: none"> • Fixed wireless costs less • Spectrum trends favor fixed wireless • Video is fueling overall growth in demand for broadband • Standards-based technologies give providers more choices • Capital availability and government support are growing • New entrants are validating the business model • New markets and service categories = more opportunities 	
Fixed Wireless Versus Other Technologies	17
BWA Providers Face Challenges	19
Conclusion	19
Appendix	20

FIGURE 1: U.S. Fixed Wireless Broadband Availability	5
FIGURE 2: Typical BWA Network Architecture	7
FIGURE 3: BWA Industry Revenue Review and Forecast	9
FIGURE 4: BWA Customer Growth	10
FIGURE 5: BWA Average Monthly Billing Review and Forecast	10
FIGURE 6: Consumer Broadband Comparative Economics	12
FIGURE 7: Popular BWA Spectrum Bands	13
FIGURE 8: Rising Global Internet Traffic	14
FIGURE 9: OTT is Driving Internet Growth	14
FIGURE 10: BWA Annual Residential Subscriber Growth, 2015 to 2016	20
FIGURE 11: BWA Average Subscriber Acquisition Cost (SAC) for Residential Customers	21
FIGURE 12: BWA Average Revenue per Unit for Residential Users	21
FIGURE 13: BWA Average Monthly Churn	22

About This Report

The purpose of this report is to provide a comprehensive, independent, informational, and analytical resource that describes the Broadband Wireless Access (BWA) industry and provides perspectives on future opportunities, threats, and outlooks.

The target audience for this report includes BWA companies, stakeholders, investors, policymakers, strategic advisors, analysts, equipment and software vendors, and anyone with an interest in the fixed wireless and broadband industries. The author's aim is to provide objective data and insights to help readers make informed business, investment, and policy decisions.

METHODOLOGY

This report is based on independent research conducted in 2016, including interviews with representatives of 30 wireless broadband service providers, vendors, and thought leaders. The interviews were conducted by The Carmel Group and lasted approximately two hours each. The Wireless Internet Service Providers Association (WISPA) and Wireless Communications Association International (WCAI), as well as several other groups and telecom companies, also provided input. Filings at the U.S. Securities and Exchange Commission by a publicly traded company in the BWA sector were another resource. Other third parties, such as bankers and financiers, were also interviewed. Finally, extensive surveys of operators, equipment manufacturers, and vendors were distributed to members of WISPA and WCAI in Q3 of 2016, to gain another critical layer of research and analysis.

The charts and graphs in the Appendix are based on survey results from 169 U.S.-based BWA providers.

THE REPORT SPONSORS

Prominent stakeholders from today's BWA community and two major trade groups representing the industry's interests in Washington, DC – WISPA and WCAI – selected Jimmy Schaeffler of The Carmel Group (www.carmelgroup.com) to conduct this project based upon his expertise in performing studies on the future of the telecom, media, and entertainment industries.

The Carmel Group prepared this report on behalf of the parties listed below.

- **All Points Broadband**
- **Amplex**
- **AtLink Services**
- **Cambium Networks**
- **Comelec Internet Services**
- **Huawei**
- **Mimosa**
- **RFelements**
- **Rise Broadband**
- **Safelink**
- **SpeedConnect**
- **TransWorld Network**
- **ViaSat**
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Individuals interested in further information may contact The Carmel Group via telephone at +1-831-622-1111 or email at: jimmy@carmelgroup.com.

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Executive Summary

- The Broadband Wireless Access (BWA) industry is experiencing robust growth in the United States and worldwide, and The Carmel Group expects this growth to continue for at least the next five years.
- There are at least seven key growth drivers lifting the fixed-wireless-based, BWA industry to new heights:
 - 1 The economics of wireless technology enable network deployments at a fraction of the cost of wireline.
 - 2 The economics of unlicensed spectrum and trends in spectrum regulation are favorable to fixed wireless.
 - 3 Consumer demands for broadband connectivity and associated applications, especially video, are surging at an exponential rate.
 - 4 Global standards-based technologies, such as LTE, and a growing equipment ecosystem are being leveraged for fixed wireless uses.
 - 5 Industry consolidation and a healthy funding environment from private and government sources are driving investment.
 - 6 New entrants and hybrid networks are validating the business model.
 - 7 New markets in urban areas and categories such as home automation, home security, and the Internet of Things (IoT) present further opportunities for fixed wireless growth.
- Bringing broadband to under-served markets is a difficult challenge. But for the foreseeable future, BWA providers using fixed wireless technologies will offer the most cost-effective solution in vast areas of the United States and the world.
- The existence of large, successful BWA providers in other nations underscores the sector's potential in the United States. Developing nations that lack wireline infrastructure present rich growth opportunities.

What is Broadband Wireless Access?

Broadband Wireless Access (BWA) providers – also known as Wireless Internet Service providers (WISPs), Fixed Wireless Access providers (FWA), Competitive Broadband Providers (CBPs), and/or Wireless Local Loop providers (WLL) – deliver broadband service to consumers in fixed locations, primarily via wireless technology.

es, and community anchor institutions.

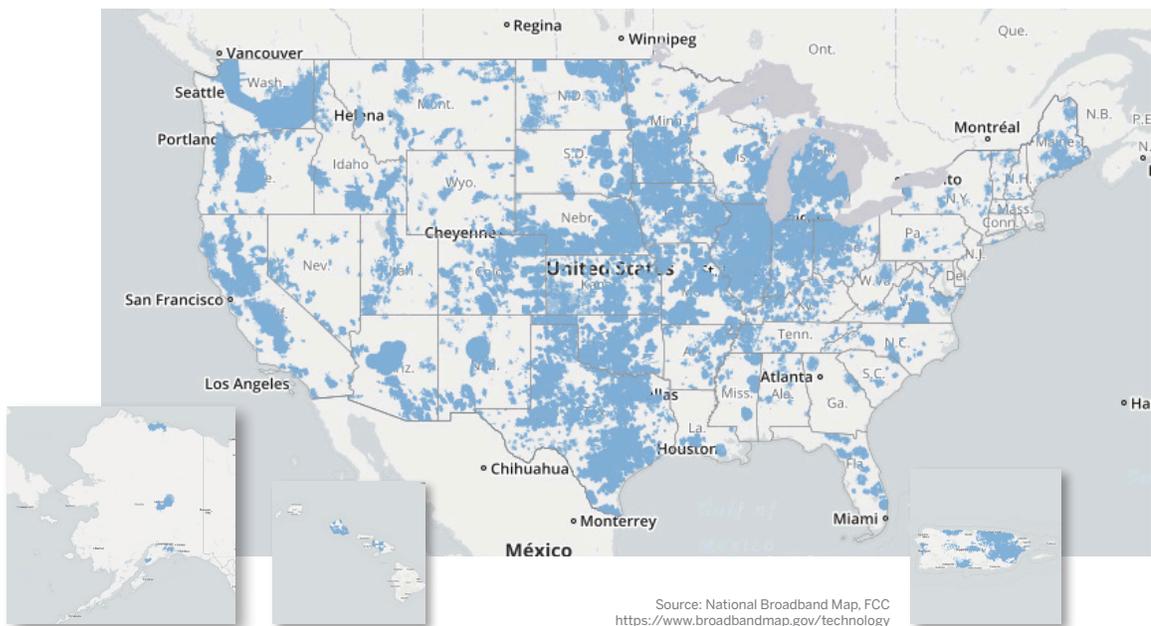
Services delivered by BWA providers may include data as well as voice, video, security, and ancillary products and services.

BWA providers deliver their services over a combination of licensed spectrum, lightly licensed spectrum (or “shared access” spectrum), and unlicensed spectrum. Many also use fiber optics in parts of their infrastructure, creating efficient “hybrid” networks. Typical download speeds are in the range of 5 to 50 Megabits per second (Mbps), a number that is rising as technology improves and equipment costs become more competitive. Fixed wireless technology can support Gigabit download speeds.

Whereas most wireless infrastructure today serves *mobile* consumers, BWA providers use wireless technology to serve customers in *fixed* locations such as residences, businesses, and community anchor institutions.

Whereas most wireless infrastructure today serves *mobile* consumers, BWA providers use wireless technology to serve customers in *fixed* locations such as residences, business-

FIGURE 1: U.S. Fixed Wireless Broadband Availability



Currently in the United States, more than 2,000 BWA providers deliver service to nearly 4 million customers. As shown in Figure 1, each state has at least one fixed wireless provider. The largest concentrations of BWA providers are found in the Midwest, Northwest, and Southwest, as well as the central and northern parts of California.

To date, the industry has served mostly rural and suburban markets where fiber and cable deployment is not cost-effective. However, given the favorable economics of fixed wireless, many BWA providers are expanding into urban markets as well, offering competitive alternatives to customers there.

Most U.S. BWA providers are small and medium-sized businesses. Rise Broadband, with nearly 200,000 subscribers, is the largest U.S.-based BWA provider. Other large providers include AtLink Services, Comelec Internet Services, Safelink, SpeedConnect, Trans-World Network, and Wisper ISP. However, the American BWA networks serve an average of approximately 1,200 customers. Very small BWA providers, especially those that serve small rural communities, may count customers in the low hundreds.

Many BWA leaders interviewed for this study indicated their “ideal” deployment occurs in residential clusters of 100 to 1,500 locations per square mile, areas that wired technology platforms often ignore because of the higher per-location cost to deliver service across sparsely populated areas.

Bringing broadband to under-served markets is a difficult challenge. At this time, BWA providers using wireless technologies are the most cost-effective solution in vast areas of the United States and the world.

How Does BWA Work?

In a typical BWA network, broadband content is received by the BWA provider from an external distribution point via fiber or microwave connections. From there, signals are delivered to BWA customers via wireless transmitters on towers. The towers are interconnected by licensed or unlicensed spectrum and can carry up to 5 to 10 Gigabytes of capacity. Customers receive the signals via antennas that are attached to the subscribers' premises. This is why the technology is called fixed wireless, as opposed to mobile/cellular wireless.

Within the subscribers' premises, the signal is most commonly delivered via a Wi-Fi router or ethernet cable to personal computers, TV monitors, and other stationary and mobile devices in the home or business.

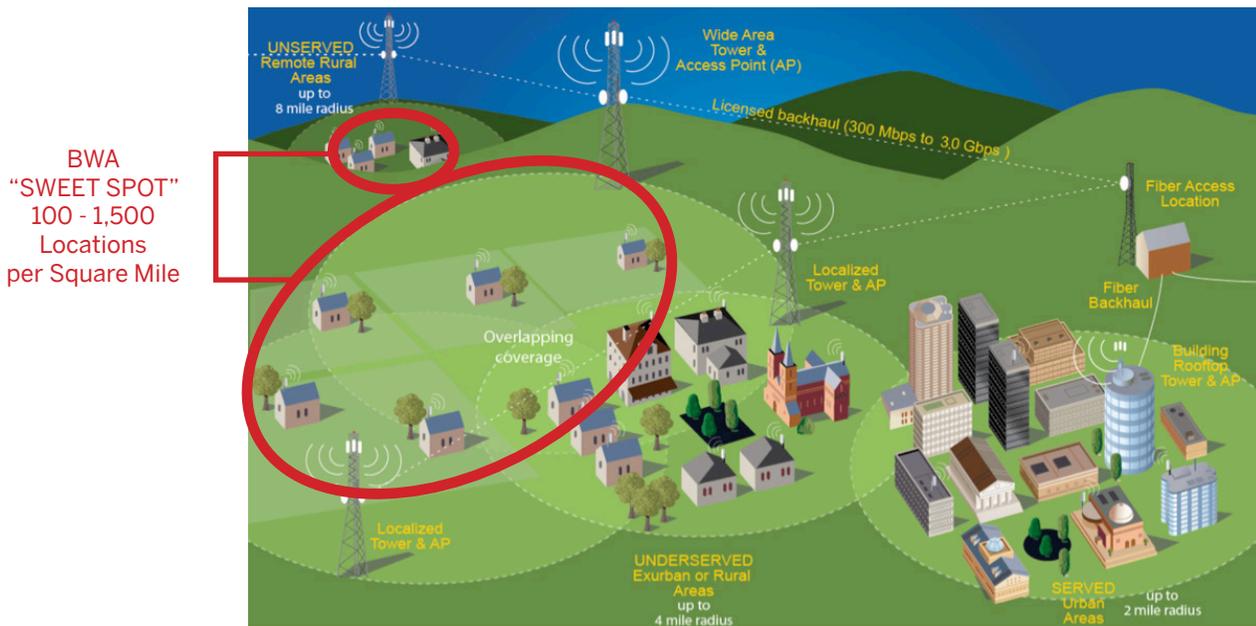
BWA providers typically employ a variety of licensed and unlicensed spectrum to deliver their services. For last-mile, point-to-multipoint connections, unlicensed spectrum bands such as 900 MHz and 2.4 GHz were

commonly used in the early years of the industry. However, these bands have given way to 5 GHz, 3.65 GHz, and 2.5 GHz to accommodate increasing speed, coverage, and capacity needs. Unlicensed 5 GHz and licensed 6-24 GHz point-to-point connections are most commonly used to connect towers and serve high-volume enterprise customers, with FCC microwave licenses readily available at nominal cost.

Equipment designed for use in unlicensed spectrum bands is limited in power output to reduce interference to other users, as mandated by the FCC, and is designed to perform well in environments with more potential for interference than equipment designed for use in exclusively licensed bands.

The BWA "sweet spot" – where providers can offer the best service and economics – is often in exurban areas with 100 to 1,500 locations per square mile, such as those shown on the left side of Figure 2.

FIGURE 2: Typical BWA Network Architecture



BWA: A Solution to the Broadband Gap

America's broadband performance is middling at best. According to the Organization for Economic Cooperation and Development (OECD), in 2015 the United States was ranked 15th out of 34 member nations in the number of fixed broadband subscriptions per 100 inhabitants.

- Only 4 percent of urban Americans lack access to 25 Mbps/3 Mbps broadband.

The United States faces a variety of challenges that have made it difficult to ensure universal broadband coverage. Chief among them are low population density and rugged terrain in large portions of rural America. BWA providers using fixed wireless technology can be a large part of the solution, largely because of their favorable economics. (See Figure 6.)

Bringing broadband to under-served markets is a difficult challenge. At this time, BWA providers using wireless technologies are the most cost-effective solution in vast areas of the United States and the world.

And according to the [FCC's 2016 Broadband Progress Report](#):

- 10 percent of all Americans (34 million people) lack access to 25 Mbps/3 Mbps service; and
- 39 percent of rural Americans (23 million people) lack access to 25 Mbps/3 Mbps; but

Without BWA providers, America's broadband gap already would be much larger. The data further suggests that many under-served Americans reside and do business in rural areas where BWA providers are thriving, validating the opportunity for them to become a key part of the solution to America's broadband gap.

International Proof of Concept

BWA providers are more common in some nations than in the United States, in most cases because cable and other broadband infrastructure is non-existent, aging, and/or very expensive to install and upgrade. For example, Australia, Canada, Italy, the Philippines, and Russia all have BWA providers with customer counts in the hundreds of thousands, or in the case of the Philippines, millions. Developing nations present significant growth opportunities for the industry.

Non-U.S. demand for BWA services has pushed the technology forward. Innovators like Cambium Networks, Ericsson, Huawei, Mimoso, Nokia, Ubiquiti, and ZTE are competing in both established and emerging markets around the world.

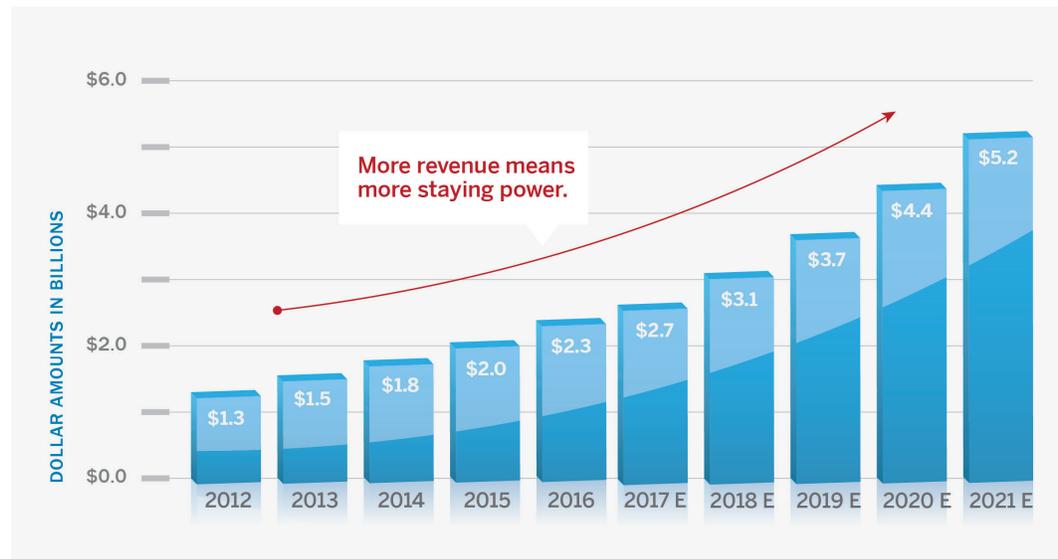
The notion of "carrier grade" fixed wireless was not widely accepted in the past, but it is now becoming more prevalent in the United States and worldwide.

U.S. BWA Growth Forecast

The Carmel Group estimates that the current upward trajectory of BWA industry revenues in the United States will continue for at least the next five years. (See Figure 3.) Core BWA industry revenues from provision of service to end-users were estimated conservatively at \$2.3 billion in 2016. These are expected to rise to more than \$5.2 billion by the end of 2021.

Drivers of growth include explosive consumer demand for broadband services, continuing deployment to unserved and under-served areas, commercial and business demand, improvements in technology at competitive prices (including standards-based LTE equipment), and the combination of existing services with ancillary services that are increasing the average revenue per unit (ARPU).

FIGURE 3: U.S. BWA Industry Revenue Review and Forecast

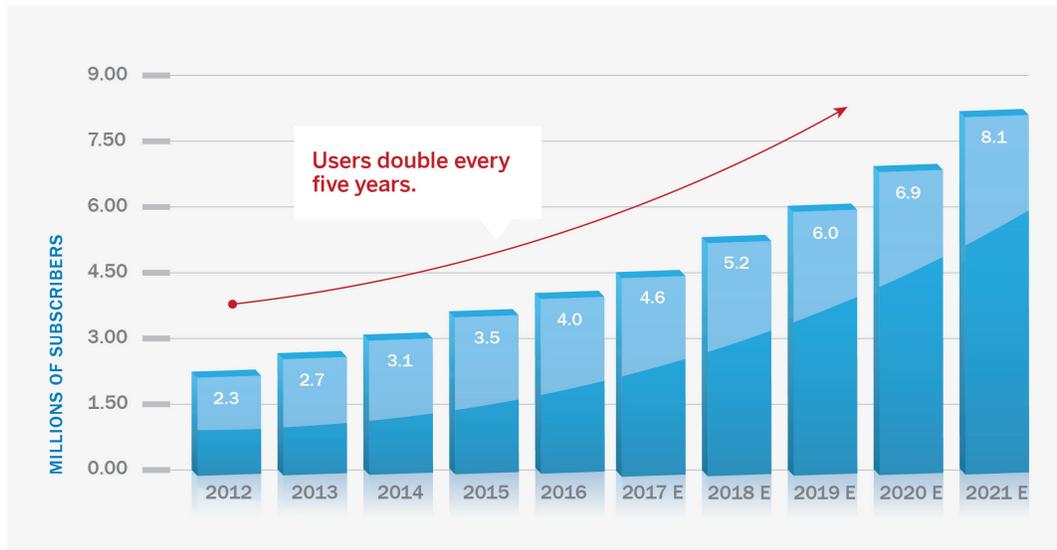


Source: The Carmel Group
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The Carmel Group believes that customer subscriptions will roughly double, from 4.0 million in 2016 to 8.1 million in 2021, as BWA providers expand in under-served areas and

contend effectively in the burgeoning number of areas where they offer superior customer service and a local presence. (See Figure 4.)

FIGURE 4: U.S. BWA Customer Growth

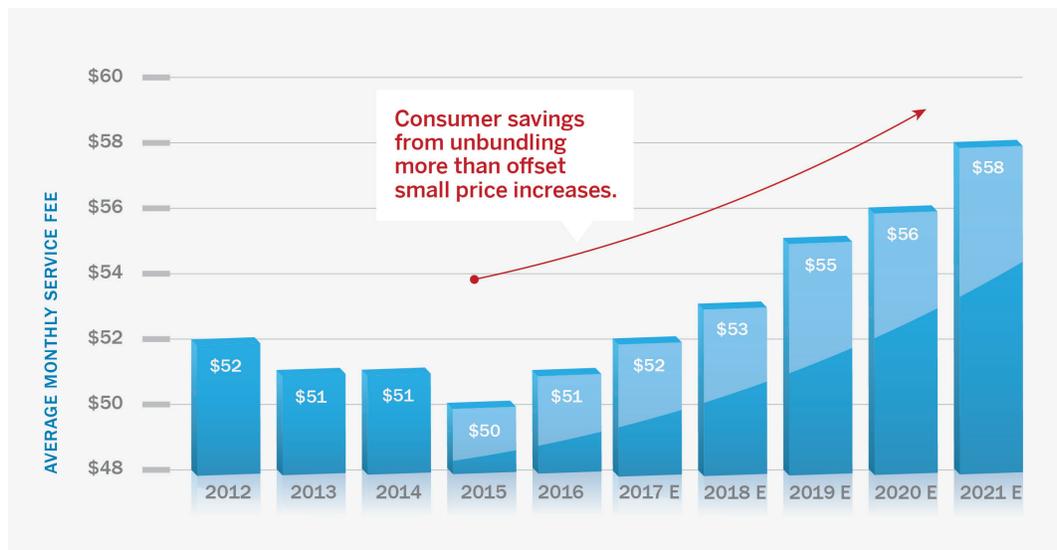


Source: The Carmel Group
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The Carmel Group believes that per-customer monthly revenue also will continue to rise, in part because consumers will be willing to pay more for the improved services and speeds

that will flow from network upgrades, standards-based technologies, and ancillary services. Figure 5 depicts our projections.

FIGURE 5: U.S. BWA Average Monthly Billing Review and Forecast



Source: The Carmel Group
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Seven Key Growth Drivers

The BWA industry is experiencing robust growth in the United States and worldwide. The Carmel Group expects this growth to accelerate for at least the next five years, due to seven key growth drivers:

- 1** The economics of wireless technology enable network deployments at a fraction of the cost of wireline.
- 2** The economics of unlicensed spectrum and trends in spectrum regulation are favorable to fixed wireless.
- 3** Consumer demand for broadband connectivity and associated applications, especially video, is surging at an exponential rate.
- 4** Global standards-based technologies, such as LTE and 5G, and a growing equipment ecosystem are being leveraged for fixed wireless applications.
- 5** Industry consolidation, a healthy funding environment, and greater support from government are driving investment.
- 6** New entrants and hybrid networks are validating the business model.
- 7** New markets and categories such as home automation, security, and the Internet of Things (IoT) present further opportunities for fixed wireless.

We delve further into each of these drivers below.

1 Fixed wireless costs less

The economics of fixed wireless are already very attractive and only becoming more so. For example, it costs nothing to install, maintain, or repair the spectrum resource, and fixed wireless equipment is inexpensive relative to fiber, coax, and twisted pairs – all of which incur extensive installation, maintenance, and repair costs. (See Figure 6.)

Moreover, upgrading fiber, cable, satellite, or mobile broadband is highly capital intensive. For these technologies, each generation of improvement requires significant network upgrades. In contrast, BWA networks can be scaled incrementally over time.

Advances in radio technology are improving wireless speeds to the point where they are approaching cable and ultimately will catch up to fiber. Industry standards and software-defined radios enable incremental upgrades without leaving past customers behind.

The following figure compares relative capital expenditures per residential subscriber, as well as speed, upgrade costs, average revenue per unit (ARPU), and payback times for the five most popular U.S. broadband technologies.

This is a relative presentation comparing the four other technologies to BWA, which is set to an index value of 10. Fiber costs about 7x BWA costs; Cable is 4.5x more. Satellite costs about the same per sub, but this analysis excludes the cost of satellites because network costs vary greatly. Mobile's capex per sub is a little more than 2x BWA's, although it offers mobility. As household density drops, capex for wireline rises but remains relatively constant for wireless.

This analysis suggests that with a payback period of just under one year, BWA offers the most attractive economics of the top U.S. broadband technologies.

The estimates for fiber, cable, and BWA assume the indicated speeds and average network reach. Satellite and mobile data are estimated from national averages. In an effort to present a rational and fair relative cost analysis, The Carmel Group constructed several cost models for each technology. The Relative Capex/Subscriber reflects a blend of these models with some analytical adjustment. Actual results vary.

FIGURE 6: Residential Consumer Broadband Comparative Economics

	FIBER	CABLE	SATELLITE	MOBILE	BWA
CAPEX/SUB RELATIVE TO BWA ⁽¹⁾	70	45	10.5 ⁽²⁾	21	10
SPEED ⁽³⁾	1 Gbps	150 Mbps	12-35 Mbps ⁽⁴⁾	10–12 Mbps	100 Mbps
UPGRADE COSTS	MODEST Only the fiber remains the same	HIGH Complete CPE & network change	LOW/HIGH Incremental upgrades until the satellite fails	HIGH Complete device & network change	MODEST Incremental upgrades in CPE and network
BROADBAND ARPU	\$69	\$42	\$61	\$59	\$51
PAYBACK PERIOD	60 months	38 months	12 months	21 months	11.5 months

Sources: Wisper ISP, National Rural Telecommunications Cooperative, and The Carmel Group. Copyright 2017, Property of The Carmel Group. All Rights Reserved.

(1) This is a relative presentation comparing all of the technologies to BWA, which is set to an index value of 10. See above for explanation.

(2) Does not include the cost of satellites.

(3) Max speeds; most service providers are not yet offering max speed. For cable, the DOCSIS 3.0 standard is capable of 1 Gbps. For BWA, point-to-point links and millimeter-wave, point-to-multipoint connections can provide more than 1 Gbps to end users.

(4) Anticipated typical speed.

2 Spectrum trends favor fixed wireless

The BWA industry's ability to use unlicensed spectrum is another growth driver.

Unlicensed spectrum is free to its users. Licensed spectrum requires capital investments at high prices, which are ultimately passed on to consumers.

Another advantage is rapid deployment. There is no need to go through lengthy regulatory proceedings and auctions to acquire access to the airwaves. In addition, the recent introduction of LTE technology in certain bands opens up an enormous, global-standards-based ecosystem for equipment and carrier-aggregation technology, adding another boost to the speed, capacity, and economics of BWA deployments and upgrades.

The Carmel Group's extensive survey of BWA operators revealed that relatively few spectrum bands support today's BWA industry. (See Figure 7.) However, the FCC is

exploring new bands that are expected to be well-suited for BWA networks, including the Citizens Broadband Radio Service band (3550-3700 MHz, called CBRS), TV white spaces, and several extremely-high-frequency, millimeter-wave bands. Industry efforts are also underway to expand geographically licensed areas in the LTE-grade 2.5 GHz band.

The growing acceptance of spectrum sharing is further increasing availability and capacity for fixed wireless, with greater overall spectral efficiency.

It is important to realize that unlicensed spectrum is not *unregulated* spectrum. Even in unlicensed bands, the FCC regulates acceptable equipment, power limits, frequencies, and interference. BWA providers stay within those limits and use a variety of frequencies and network design features to overcome population density, terrain, and propagation obstacles.

FIGURE 7: Spectrum Bands Most Commonly Used by the BWA Industry

FREQUENCY	500-700 MHz	902-928 MHz	2.4 GHz	2.5 GHz	3.55 – 3.7 GHz	5.15- 5.85 GHz	28 & 39 GHz	>40 GHz
COMMON NAME	White Space	ISM	ISM/Wi-Fi	EBS/BRS, LTE Band 41	CBRS, LTE Band 42, 43 & 48	U-NII 5 GHz Wi-Fi Band 33	LMDS, TN	Millimeter Wave
LICENSE	ASA*	EXEMPT	EXEMPT	LICENSED	ASA, PAL or GAA	EXEMPT	LICENSED	VARIOUS
INTERFERENCE RISK	Medium	High	High	Low	Low, Medium	High	Low	Low
BAND SIZE	Varies by Location	26 MHz	83.5 MHz	194 MHz	150 MHz	580 MHz	1.2 GHz 1.4 GHz	6.2 GHz
NLOS ABILITY	Excellent	Excellent	Fair	Good	Fair	Poor	Poor	Poor
PRIMARY TECHNOLOGY	802.11af "Super Wi-Fi"	Proprietary TDD	Wi-Fi	LTE	Proprietary, WiMax and LTE	Wi-Fi, LTE-U	5G	5G

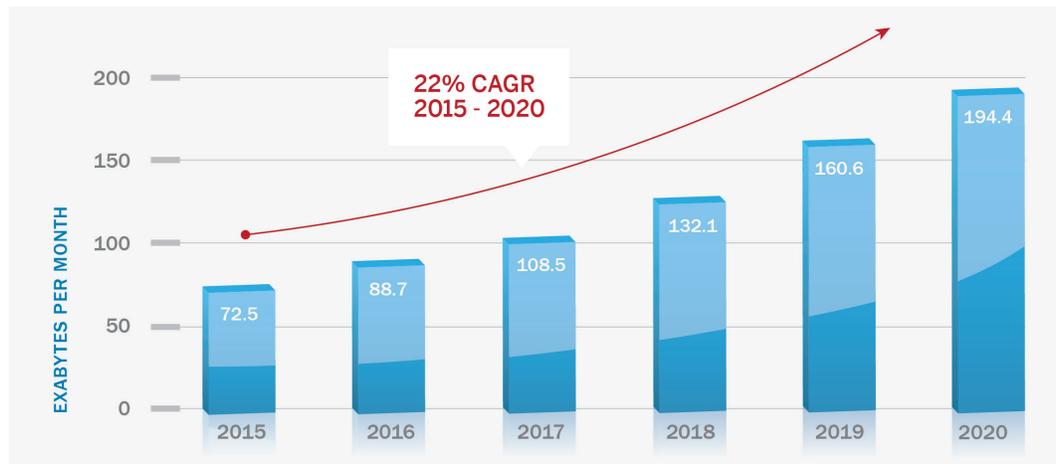
* Authorized Shared Access
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3 Video is fueling overall growth in demand for broadband

The demand for broadband access to the internet is growing at an exponential rate. Figure 8 presents Cisco's 2016 assessment and forecast of overall internet traffic mea-

sured in gigabits per second (Gbps). Consumers are defining their internet access needs in terms of both speed and throughput.

FIGURE 8: Rising Global Internet Traffic



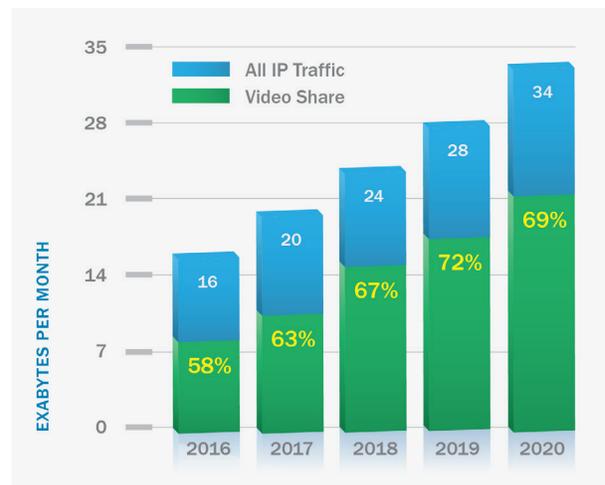
Source: Cisco Visual Networking Index 2016

Video is a major driver of broadband demand. Figure 9 presents Cisco's 2016 assessment on how video will drive broadband demand in terms of quantity (exabytes) of data moved.

Video accounts for a rapidly growing share of internet traffic. Cisco projects a 22% compound annual growth in overall internet traffic between 2015 and 2020, but it expects video traffic alone to grow 31% annually over the same time frame.

The reasons for this are clear. A growing number of consumers are unbundling from pay TV services and replacing expensive programming bundles with less expensive "over the top" (OTT) access via broadband. BWA providers make this cost-saving option – once available only to urban dwellers – available to rural and exurban customers.

FIGURE 9: OTT is Driving Internet Growth



Source: Cisco Visual Networking Index June 2016

We do not expect this trend will slow. If anything, we expect unbundling will accelerate as more consumers embrace Internet-based programming and watch programs on wireless devices at times of their choosing.

4 Standards-based technologies give providers more choices

Every significant advancement in mobile technology is paying dividends in the fixed wireless arena as well. For example, standards-based LTE technology, which originated in mobile standards bodies, is being deployed in fixed networks to give BWA providers greater speed, capacity, and credibility as service providers.

The benefits of unlicensed spectrum are so powerful that many mobile carriers are planning to augment licensed networks with LTE over unlicensed spectrum.

The WISP industry started with consumer and enterprise-class technology. These technologies were sometimes cumbersome to manage and upgrade. But because of rising world demand, today's BWA providers have an array of suppliers and technologies. Indeed, carrier-class technology is rapidly gaining share among BWA providers. This competition, together with enhanced global research and development and related investments, is enabling the technologies and services to improve more rapidly.

5 Capital availability and government support are growing

As noted in this report, BWA providers generally do not hold licenses for the spectrum they use. The lack of a tangible medium such as fiber, copper, or licensed spectrum has deterred financial institutions from investing in BWA providers. Other investor concerns have included low barriers to entry by competitors, signal interference, and alleged "unreliability" of unlicensed spectrum.

However, more than a decade of successful operations, validation from new entrants, recent standards-based equipment deployments, and the advance of successful consolidators like Rise Broadband have all improved capital availability. Today, the financial markets are beginning to recognize the favorable economics of fixed wireless and BWA providers. The validity of licensed spectrum at 2.5 GHz is also emerging, as illustrated by larger BWA providers such as Michigan-based SpeedConnect.

Meanwhile, the federal government is considering regulatory changes that could open up more opportunities for BWA providers. For example, the FCC and U.S. Department of Agriculture are eyeing plans to make broadband subsidy programs less oriented to incumbent telecom providers, more technology-neutral, and more focused on cost-effectiveness and speed of deployment. Spectrum sharing initiatives are underway to provide additional unlicensed and affordable spectrum licenses to service providers. And the new chairman of the FCC, Ajit Pai — having himself grown up in rural America — has developed a 'Digital Empowerment Agenda' to prioritize expanded access to broadband in under-served areas of the United States.

6 New entrants are validating the business model

The arrival of major new entrants is signaling a wave of growth in fixed wireless and the BWA sector. Google, AT&T, Verizon, Windstream, and other carriers have recently announced plans to deploy more fixed wireless, generally as an extension of their wired services. Many of these efforts target rural areas and are supported by the federal Connect America Fund. Other efforts target multi-dwelling units

(MDU) and commercial customers in urban and suburban areas.

These new entrants will further validate the business model and lend BWA providers greater credibility in capital markets and the halls of government. Long term, these companies could pose a competitive threat or present exit opportunities for smaller providers.

7 New markets and service categories = more opportunities

To date, fixed wireless technology has been most successful in rural America, where it offers high-grade service in areas with limited alternatives, locally based customer service, and superior economics compared to other broadband options.

However, BWA providers are beginning to enter higher-density markets due to the new technologies available, the faster deployments possible, and the improving access to capital. For example, industrial parks, residential communities, and government or institutional facilities are often found on the fringes of urban areas. Urban enterprise zones often have aging infrastructure and indifferent incumbent providers. We see growth in urban deployments utilizing 5G millimeter-wave technologies, which deliver high-capacity, high-speed services, albeit at shorter distances.

For all the reasons described in this report, BWA providers are well positioned to compete in these neglected markets as well. The Carmel Group expects these higher-density markets could grow to represent 30 percent or more of industry revenues in the five- to ten-year time horizon.

On another front, the advances in equipment are enabling wireless networks to dramatically reduce latency, i.e., the delay between transmitting and receiving data. Broadband applications that depend on speed, reliability, and low latency – such as gaming, video-on-demand, the Internet of Things (IoT), and data backup for business and government – are among the most robust segments in the broadband market.

BWA operators interviewed for this report also noted that home security and automation systems are ancillary services that can be conveniently packaged with fixed wireless broadband.

These growth drivers are not yet factored into our current growth forecast, which means the BWA outlook could have even more upside than that projected here.

Fixed Wireless Versus Other Technologies

The various telecommunications technologies have “pros and cons” that affect their suitability for various market requirements. The gaps in any one technology present clear opportunities for the others. Fixed wireless competes well with many of the alternatives. (See Figure 6.)

VERSUS MOBILE/CELLULAR

Mobile/cellular networks were developed for mobile voice service; data-intensive applications came much later. In the mobile arena, customers typically buy a quantity of data per month and face extra charges or service restrictions if they exceed data caps.

Mobile carriers typically use licensed spectrum in the 700 MHz to 2.5 GHz range, which they buy at FCC auctions or on the secondary market. These costs are passed through to consumers. On top of spectrum costs, the equipment needed to run mobile networks costs substantially more to own and operate than fixed wireless equipment.

Fixed wireless BWA systems do not provide for mobility. However, they can ensure high reliability and efficient carriage of large volumes of data for customers in fixed locations through the use of large, outdoor, directional antennas.

The mobile/cellular industry also spreads supply, operations, and maintenance among a dizzying array of consumer electronics companies, equipment vendors, and telephone companies.

In contrast, fixed wireless providers typically do it all. They buy, install, and maintain everything in their network, from the “backhaul” into the system base, to the towers, to the fiber, to the consumer premises equipment both inside and outside their customers’ buildings.

VERSUS DSL, FIBER, CABLE AND SATELLITE

A remarkable 74% of American households have only one local provider of broadband connections that can meet the FCC’s broadband speed standard of 25 Mbps download and 3 Mbps upload – consistently and at attractive prices. This fact alone indicates the need for policies to encourage more investment and competition.

Fixed wireless BWA systems do not provide for mobility. However, they can ensure high reliability and efficient carriage of large volumes of data for customers in fixed locations.

In the mobile arena, tiny antennas that fit inside of a handheld device and transmit signals on-the-go are the norm. Sadly, customers can do little but accept spotty connections and dropped calls caused by poor reception on the handheld device.

In areas where consumers have two or more options, telco-provided Digital Subscriber Line (DSL) service is often the only competitor to fixed wireless. However, DSL is comparatively slow and costs considerably more to deploy and upgrade than other technologies.

Many of the BWA leaders interviewed for this report said fiber-to-the-home (FTTH) tends to be their fiercest rival in those limited areas where FTTH is available. Previously-deployed-but-unused fiber provides good throughput and tends to be cost-competitive to the consumer. The economics of new fiber tend to limit it to higher-density markets and higher-traffic tower links.

Cable tends to be limited to more densely populated areas, and many cable systems still deliver services via aging infrastructure. State-of-the-art cable tends to be limited to the most profitable markets. Thus, BWA providers enjoy several advantages over cable broadband in terms of reaching more far-flung customers with reliable, speed-competitive service, even in urban and suburban environments.

The relatively high latency of satellite broadband limits its use for gaming and other low-latency applications. BWA providers, cable, fiber, and mobile are all better suited for latency-sensitive applications.

Data caps among satellite providers further reflect the relative scarcity of today's satellite broadband capacity. Conversely, data caps among BWA providers are quite rare.

However, it is worth noting that BWA providers may occasionally team up with satellite broadband providers to offer broadband where typical terrestrial wireless services are not available.

BWA Providers Face Challenges

While the outlook for the BWA industry is highly positive, there are a number of challenges:

- Across the telecommunications and media industries, there are intense competitive pressures and aggressive efforts by all kinds of service providers to attract and retain customers.
- Policymakers at all levels are less familiar with BWA providers and fixed wireless than they are with larger incumbents using traditional technologies. Hence, there tends to be a lack of policy support for BWA providers and, indeed, there are many policies that tend to favor incumbent competitors.
- Detractors raise concerns about the sustainability of unlicensed spectrum and spectrum sharing.
- Several of the largest broadband competitors – specifically telcos and cable companies – have acquired significant interests in content companies, giving them the ability to offer consumers attractive service packages that feature their favorite networks and shows. As mostly small businesses, BWA providers cannot compete with large, vertically integrated companies in this arena.
- The industry's comparatively small size, especially on an average individual company basis, together with its lack of scale and consolidation, affect its ability to educate investors, legislators, regulators, media, and the general public.

Conclusion

The Carmel Group believes that the fixed-wireless-based, Broadband Wireless Access industry will continue to experience robust growth in revenues, subscribers, and investment, as well as increasing recognition in the United States' telecommunications regulatory scheme – all primarily because of the many favorable conditions and trends described above.

Telecommunications industry stakeholders, investors, and policymakers can look forward to exciting days ahead for the BWA industry.

Appendix

As part of the extensive research conducted for this report, in Q4 of 2016 The Carmel Group received survey results from 169 Broadband Wireless Access (BWA) operators, who answered 80 questions on a variety of business issues. The response rate was an above-average 30% of the entire survey sample. An additional BWA manufacturer/vendor survey was also completed.

Topic areas of the Operator Survey included current subscribers, future subscribers, customer service, equipment, services, competition and competitive advantages, and business issues.

The BWA operators' answers to four of the 80 survey questions are provided below. These charts show that:

Subscribers: Many BWA operators experienced robust growth in the number of new

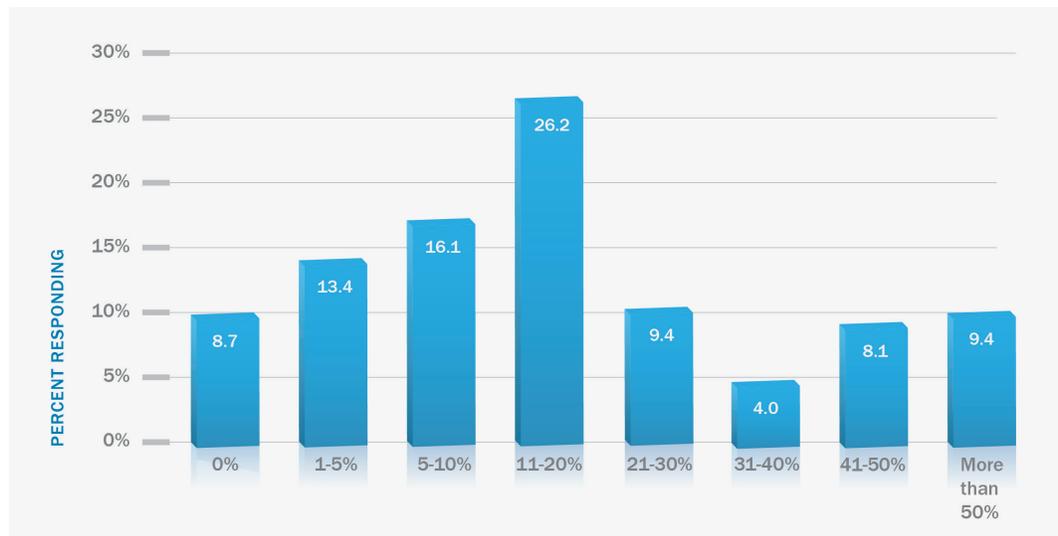
residential subscribers from 2015 to 2016, with roughly half reporting growth of 11% or more.

SAC: Most of the respondents reported Subscriber Acquisition Costs (SAC) in the range of \$200 to \$400, which compares quite favorably to the SAC reported by cable, telco, and satellite providers for delivery of their video and broadband service.

ARPU: Most respondents reported average revenue per unit (ARPU) in the range of \$40 to \$70, with the highest number of respondents having an ARPU in the \$51-60 range.

Churn: Most responding BWA operators experience low subscriber turnover relative to the competitors mentioned above, suggesting that those providers produce and deliver a highly satisfactory broadband product.

FIGURE 10: What was your actual or best estimate of the annual residential subscriber growth percentage rate for your company during the past year?



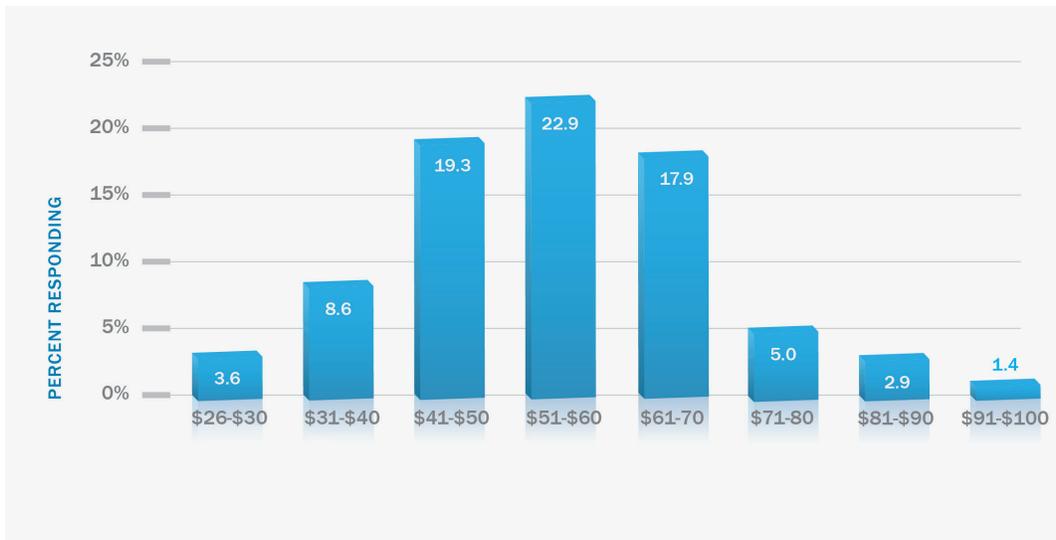
Source: The Carmel Group
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FIGURE 11: What is your company's average Subscriber Acquisition Cost (SAC) for a new residential customer?



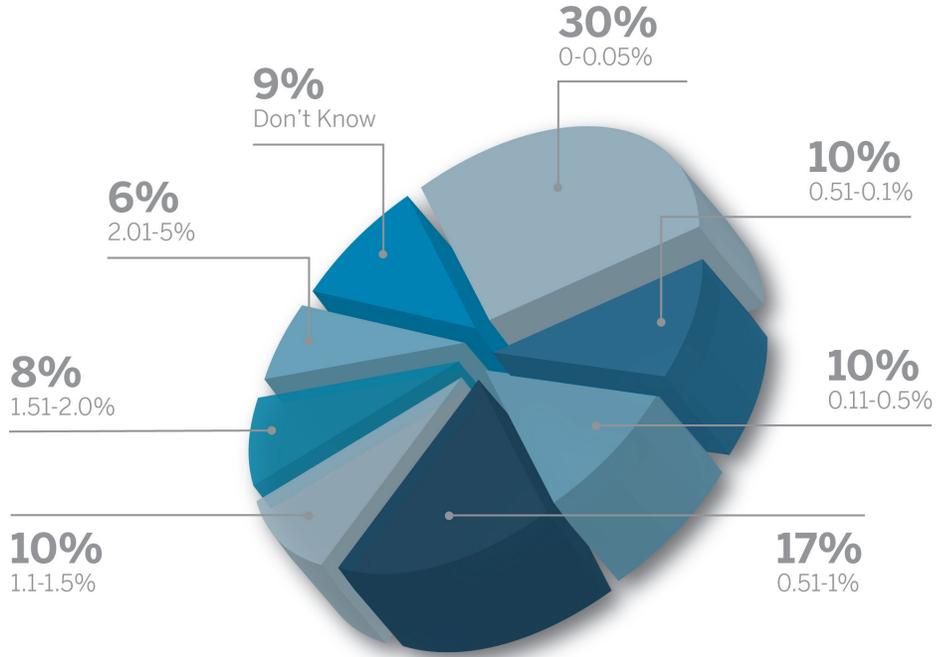
Source: The Carmel Group
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FIGURE 12: What is your company's most recent figure for average revenue per unit/subscriber (ARPU) for only residential users?



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FIGURE 13: What is your company's average monthly churn (or turnover) rate for the past year (take your average number of disconnected subscribers in a given month and divide that by your subscriber base at the beginning of month)?



Source: The Carmel Group
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