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**Reaching Rural America: Free Market Solutions for Promoting Broadband
Deployment**

by

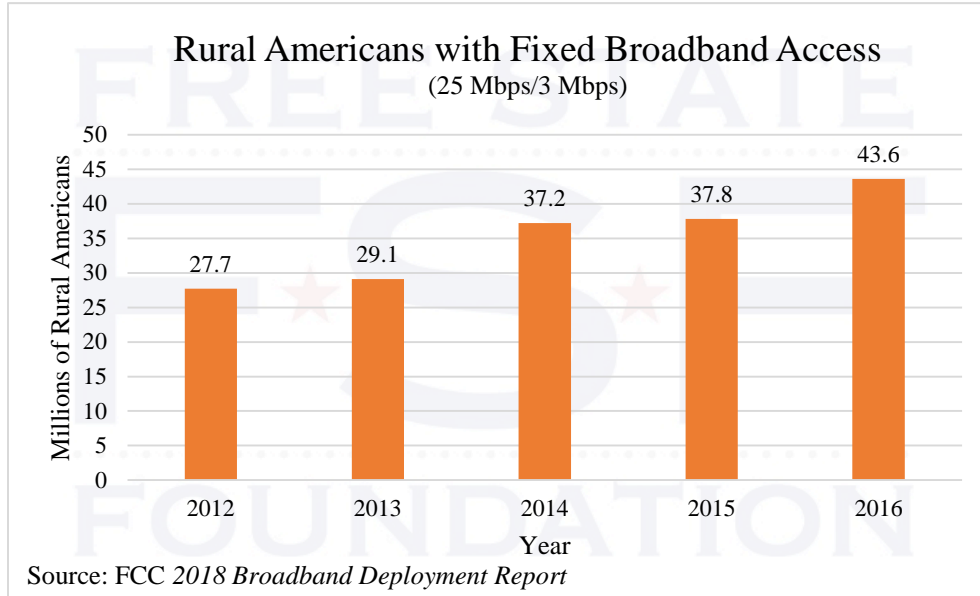
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Introduction and Summary

In his first remarks after being named Chairman of the Federal Communication Commission in January 2017, Ajit Pai announced that his top priority would be to close the digital divide, the gap between those who use broadband access and those who do not. In particular, many rural Americans either do not have broadband access or have limited broadband choices. Chairman Pai reiterated this commitment on March 13, 2018, when he said: “My top priority as Chairman of the FCC is closing the digital divide. I’ve often said that in order to bring digital opportunity to all Americans, we need to use all of the tools in the toolbox.”

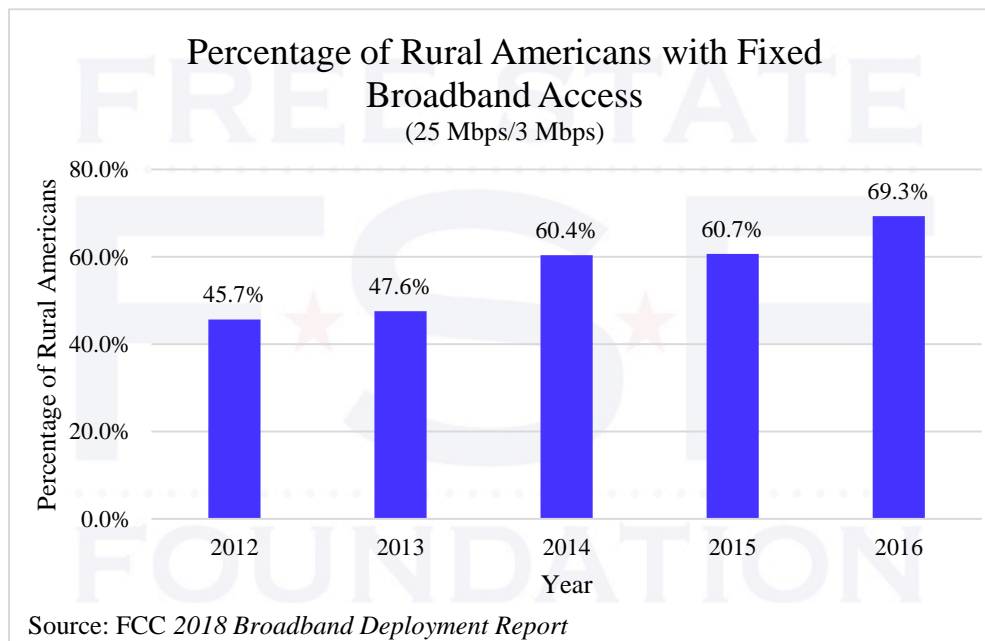
Rural broadband deployment already was improving dramatically, so Chairman Pai’s commitment is to continue and even accelerate the progress. According to the FCC’s *2018 Broadband Deployment Report*, from 2012 to 2016, the number of rural Americans with access to at least 25 Mbps/3 Mbps increased from 27.7 million to 43.6 million.

Rural Americans with Fixed Broadband Access (Millions)



Put another way, from 2015 to 2016, the percentage of rural Americans with fixed access to at least 25 Mbps/3 Mbps increased from 61% to 69%, and from 2012 to 2016, the percentage increased from 46% to 69%.

Percentage of Rural Americans with Fixed Broadband Access



This increase in rural broadband access is mostly limited to traditional wireline broadband, but other broadband technologies are also available. In addition to the progress being made in extending wireline broadband to more rural Americans, other broadband technologies are

becoming much more competitive with traditional wireline broadband and are rapidly becoming effective alternatives for Internet users in rural and remote areas. When including one of those broadband technologies, satellite broadband, only 11.5 million rural Americans (or 18% of rural Americans) lacked access in 2016 to the FCC's definition of broadband of 25 Mbps/3 Mbps.

Moreover, the capabilities and deployment of wireless technologies, like fixed wireless and 5G broadband, are providing viable residential alternatives for rural consumers. Thus, it is no longer sufficient to measure broadband availability by the coverage of fixed wireline providers in a given area. Instead, rural broadband availability should be evaluated as a dynamic process that includes many broadband technologies. These broadband technologies can deliver next-generation broadband to rural residents, and the speeds and number of services associated with these technologies will continue to increase.

In his March 2018 speech before the Satellite Industry Association, Chairman Pai described the tremendous innovation and investment occurring in the satellite broadband marketplace and how it provides a competitive option for underserved Americans. He observed: "So we now stand at a moment of tremendous promise for your industry – and ultimately for American consumers, who stand to benefit from your efforts. I want the FCC to help you, and with you the public, seize the opportunities that are in front of you."

Chairman Pai and the FCC are doing just that. In the past year, the FCC has approved multiple deployment requests from satellite broadband providers, including OneWeb, Space Norway, Telesat, and SpaceX. And with the FCC's new Order to promote satellite deployment, OneWeb said that it is investing \$1.5 billion and will offer low-latency broadband with download speeds of 50 Mbps in Alaska by 2019. Viasat, an established satellite broadband provider, announced that it has started offering nationwide, unlimited access with download speeds up to 100 Mbps. Furthermore, SpaceX has announced that it plans to launch nearly 12,000 satellites by 2024, spurring even more competition in the satellite broadband market. And the FCC still has pending Ligado's application to provide services primarily to enterprise customers using satellite capacity in combination with terrestrial networks.

As technological innovation continues, satellite broadband services should not be categorized as last-resort alternatives for rural consumers. Instead, its capabilities as a next-generation broadband technology should be acknowledged. Rural consumers are now in a position to enjoy satellite services for their relatively low costs and broad reach into areas not served by wireline broadband.

Another technology that should receive more attention in rural areas where consumers have few broadband choices is fixed wireless broadband. Fixed wireless providers deliver broadband access to consumers at fixed locations through wireless transmitters on towers interconnected by unlicensed or licensed spectrum. Like mobile wireless, these towers are connected to fiber backhaul networks. Consumers generally receive access at their locations through a Wi-Fi router, creating a fixed connection with download speeds up to 100 Mbps. Fixed wireless subscriptions are now projected to double from 2016 to 2021. As 5G becomes the new norm for wireless services, additional licensed spectrum could enable fixed wireless to become even more competitive as a next-generation broadband alternative, while helping to close the rural-urban digital divide.

The capabilities and deployment of mobile broadband also have increased significantly. According to the *Twentieth Wireless Competition Report*, in 2016 4G mobile broadband was available to 99.8% of Americans and 96.6% of Americans had access to three or more 4G providers. And the average national download speed was 23.5 Mbps, just shy of the FCC's upwardly-revised definition of broadband. With 5G technology just around the corner, the increasing capabilities and speeds of mobile broadband may well serve as a sufficient residential connection for many rural Americans.

But, in order to promote additional broadband deployment in rural areas, Congress and the FCC should continue to focus on removing or reducing regulatory and licensing barriers, which exacerbate the digital divide by raising the costs of delivering service to every American. If not for regulatory barriers at the local, state, and federal levels, most broadband providers would invest more than they already do, thereby extending their service areas even further.

In April 2017 the FCC adopted a Notice of Proposed Rulemaking (NPRM) which would “accelerate wireline broadband deployment by removing barriers to infrastructure investment.” If the Order is adopted, these rules would streamline the application process for examining pole attachment requests, which currently take up to five months to process. Expediting this process would not only make it easier for fiber and cable providers to deploy in a timely and efficient manner, but it would advance small cell deployment by creating much-needed backhaul for the implementation of 5G technology.

The FCC's NPRM also could create a national standard for state and local broadband regulations and reduce exorbitant deployment fees across the country. Doing so would lessen the burden of regulatory compliance among large and small broadband providers and would streamline the administrative process behind broadband deployment. One study found that if all the proposed rules in this NPRM were adopted, it would spur broadband investment by \$69 billion, of which \$43 billion would be invested in underserved areas.

In order for satellite and fixed and mobile wireless to continue to grow and provide access to the most rural and remote areas, more licensed spectrum is needed to deliver broadband to consumers. Congress and the FCC therefore need to continue to assign and allocate low-, mid-, and high-band spectrum for commercial use. Many proposals have emerged within the last year, including multiple items by the FCC to make more spectrum in specific bands available for private use. Bipartisan passage of the MOBILE NOW Act in the Senate is a step towards advancing the reallocation and assignment of licensed spectrum for wireless (fixed and mobile) broadband use. Moreover, the Senate's introduction of the AIRWAVES Act would identify specific mid- and high-band spectrum and establish deadlines for reallocations and auctioning of these spectrum bands.

Lastly, the FCC's decision to repeal the *Title II Order* also will help promote broadband investment in rural areas. The reason this deregulatory action is important to reaching rural America is because the *Title II Order* created a lot of regulatory uncertainty. With the FCC looming over providers' business decisions with the authority to impose Title II regulations, the incentive to invest in rural areas was stifled even more following the adoption of the *Title II Order*. In May 2017 we estimated that broadband investment declined by \$5.6 billion since the adoption of the *Title II Order*, potentially hindering rural broadband deployment.

The FCC's decision to roll back Title II regulation will reduce the amount of regulatory uncertainty in the broadband marketplace. Under the Title II reclassification the FCC had the authority to impose any sections of Title II, despite promises to forbear from these certain regulations. Notably, however, the FCC did not forbear from the core provisions of Title II, including the rate regulation authority and non-discrimination mandate in Sections 201 and 202. Additionally, the *Title II Order's* vague general conduct standard could have been used by the Commission to outlaw anything the FCC deemed anticompetitive or harmful. The FCC's decision to undo Title II will encourage additional investment and innovation because Internet Service Providers (ISPs) will not fear that their business activity will violate FCC regulations. In rural areas, where the business case for broadband deployment is more marginal, ISPs should be more willing to invest in next-generation networks.

By reducing regulatory barriers, making additional licensed spectrum available, and continuing to encourage capital investment, Congress and the FCC can use market competition as a tool to promote rural broadband deployment and close the gap of the digital divide. Then, if a digital divide still exists, further steps by the government should be considered. To the extent that government funds are used to promote broadband deployment in rural areas, this should be more as a last resort, especially when government regulations, at all levels, often are a major barrier to rural deployment. And any government funds should be carefully targeted to unserved areas, so that they are not used to support overbuilding in already-served areas.

This *Perspectives* paper will explore emerging technologies that could advantage rural broadband consumers and the legislative and regulatory initiatives at the FCC and in Congress that should be adopted in order to promote private broadband investment in rural and underserved areas.

I. Impediments to Rural Broadband Deployment

In January 2017 FCC Chairman Ajit Pai announced that his top priority would be to close the digital divide.¹ Soon after making this statement, Chairman Pai created a task force to advise the Commission on “how to accelerate the deployment of high-speed Internet access, or broadband, by reducing and removing regulatory barriers to infrastructure investment.”² As Free State Foundation President Randolph May recently noted, the principle of promoting “universal service,” or promoting access to communications services for all Americans, has been central to federal and state communications policy for many decades.³

¹ Ajit Pai, “Remarks of FCC Chairman Ajit Pai,” (January 24, 2017) available at:

http://transition.fcc.gov/Daily_Releases/Daily_Business/2017/db0124/DOC-343184A1.pdf.

² See “FCC Chairman Ajit Pai Announces Broadband Deployment Advisory Committee Members, Working Groups, and Leadership” (April 6, 2017), available at:

https://apps.fcc.gov/edocs_public/attachmatch/DOC-344285A1.pdf.

³ See, e.g., Randolph J. May, “Comments of Randolph J. May, President, The Free State Foundation,” In the Matters of Bridging the Digital Divide for Low Income Consumers; Lifeline and Link Up Reform and Modernization; Telecommunications Carriers Eligible for Universal Service Support, WC Dockets No. 17-287, No. 11-42, and No. 09-197 (February 21, 2018), p. 2., available at:

http://www.freestatefoundation.org/images/FCC_Lifeline_Initial_Comments_-_February_21,_2018.pdf.

Lacking sufficient access to broadband can choke off economic benefits that may arise from businesses, entrepreneurs, schools, and other parties being able to use Internet access to grow their businesses and hire more employees. Any actual or perceived insufficient access to broadband often has been used as an argument for local governments providing Internet service.⁴ As FSF scholars have discussed previously, policymakers seeking to increase access to broadband in specific areas have better options available to them than government-run or government-assisted broadband networks.⁵ Before assessing the policy debates over how best to reach rural America with broadband access, it is important to understand how much progress has been made in extending the reach of rural broadband, and how much remains to be done.

According to the FCC's *2018 Broadband Deployment Report*, in 2016, 19 million rural Americans (about 31% of rural residents) lacked fixed access to broadband with speeds of at least 25 Mbps download and 3 Mbps upload, which is the FCC's definition of broadband. And 10.1 million rural Americans (about 16%) lacked fixed access to a connection offering 10 Mbps/1 Mbps broadband or greater. An earlier study found that among all non-broadband users, 23% did not have reliable broadband access in July 2015, showing significant improvement over the last couple of years.⁶

From 2015 to 2016 the percentage of rural Americans with fixed access to at least 25 Mbps/3 Mbps increased from 61% to 69%, and from 2012 to 2016 the percentage increased from 46% to 69%.⁷ This increase in rural broadband access is shown in Chart 1 below. And when including satellite broadband deployment, in 2016 only 11.5 million rural Americans (about 18%) lacked access to a connection offering 25 Mbps/3 Mbps or greater. Therefore, the deployment of broadband in rural areas is increasing rapidly, but as Chairman Pai stated, as long as there is a digital divide, "we must work to bring the benefits of the digital age to all Americans."⁸

⁴ See, e.g., "Municipal Networks and Economic Development," Community Networks (visited February 26, 2018), available at <https://muninetworks.org/content/municipal-networks-and-economic-development>.

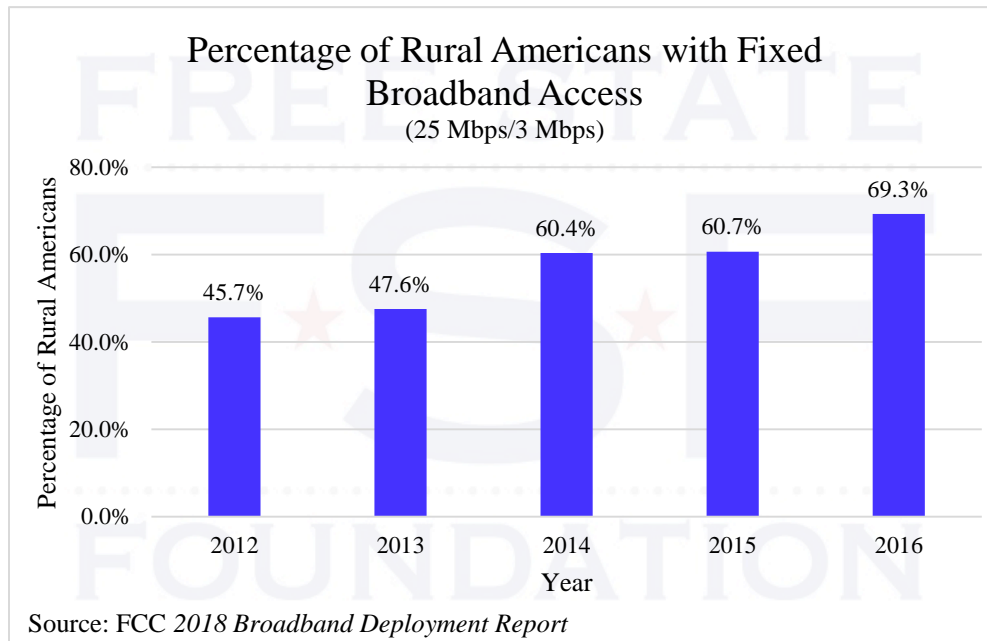
⁵ Michael J. Horney, "Local Governments Should Focus on 5G Smart Cities, Not Municipal Broadband," *FSF Blog*, (February 20, 2018), available at: <http://freestatefoundation.blogspot.com/2018/02/local-governments-should-promote-5g.html>; Theodore R. Bolema and Michael J. Horney, "The Problem with Municipal Broadband and Solutions for Promoting Private Investment," *Perspectives from FSF Scholars* Vol. 12, No. 21 (June 21, 2017), available at: http://www.freestatefoundation.org/images/The_Problem_with_Municipal_Broadband_and_Solutions_for_Promoting_Private_Investment_062017.pdf; Theodore R. Bolema and Michael J. Horney, "A Critical Assessment of the 'Community-Owned Fiber Networks: Value Leaders in America' Study," *Perspectives from Free State Foundation Scholars* Vol. 13, No. 4 (January 30, 2018), available at: http://www.freestatefoundation.org/images/The_Problem_with_Municipal_Broadband_and_Solutions_for_Promoting_Private_Investment_062017.pdf.

⁶ John Horrigan and Maeve Duggan, "Home Broadband 2015," *Pew Research Center*, (December 21, 2015), available at: <http://www.pewinternet.org/2015/12/21/3-barriers-to-broadband-adoption-cost-is-now-a-substantial-challenge-for-many-non-users/>.

⁷ FCC, "Inquiry Concerning Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion," GN Docket No. 17-199, ("*2018 Broadband Deployment Report*"), (February 2, 2018), at Table 4, available at: https://transition.fcc.gov/Daily_Releases/Daily_Business/2018/db0202/FCC-18-10A1.pdf.

⁸ "Remarks of FCC Chairman Ajit Pai," at page 2.

Chart 1: Percentage of Rural Americans with Fixed Broadband Access



Rural Americans often have limited broadband options because it is very costly for Internet service providers to deploy networks in rural areas. Wireline ISPs require heavy capital costs when deploying broadband. Not only do they need to reach some rural areas with backhaul networks, but the marginal cost of deploying fiber or cable to an additional residence (residences are usually far apart in rural areas) is greater than the marginal benefit. In other words, rural areas do not have enough demand for broadband to pay for the massive costs it takes to deploy wireline broadband in rural areas. Therefore, wireline ISPs often do not even deploy in rural areas because it would not generate profit.

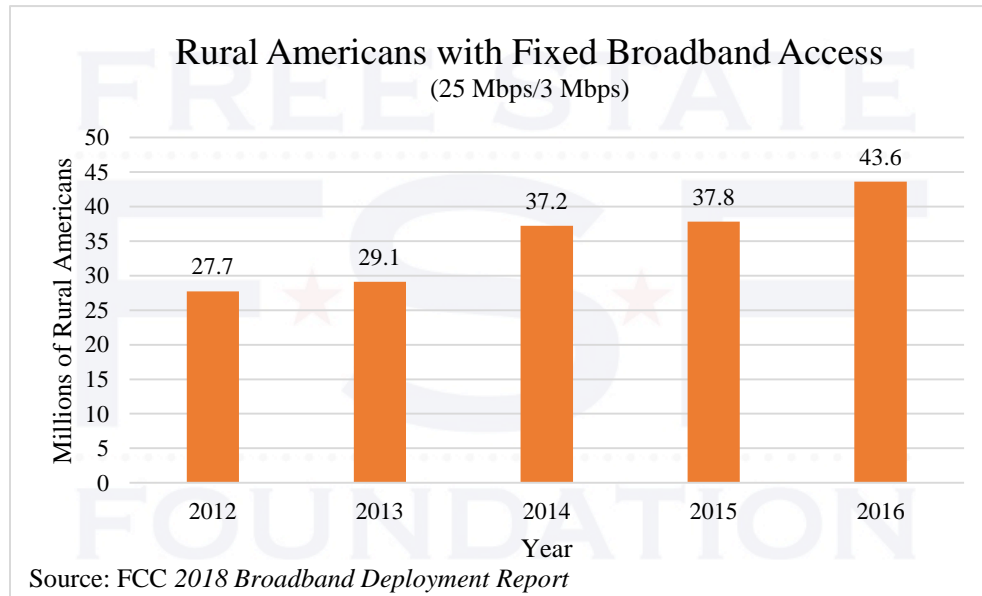
There are pricing mechanisms that could help lower the prices of rural broadband, but because broadband is dynamically competitive, asking for above-market prices is quite risky. For example, a large ISP with national coverage could cross-subsidize, raising the price for urban residents so it can deploy in rural areas and charge below-market prices. In some instances, ISPs already do this.⁹ However, in a dynamically competitive marketplace, like broadband, raising the price too much will lose subscribers in urban areas, ultimately limiting the potential for cross-subsidization approaches to deliver in rural areas.

That being said, rural areas are not doomed when it comes to residential, business, or mobile broadband. In fact, rural consumers should be more bullish than ever about the prospect of receiving next-generation broadband, if they do not have access already. Illustrated in Chart 2 below, in each year since 2012, millions of rural Americans who did not have it in the prior year

⁹Richard Bennett, Luke Stewart, and Robert Atkinson, “The Whole Picture; Where America’s Broadband Networks Really Stand,” *ITIF*, (February 2013), available at: http://www2.itif.org/2013-whole-picture-america-broadband-networks.pdf?_ga=2.140467504.2012936557.1519230256-371363704.1519230256.

received fixed broadband access.¹⁰ And in just four years, nearly 16 million rural Americans who did not have access in 2012 received access to fixed broadband.¹¹

Chart 2: Rural Americans with Fixed Broadband Access (Millions)



Some very rural areas may not have a business case for traditional wireline broadband, but that is not the only technology that delivers next-generation broadband. Thus, it is no longer sufficient to measure broadband availability by the coverage of fixed wireline providers in a given area. Instead, rural broadband availability should be evaluated as a dynamic process that includes many broadband technologies. There are several broadband technologies that can deliver next-generation broadband to rural residents, and the speeds and number of services associated with these technologies will continue to increase.

II. Other Broadband Technologies Are Rapidly Becoming Competitive in Rural Areas

In addition to the progress being made in extending wireline broadband to more rural Americans, other broadband technologies are becoming much more competitive with traditional wireline broadband and are rapidly becoming effective alternatives for Internet users in rural and remote areas.

Satellite

Satellite broadband often has been dismissed as a substitute for wireline broadband. However, this technology rapidly is becoming more competitive with wireline broadband. In a March 2018 speech before the Satellite Industry Association, Chairman Pai talked about the tremendous

¹⁰ Chart 1 and 2 do not include satellite broadband access and therefore the numbers and percentages are noticeably smaller than if they were to include satellite broadband.

¹¹ “2018 Broadband Deployment Report,” at page 22, Table 1.

innovation and investment occurring in the satellite broadband marketplace and how it provides a competitive option for underserved Americans:

[Y]ou don't need a 20-year industry forecast to figure out that we're at an inflection point for satellite broadband. Breakthroughs are already happening.

Just two weeks ago, Viasat began offering 100 Mbps broadband service in the United States with unlimited data. This was made possible by high-throughput satellites that use spot-beam technology and frequency re-use to dramatically increase capacity. Other companies have applications before the FCC for similar high-throughput satellite service.

But we're not only seeing dramatic changes in satellites' capabilities; we're also witnessing a sea change in the economics of their deployment. Re-usable rockets are dramatically reducing the cost to access space. How much? Well, the price tag of launching a large satellite has already dropped from \$200 million to \$60 million and could go much lower.

So we now stand at a moment of tremendous promise for your industry—and ultimately for American consumers, who stand to benefit from your efforts. I want the FCC to help you, and with you the public, seize the opportunities that are in front of you.

My top priority as Chairman of the FCC is closing the digital divide. I've often said that in order to bring digital opportunity to all Americans, we need to use all of the tools in the toolbox. Satellite broadband service is one of those tools.¹²

While the *2018 Broadband Progress Report* finds that 16% of rural Americans lacked access to a connection offering 10 Mbps/1 Mbps or greater in 2016, these figures do not include satellite deployment.¹³ According to the FCC's *Internet Access Service Report as of June 30, 2016*, satellite Internet was accessible to 99.1% percent of census blocks at speeds of at least 10 Mbps/1 Mbps.¹⁴ Although these speeds likely are adequate for many rural consumers, until recently, satellite connections did not fit the FCC's definition of broadband of 25 Mbps/3 Mbps. But this is quickly starting to change. The *2018 Broadband Deployment Report* found that multiple satellite broadband providers have begun offering at least 25 Mbps/3 Mbps. In 2016 over 43 million rural Americans had access to fixed broadband at speeds of at least 25 Mbps/3 Mbps, but when accounting for recent satellite broadband deployments, an additional 7.8 million rural Americans had such access. Therefore, with satellite broadband included, the *2018*

¹² Remarks of FCC Chairman Ajit Pai, Satellite Industry Association's 21st Annual leadership Dinner, (March 12, 2018), available at:

https://transition.fcc.gov/Daily_Releases/Daily_Business/2018/db0313/DOC-349676A1.pdf.

¹³ "2018 Broadband Progress Report," at page 22.

¹⁴ *Internet Access Services: Status as of June 30, 2016*, Industry Analysis and Technology Division, Wireline Competition Bureau, (April 2017), available at:

http://transition.fcc.gov/Daily_Releases/Daily_Business/2017/db0503/DOC-344499A1.pdf.

Broadband Deployment Report finds that about 11.5 million rural Americans (or 18% of rural Americans) lacked access to speeds of at least 25 Mbps/3 Mbps in 2016.¹⁵

In September 2017 the FCC adopted a Report and Order to modernize rules facilitating deployment of next-generation satellite systems. Specifically, this Order integrates three types of Earth Stations in Motion (ESIM) into a single regulatory category, simplifying the regulatory approval process for ESIM, reducing the regulatory burden on applicants, and increasing the efficiency in processing applications. The Order also relaxes requirements for frequency-band usage, enabling satellite broadband providers to experiment with consumer-friendly innovations.¹⁶

In addition to this important action by the FCC, Congress should consider creating guidelines for satellite infrastructure deployment in its next infrastructure legislation. Satellite broadband infrastructure includes launch facilities, consumer terminals placed on homes or businesses, hundreds of points of presence throughout the U.S., large antennas for controlling the satellites, and satellite operations centers. As with other broadband technologies, federal legislation can create guidelines that prevent states and municipalities from imposing unnecessary regulations or excessive licensing fees and taxes that discourage the adoption of satellite broadband.¹⁷

In the past year, the FCC has approved multiple deployment requests from satellite broadband providers, including OneWeb, Space Norway, Telesat, and SpaceX.¹⁸ And with the FCC's new Order to promote satellite deployment, OneWeb said that it is investing \$1.5 billion and will offer low-latency broadband with download speeds of 50 Mbps in Alaska by 2019.¹⁹ Viasat, an established satellite broadband provider, announced that it has started offering nationwide, unlimited access with download speeds up to 100 Mbps.²⁰ Furthermore, SpaceX has announced that it plans to launch nearly 12,000 satellites by 2024, spurring even more competition in the satellite broadband market.²¹ And the FCC still has pending Ligado's application to provide

¹⁵ "2018 Broadband Deployment Report," at page 22, ¶ 51. (The report does acknowledge that these figures could be overstated due to the limited capacity of some satellite networks, but new deployments and innovations should improve network capacity.)

¹⁶ "Update to Parts 2 and 25 Concerning Non-Geostationary, Fixed-Satellite Service Systems and Related Matters," IB Docket No. 16-408, Report and Order and Further NPRM, (September 26, 2017), available at: https://apps.fcc.gov/edocs_public/attachmatch/FCC-17-122A1.pdf.

¹⁷ Statement of Patricia Cooper, Vice President, Satellite Government Affairs, SpaceX, Before the Committee on Commerce, Science & Technology, United States Senate, (May 3, 2017).

¹⁸ Ajit Pai, "Statement on SpaceX Satellite Broadband Application," (February 14, 2018), available at: https://transition.fcc.gov/Daily_Releases/Daily_Business/2018/db0214/DOC-349224A1.pdf.

¹⁹ Andy Pasztor and Mayuni Negishi, "Softbank to Invest Around \$500 Million More in OneWeb Satellite-Internet Venture," *The Wall Street Journal*, (December 11, 2017), available at: <https://www.wsj.com/articles/softbank-to-invest-around-500-million-more-in-oneweb-satellite-internet-venture-1512990003>.

²⁰ Michael Horney, "Viasat Is offering Satellite Broadband Speeds of 100 Mbps," *FSF Blog*, (March 5, 2018), available at: <http://freestatefoundation.blogspot.com/2018/03/viasat-is-offering-satellite-broadband.html>.

²¹ "Statement by Patricia Cooper."

services primarily to enterprise customers using satellite capacity in combination with terrestrial networks.²²

Satellite Internet is already accessible to over 99% of Americans, and satellite service at broadband speeds is accessible to 95.6% of Americans and 81.7% of rural Americans.²³ As of the end of 2016, nearly two million Americans used fixed satellite broadband as their residential connection.²⁴ As technological innovation continues, satellite broadband services should not be categorized as last-resort alternatives for rural consumers. Instead, its capabilities as a next-generation broadband technology should be acknowledged. Rural consumers are now in a position to enjoy satellite services for their relatively low costs and broad reach into areas not served by wireline broadband.

Fixed Wireless

Another technology that should receive more attention in rural areas where consumers have few broadband choices is fixed wireless broadband. Recent studies predict rapid growth of fixed wireless broadband as a technology that has the potential to reach more areas that are not presently being reached by other modes of Internet access.²⁵

Fixed wireless providers, sometimes referred to as wireless Internet service providers, deliver broadband access to consumers at fixed locations through wireless transmitters on towers interconnected by unlicensed or licensed spectrum. Like mobile wireless, these towers are connected to fiber backhaul networks. Consumers generally receive access at their locations through a Wi-Fi router, creating a fixed connection with download speeds up to 100 Mbps.²⁶

A report by the Carmel Group projects the number of fixed wireless subscribers to double from just over 4 million in 2016 to 8.1 million by 2021. Additionally, market revenue is projected to increase from \$2.3 billion in 2016 to \$5.2 billion in 2021.²⁷ The Carmel Group report also suggests that fixed wireless services are the most cost-effective solution for deploying broadband in rural areas.

²² Seth Cooper, "Satellite Broadband Services Will Enhance Competition and Reach New Consumers," *FSF Blog*, (March 14, 2018), available at: <http://freestatefoundation.blogspot.com/2018/03/satellite-broadband-services-will.html>.

²³ "2018 Broadband Progress Report," at page 22.

²⁴ "Satellite Broadband Services Will Enhance Competition and Reach New Consumers."

²⁵ See "Ready for Takeoff: Broadband Wireless Access Providers Prepare to Soar with Fixed Wireless," *The Carmel Group*, *The BWA Industry Report* (2017), available at: http://www.wispa.org/Portals/37/Docs/Press%20Releases/2017/TCG's_2017_BWA_FINAL_REPORT.pdf.

"5G for FWA (Fixed Wireless Access): 2017 – 2030 – Opportunities, Challenges, Strategies & Forecasts," *SNS Telecom*, (August 2017), available at: <http://www.snstelecom.com/5gfw>.

²⁶ Michael Horney, "Fixed Wireless Broadband Could Help Reach More Rural Consumers," *FSF Blog*, (November 24, 2017), available at: <http://freestatefoundation.blogspot.com/2017/11/fixed-wireless-broadband-could-help.html>.

²⁷ "Ready for Takeoff: Broadband Wireless Access Providers Prepare to Soar with Fixed Wireless."

Moreover, the implementation of 5G wireless technology, with at least ten times the speed of 4G, will advance the capabilities of fixed wireless networks. An August 2017 report from SNS Research predicted early commercial rollouts from AT&T and Verizon would drive fixed wireless 5G revenue to \$1 billion by the end of 2019. SNS Research indicated the fixed wireless 5G market will grow at a compound annual growth rate of 84% from 2019 to 2025, with service revenue increasing to more than \$40 billion by the end of 2025.²⁸ In December 2017 Verizon announced its plan to use 5G wireless technology to offer fixed wireless service in a select group of cities throughout the U.S.²⁹

As technology continues to improve, fixed wireless is becoming a viable option for residential or small business broadband access. For many rural Americans, fixed wireless may already be more than sufficient. As 5G becomes the new norm for wireless services, additional licensed spectrum could enable fixed wireless to become even more competitive as a next-generation broadband alternative, while helping to close the rural-urban digital divide.

Mobile Wireless

The capabilities and deployment of mobile broadband also have increased significantly. According to the *Twentieth Wireless Competition Report*, in 2016 4G mobile broadband was available to 99.8% of Americans and 96.6% of Americans had access to three or more 4G providers. And the average national download speed was 23.5 Mbps, just shy of the FCC's upwardly revised definition of broadband.³⁰

FSF scholars have argued that mobile broadband is a substitute for fixed broadband because consumers across all income levels are going mobile-only.³¹ For example, 29% of low-income consumers, 18% of middle-income consumers, and 15% of high-income consumers are mobile-only broadband users.³² Therefore, mobile wireless should not be discounted as viable option for residential broadband. In 2016 4G service was available to 98.6% of rural Americans at speeds of 5 Mbps/1 Mbps or greater. During the same year, 70% of rural Americans had access to median 4G speeds of 10 Mbps/3 Mbps. While these figures may not seem overwhelming, the 5G revolution is approaching quickly and is projected to bring at least ten times faster speeds than

²⁸ "5G for FWA (Fixed Wireless Access): 2017 – 2030 – Opportunities, Challenges, Strategies & Forecasts."

²⁹ Michael Horney, "Verizon Plans to Offer Fixed Wireless Residential Broadband," *FSF Blog*, (December 4, 2017) available at: <http://freestatefoundation.blogspot.com/2017/12/verizon-plans-to-offer-fixed-wireless.html>.

³⁰ FCC, Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993; Annual Report and Analysis of Competitive Market Conditions With Respect to Mobile Wireless, Including Commercial Mobile Services, WT Docket No. 17-69, Twentieth Report ("Twentieth Wireless Competition Report") (September 27, 2017), at 85, available at: https://apps.fcc.gov/edocs_public/attachmatch/FCC-17-126A1.pdf.

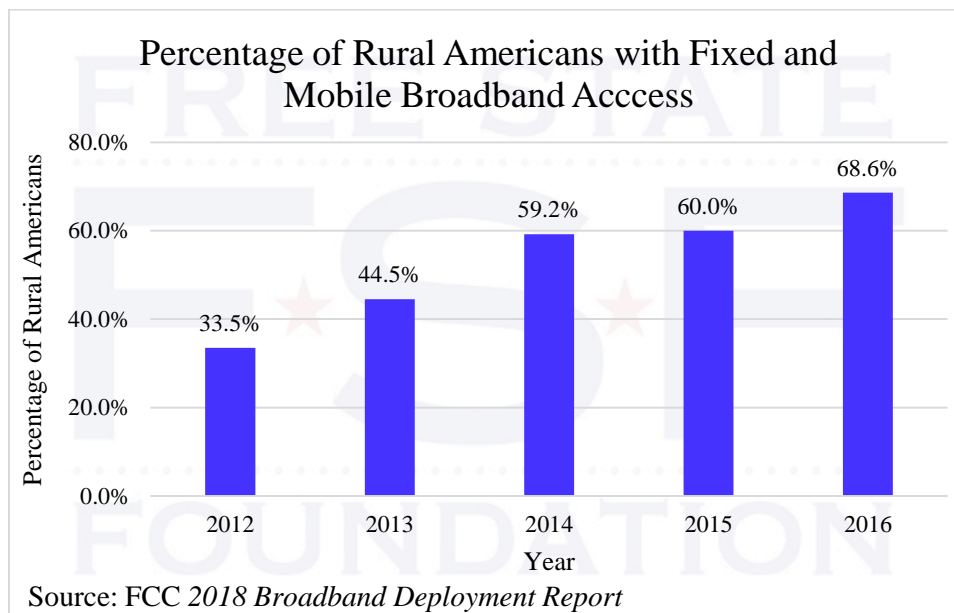
³¹ Randolph May and Michael Horney, "Mobile Broadband Is a Substitute for Fixed Broadband," *FSF Blog*, (January 14, 2016), available at: <http://freestatefoundation.blogspot.com/2016/01/mobile-broadband-is-substitute-for.html>.

³² Giulia McHenry, "Evolving Technologies Change the Nature of Internet Use," NTIA, (April 19, 2016), Figure 2, available at: <https://www.ntia.doc.gov/blog/2016/evolving-technologies-change-nature-internet-use>.

4G along with \$275 billion in investment, 3 million jobs, and \$500 billion in gross domestic product throughout the United States. With 5G technology just around the corner, the increasing capabilities and speeds of mobile broadband may well serve as a sufficient residential connection for many rural Americans.

However, every consumer is different. Some consumers may view mobile broadband and fixed broadband as complements, meaning they value having a subscription to both types of technologies. For rural consumers who value having a fixed and mobile subscription, the 5G revolution will be critical for advancing the capabilities of both mobile and fixed wireless broadband. As Chart 3 illustrates, rural broadband access to both fixed and mobile services looks much better than it did just five years ago.³³

Chart 3: Percentage of Rural Americans with Access to Both Fixed Speeds of 25 Mbps/3 Mbps and Mobile Speeds of 5 Mbps/1 Mbps



III. Federal Policies to Support and Encourage Rural Broadband Deployment

The capabilities and deployment of wireless technologies, including fixed and mobile wireless and satellite broadband, are expanding rapidly and providing viable residential alternatives for more rural consumers. In order to promote additional broadband deployment in rural areas, Congress and the FCC should continue to focus on removing or reducing regulatory and licensing barriers, which exacerbate the digital divide by raising the costs of delivering service to every American. Congress and the FCC also need to continue to assign and allocate low-, mid-, and high-band spectrum for commercial use, and many proposals have emerged within the last year. Lastly, the FCC's decision to repeal the *Title II Order*, which caused regulatory uncertainty

³³ This chart does not include satellite broadband access and therefore the percentages are noticeably smaller than if they were to include satellite.

and was correlated with a \$5.6 billion decline in U.S. broadband investment, also will help promote investment in rural areas.

Removing Federal, State, and Local Barriers to Broadband Deployment

The previous section focused mostly on the satellite and fixed wireless broadband as low-cost solutions to bridging the gap of the digital divide. More common wireline broadband technologies, like fiber and cable, obviously are competitive alternatives. However, if not for regulatory barriers at the local, state, and federal levels, most broadband providers would invest more than they already do, thereby extending their service areas even further. For example, a 2005 AEI-Brookings study found that states with laws that guarantee telecommunications companies access to rights-of-way have broadband penetration that is about 10 percent higher than states that do not guarantee access. Similarly, penetration rates were lower when these guarantees were not extended to cable companies.³⁴ Greater access to rights-of-way and more capital investment would have helped deploy broadband in more rural and underserved areas than are served currently.

In April 2017 the FCC adopted a Notice of Proposed Rulemaking (NPRM) which would “accelerate wireline broadband deployment by removing barriers to infrastructure investment.”³⁵ If the Order is adopted, these rules would streamline the application process for examining pole attachment requests, which currently take up to five months to process. Expediting this process would not only make it easier for fiber and cable providers to deploy in a timely and efficient manner, but it would advance small cell deployment by creating much-needed backhaul for the implementation of 5G technology.³⁶

The FCC’s item also included a Notice of Inquiry seeking comment on specific areas where the Commission could use its authority to prevent the enforcement of state and local laws that inhibit broadband deployment. The FCC is collecting information on laws and regulations that artificially increase construction costs, create excessive delays in approvals for rights-of-way agreements, or impose fees that slow the provision of broadband services. The FCC could create a national standard for state and local broadband regulations and reduce exorbitant deployment fees across the country. Doing so would lessen the burden of regulatory compliance among large and small broadband providers and would streamline the administrative process behind broadband deployment.

A June 2017 paper by CMA Strategy and Corning found that the adoption of all of the proposed rules in this NPRM would increase fiber broadband penetration by 26.7 million premises (residential and businesses), which corresponds to over \$45 billion in capital investment. The

³⁴ Scott Wallsten, “Broadband Penetration: An Empirical Analysis of State and Federal Policies,” AEI-Brookings Joint Center for Regulatory Studies Working Paper No. 05-12, June 2005, p. 3, available at: <https://www.heartland.org/template-assets/documents/publications/17468.pdf>.

³⁵ Accelerating Wireline Broadband Deployment by Removing Barrier to Infrastructure Investment, WC Docket No. 17-84 (April 20, 2017), available at: https://apps.fcc.gov/edocs_public/attachmatch/FCC-17-37A1.pdf.

³⁶ Michael Horney, “5G Deployment Projected to Create 3 million Jobs and \$500 Billion in GDP,” *FSF Blog*, (January 26, 2017), available at: <http://freestatefoundation.blogspot.com/2017/01/5g-deployment-projected-to-create-3.html>.

paper also found that adoption of the full NPRM would increase 5G broadband penetration by 14.9 million premises, which corresponds to \$24 billion in capital investment. For both fiber and 5G providers, over 95% of the \$69 billion would be invested in rural and suburban areas. That means that if the FCC adopts the entire wireline NPRM as an Order, it will lead to an additional \$42.8 billion in capital investment from fiber providers in rural and suburban areas and an additional \$22.8 billion in capital investment from 5G wireless providers in rural and suburban areas.³⁷

Moreover, a January 2018 report, also by CMA Strategy and Corning, found that simply implementing a one-touch make-ready (OTMR) policy,³⁸ proposed in the wireline NPRM, would create an additional \$12.6 billion in capital investment from fiber providers and an additional \$8.8 billion in capital investment from 5G wireless providers.³⁹

In other words, in the absence of the unnecessary regulations discussed in the wireline NPRM, fiber and 5G wireless providers would have invested upwards of \$69 billion, of which a large percentage would be allocated to underserved areas. As the CMA Strategy and Corning reports find, an easy solution for reducing the gap of the digital divide is to eliminate the state and local barriers to broadband deployment that exacerbate the digital divide.

Making More Licensed Spectrum Available

For Americans who live in rural and underserved areas, wireless services, like satellite broadband and fixed wireless, can provide a low-cost solution to a high-cost problem. However, in order for satellite and fixed wireless to continue to grow and provide access to the most rural and remote areas, more licensed spectrum is needed to deliver broadband to consumers.

The current FCC and the 115th Congress have introduced a number of bills and proposals which would implement pro-consumer spectrum initiatives. In a September 2017 *Perspectives from FSF Scholars*, FSF Visiting Fellow Gregory Vogt discussed these initiatives in detail. Bipartisan passage of the MOBILE NOW Act in the Senate is a step towards advancing the reallocation and assignment of licensed spectrum for wireless (fixed and mobile) broadband use. Moreover, the

³⁷ Hal Singer, Ed Naef, and Alex King, “Assessing the Impact of Removing Regulatory Barriers on Next Generation Wireless and Wireline Broadband Infrastructure Investment,” *CMA Strategy Consulting and Corning Inc.*, (June 2017), available at:

<https://prodnet.www.neca.org/publicationsdocs/wwpdf/012618corning.pdf>.

³⁸ Randolph May, “A Nationwide ‘One-Touch Make-Ready’ Policy Would Spur Broadband Investment,” *FSF Blog*, (January 31, 2018), available at: <http://freestatefoundation.blogspot.com/2018/01/a-nationwide-one-touch-make-ready.html>. (An OTMR policy which ensures that attachment poles are prepared for the installation of new broadband infrastructure. In many municipalities, when a provider wishes to attach equipment to a pole, providers currently attached to that pole must approve the plans and hire contractors to carry out the work of moving existing attachments to make room for the new ones. The current process creates unnecessary costs among multiple providers and multiple contractors. With an OTMR policy, a single, pre-approved contractor is able to perform all of the necessary attachments, significantly reducing the costs of broadband deployment.)

³⁹ Ed Naef and Alex King, “Assessing the Impact of Removing Regulatory Barriers on Next Generation Wireless and Wireline Broadband Infrastructure Investment: Annex 1, Model Sensitivities,” *CMA Strategy Consulting and Corning Inc.*, (January 2018), available at:

<https://prodnet.www.neca.org/publicationsdocs/wwpdf/012618corning.pdf>.

Senate's introduction of the AIRWAVES Act would identify specific mid- and high-band spectrum and establish deadlines for reallocations and auctioning of these spectrum bands.⁴⁰

Also, in October 2017 the FCC adopted an NPRM to promote investment in the 3.5 GHz band.⁴¹ If adopted, this proposal would create longer license terms, license renewability, and larger geographic license areas – all of which would help accelerate the deployment of satellite and fixed wireless broadband.

The FCC also has begun initiating the spectrum frontiers proceeding, which identifies and preserves low-, mid-, and high-band spectrum that can be allocated for commercial use. In November 2017 the Commission adopted a Second Report and Order to allocate an additional 1700 megahertz of high-band spectrum for flexible wireless use. Specifically, the Order preserves the 70 and 80 GHz bands for traditional and innovative fixed wireless uses. This Order also targets the 40-42 GHz and 48.2-50.2 GHz bands for the expansion of fixed satellite services.⁴² In February 2018 the Commission adopted an NPRM that would permit the commercial use of spectrum bands above 95 GHz, which could spur innovation in 5G wireless and satellite services.⁴³

Once a spectrum frontiers auction occurs, satellite and fixed wireless providers, as well as other broadband providers, will be able to purchase licensed spectrum, which will help expand the deployment of their services. Although the demand for fixed and mobile wireless services is exploding at a much faster pace than the supply of spectrum being assigned and allocated by the federal government, the current FCC has introduced a number of proposals to increase the amount of licensed spectrum. With the technological innovation of wireless services and the increasing amount of licensed spectrum, the prospects for rural broadband deployment look promising.

Restoring Internet Freedom

On December 14, 2017 the Commission voted to adopt the *Restoring Internet Freedom Order* and repeal the FCC's Title II reclassification of broadband, returning broadband to a light-touch

⁴⁰ Gregory Vogt, "MOBILE NOW and AIRWAVES Create an Essential Spectrum Pipeline: Free Market Principles Should Guide Spectrum Policy," *Perspectives from FSF Scholars* Vol. 12, No. 30, (September 14, 2017), available at: http://freestatefoundation.org/images/MOBILE_NOW_and_AIRWAVES_Create_an_Essential_Spectrum_Pipeline_091417.pdf.

⁴¹ "Promoting Investment in the 3550-3700 MHz Band," GN Docket No. 17-258, Notice of Proposed Rulemaking, (October 24, 2017), available at: https://apps.fcc.gov/edocs_public/attachmatch/FCC-17-134A1.pdf.

⁴² "Use of Spectrum Bands Above 24 GHz For Mobile Radio Services," GN Docket No. 14-177, Second Report and Order, (November 18, 2017), available at: http://transition.fcc.gov/Daily_Releases/Daily_Business/2017/db1026/DOC-347449A1.pdf.

⁴³ Federal Communications Commission, "In the Matter of Spectrum Horizons, Battelle Memorial Institute Petition for Rulemaking to Adopt Fixed Service Rules in the 102-109.5 GHz Band, Request for Waiver of ZenFi Networks, Inc. and Geneva Communications LLC, James Edwin Whedbee Petition for Rulemaking to Allow Unlicensed Operation in the 95-1,000 GHz Band Draft Notice of Proposed Rulemaking" (NPRM), ET Docket No. 18-21, (February 22, 2018), available at: https://apps.fcc.gov/edocs_public/attachmatch/FCC-15-24A1.pdf. (visited February 13, 2018).

Title I regulatory framework.⁴⁴ For nearly two decades broadband was regulated as Title I service, allowing competitors to freely enter the marketplace. However, under the FCC’s *Title II Order*, the Commission had the authority to subject broadband ISPs to heavy-handed regulation.

Despite promises of forbearance from some of the most heavy-handed aspects of Title II regulation, such as rate regulation, the FCC’s ability to impose such burdensome rules slowed broadband investment and scared off new broadband competitors.⁴⁵ Notably, however, the FCC did not forbear from the core provisions of Title II, including the rate regulation authority and non-discrimination mandate in Sections 201 and 202. And the FCC’s vague general conduct standard, adopted in the *Title II Order*, enabled the Commission to investigate free data services. The Commission could not reasonably promote ending the digital divide as a serious goal if it also was considering prohibiting ISPs from offering consumers free data. For this reason, one of Chairman Pai’s first actions as Chairman was to end this investigation. Since then, numerous pro-consumer offerings have emerged because ISPs no longer fear the FCC will prohibit them for experimenting with consumer offerings.⁴⁶

The reason this deregulatory action is important to reaching rural America is because the *Title II Order* created a lot of regulatory uncertainty. As discussed earlier in this paper, some ISPs have little incentive to invest in rural areas due to high costs. And with the FCC looming over providers’ business decisions with the authority to impose Title II regulations, the incentive to invest in rural areas was stifled even more following the adoption of the *Title II Order*. In May 2017 we estimated that broadband investment declined by \$5.6 billion since the adoption of the *Title II Order*, potentially hindering rural broadband deployment.⁴⁷

Moreover, the *Restoring Internet Freedom Order* states:

A coalition of 70 small wireless ISPs cited the uncertainty created by the Title II Order as a major reason that their costs of capital have risen, preventing them from further expanding and improving their networks. The new regulatory burdens, risks, and uncertainties combined with “diminished access to capital 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.” A coalition of 19 municipal ISPs cited high legal and consulting fees necessary to navigate the Title II Order, as well as regulatory compliance risk as a reason for delaying or abandoning new features and services.

⁴⁴ Restoring Internet Freedom Order, WC Docket No. 17-108, (December 14, 2017), available at: https://apps.fcc.gov/edocs_public/attachmatch/FCC-17-166A1.pdf.

⁴⁵ See, e.g., Comments of the Free State Foundation in the matter of Restoring Internet Freedom, (July 17, 2017), available at: http://freestatefoundation.org/images/FSF_Initial_Comments_-_Restoring_Internet_Freedom_-_071717.pdf.

⁴⁶ Michael Horney, “Free Market Orientation Spurs Unlimited Data Plans,” *FSF Blog*, (March 23, 2017), available at: <http://freestatefoundation.blogspot.com/2017/03/free-market-orientation-spurs-unlimited.html>.

⁴⁷ Michael Horney, “Broadband Investment Slowed by \$5.6 Billion Since Open Internet Order,” *FSF Blog*, (May 5, 2017), available at: <http://freestatefoundation.blogspot.com/2017/05/broadband-investment-slowed-by-56.html>.

The FCC's decision to roll back Title II regulation will reduce the amount of regulatory uncertainty in the broadband marketplace. Under the Title II reclassification, the FCC had the authority to impose any sections of Title II, despite promises to forbear from these overly-burdensome regulations. Additionally, the *Title II Order's* vague general conduct standard could have been used by the Commission to outlaw anything the FCC deemed anticompetitive or harmful. And as FSF scholars noted in our initial⁴⁸ and reply comments,⁴⁹ the FCC's definition of broadband competition used in the *Title II Order* did not provide any analysis of local competition and said that any broadband provider is a monopoly "regardless of the competition in the local market." This definition leaves open the possibility that any innovation or activity performed by a broadband provider could be considered anticompetitive.

Therefore, the FCC's decision to undo Title II will encourage additional investment and innovation because ISPs will not fear that their business activity will violate FCC regulations. In rural areas, where the business case for broadband deployment is more marginal, ISPs should be more willing to invest in next-generation networks.

Prioritizing Private Investment Over Public Investment

With new technologies emerging and broadband capabilities increasing, there is good reason to be bullish about the future of rural broadband deployment. As this paper describes, there is a role for Congress and the FCC. The broadband market will continue to grow as more spectrum is assigned and allocated for commercial use. Unnecessary delays can be avoided if states and local governments reduce barriers that significantly discourage deployment.⁵⁰ Moreover, the adoption of the *Restoring Internet Freedom Order* should reduce regulatory uncertainty from broadband providers, spurring investment throughout the United States.

Government regulation at all levels combined with the lack of spectrum availability has discouraged rural broadband deployment. Before resorting to government subsidies for rural broadband projects, the government should lift the barriers that stifle deployment. Only then, if the digital divide remains, should the FCC and state and local agencies explore ways to nudge the market into promoting additional rural broadband deployment. As Chairman Pai stated in a

⁴⁸ Comments of the Free State Foundation in the matter of Restoring Internet Freedom, (July 17, 2017), available at: http://freestatefoundation.org/images/FSF_Initial_Comments_-_Restoring_Internet_Freedom_-_071717.pdf.

⁴⁹ Reply Comments of the Free State Foundation in the matter of Restoring Internet Freedom, (August 30, 2017), available at: http://freestatefoundation.org/images/FSF_Restoring_Internet_Freedom_Reply_Comments_-_Final_-_083017.pdf.

⁵⁰ See, e.g., Theodore R. Bolema and Michael J. Horney, "The Problem with Municipal Broadband and Solutions for Promoting Private Investment, *Perspectives from FSF Scholars* Vol. 12, No. 21 (June 21, 2017), available at: http://www.freestatefoundation.org/images/The_Problem_with_Municipal_Broadband_and_Solutions_for_Promoting_Private_Investment_062017.pdf.

September 2017 speech, the best way to close the digital divide is to create “a regulatory framework that promotes private investment and innovation.”⁵¹

In January 2018 the FCC voted to create a Connect America Fund (CAF) reverse auction, setting aside \$2 billion to help deliver fixed broadband to rural America. Providers will compete to receive support to offer voice and broadband service in unserved high-cost areas.⁵² This is a commendable and potentially necessary action. However, if all the proposals in wireline NRPM are adopted in an Order, rural areas would benefit from over \$69 billion in additional broadband investment throughout the United States. And as discussed in this paper, competition among fixed wireless and satellite providers is exploding, which particularly will benefit rural consumers.

The FCC’s CAF reverse auction could go a long way towards reducing the digital divide, but it is important to unleash more spectrum into the market, so the FCC can use the \$2 billion to effectively target unserved areas, as opposed to areas that are underserved because of unnecessary regulatory costs. By using market-based broadband competition to incentivize rural deployment, the cost of government-subsidized broadband, used as a tool to close the gap of the digital divide, will be reduced significantly. And any government funds should be carefully targeted to unserved areas, so that they are not used to support overbuilding in already-served areas. In other words, it is important that the FCC and Congress continue to prioritize private investment over public investment, because private providers have the incentive to deploy broadband in areas where it will create the most value for consumers.

IV. Conclusion

Many rural households still do not have access to the FCC’s definition of broadband of 25 Mbps/3 Mbps. However, the percentage of rural Americans who do have access to a broadband connection has increased significantly, as each year millions of people are reached by wireline, satellite, fixed wireless, or mobile wireless services. The broadband market is on the frontier of providing next-generation access to most, if not all, rural and underserved areas.

As discussed throughout this paper, the FCC and Congress have the ability to remove regulatory barriers that clearly stifle broadband deployment and assign and allocate the necessary licensed spectrum that would accelerate rural deployment. If these initiatives are adopted, the digital divide would be reduced significantly. Then, if government-assisted broadband deployment is necessary to close the gap of the digital divide, it would be significantly less costly to target any remaining rural areas that need assistance.

In general, Americans should be optimistic about how dynamic competition and innovation in the broadband market is closing the gap of the digital divide.

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⁵¹ Remarks of FCC Chairman Ajit Pai, Institute for Policy Innovation, (September 7, 2017), available at: https://apps.fcc.gov/edocs_public/attachmatch/DOC-346600A1.pdf.

⁵² Public Notice, “Connect America Fund Phase II Auction,” (February 1, 2018), available at: https://transition.fcc.gov/Daily_Releases/Daily_Business/2018/db0201/FCC-18-6A1.pdf.