Before the
UNITED STATES DEPARTMENT OF AGRICULTURE
FARM SERVICE AGENCY
Washington, DC 20250

CURRENT AND ANTICIPATED FUTURE SPECTRUM REQUIREMENTS FOR COMMERCIAL AGRICULTURE, FORESTRY, MINING AND RURAL MANUFACTURING	**)**	**84 Fed. Reg. 49, 9078**

Comments of

NTCA–THE RURAL BROADBAND ASSOCIATION

TO THE AGENCY:

I. INTRODUCTION

NTCA-The Rural Broadband Association (NTCA) hereby submits comments in the above-captioned proceeding. NTCA represents nearly 850 independent, community-based telecommunications companies and cooperatives and more than 400 other firms that support the provision of communications in the most rural portions of the United States. NTCA members and small operators like them serve fewer than five percent of the U.S. population, yet their collective service territories cover approximately 35 percent of the U.S. landmass. All NTCA service provider members are historically rural telephone companies as defined by the Communications Act, as amended,[1] although they have all evolved to become the leading broadband Internet service providers in wide swaths of rural America today.[2] In the instant

[1] *See,* 47 U.S.C. § 153(44).

[2] According to the most recent survey data, nearly 50 percent of NTCA members' customer base can receive maximum download speeds of greater than/equal to 10 Mbps. For these and other data, *see,* Broadband/Internet Availability Survey Report, NTCA-The Rural Broadband Association, Arlington, VA (Dec. 2018).

Notice of Inquiry (NOI),[3] the Farm Service Agency (Agency, or FSA) seeks comment on radio spectrum requirements for commercial agriculture, forestry, mining and rural manufacturing. NTCA submits that access to spectrum is critical to support industrial and agricultural undertakings in rural America. These businesses are crucial to the economic and social welfare of rural spaces and, by extension, urban regions of the nation, as well.

II. DISCUSSION

A. RURAL INDUSTRY AND AGRICULTURE RELY ON BROADBAND

Industry and agriculture rely increasingly on broadband and the integration of advanced technological capabilities. As consumer and industrial goods become more complex, the processes of designing, manufacturing, maintaining and repairing those devices (whether household appliances or factory machinery) become more complex. Similarly, agriculture is benefitting from the incorporation of broadband-enabled technology that supports crop and livestock production. Both sectors are important to the rural economy. According to the USDA, U.S. farms generated $245 billion in gross output and purchased more than $225 billion in inputs in 2015. In 2016, U.S. farming exports were valued at $135 billion;[4] in 2019, U.S. exports are expected to reach $141.5 billion.[5] In 2016, U.S. agricultural exports alone supported one million domestic jobs.[6] The USDA also reports that while rural manufacturing jobs have declined, the

[3] *Current and Anticipated Future Spectrum Requirements for Commercial Agriculture, Forestry, Mining and Rural Manufacturing*: *Notice of Inquiry and Request for Comments,* Farm Service Agency, U.S. Department of Agriculture, 84 Fed. Reg. 49, 9078 (2019) (NOI).

[4] Jason Hafmeister, "Trade: An Economic Engine for Agriculture and Rural America," U.S. Department of Agriculture (May 17, 2019) (https://www.usda.gov/media/blog/2017/05/17/trade-economic-engine-agriculture-and-rural-america).

[5] Kamron Daugherty and Hui Jiang, "Outlook for U.S. Agricultural Trade," Economic Research Service Situation and Outlook Report AES-107, U.S. Department of Agriculture (Feb. 21. 2019) (https://www.ers.usda.gov/webdocs/publications/91333/aes-107.pdf?v=3730.5).

[6] Hafmeister.

sector still represents approximately 14% of all rural non-farm jobs. In 2015, 2.5 million rural manufacturing jobs supported more than $158 million in earnings.[7] Accordingly, given the role of manufacturing and agricultural in rural economies, and the role of broadband in those industries, it is evident that robust broadband is necessary to secure the future of the rural economy. Both fiber facilities (which offer future-proof capabilities, resilience and security) and mobile wireless services (which offers mobility and "in the field" capabilities) are necessary. The Federal Communications Commission (FCC) has identified the complementary nature of these platforms.[8] Access to spectrum ownership by operators who are committed to rural markets, alongside fiber-fed backhaul to make higher frequency and even lower frequency spectrum useful in those areas, will be critical.

The challenge to support advanced manufacturing in rural America is critical. Since 2000, manufacturing jobs in rural areas have declined by 20%.[9] Historically, rural manufacturers provided a stable place of employment for their communities and a source of implicit support for other area businesses that factory employees rely upon, such as groceries or other retailers. Moreover, the manufacturing sector produces strong multiplier impacts: every six manufacturing jobs creates seven indirect jobs elsewhere, and every dollar of manufactured goods triggers $1.40 output elsewhere.[10] The Bureau of Labor Statistics (BLS) ranks manufacturing salaries as

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[7] Sarah Low, "Rural Manufacturing Survival and Its Role in the Rural Economy," Economic Research Service, U.S. Department of Agriculture (Oct. 25, 2017) (www.usda.gov/amber-waves/2017/october/rural-manufacturing-survival-and-its-role-in-the-economy) (Low).

[8] *Inquiry Concerning Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion: 2018 Broadband Deployment Report,* Federal Communications Commission, GN Docket No. 17-199, FCC 18-10, at para. 18 (2018).

[9] Reid Wilson, "Rural Poverty Skyrockets as Jobs Move Away," The Hill (Dec. 17, 2017).

[10] Joel Kotkin and Michael Shires, "Where U.S. Manufacturing is Thriving in 2018," Forbes (May 23, 2018) (https://www.forbes.com/sites/joelkotkin/2018/05/23/where-u-s-manufacturing-is-thriving-in-2018/#6cbbcac753b3) (Kotkin).

slightly higher than the average wage for all occupations (by way of comparison, the average manufacturing wage is almost twice the average wage for leisure and hospitality).[11] In 2018, Forbes characterized "small towns in the Rust Belt" as having "the most encouraging growth."[12] Unlike factories from the early and mid-20th century that could be perceived as dirty and noisy, modern factories that house robots must be clean and cool to ensure the proper operation of robots and other vital machinery.[13] About 50% of manufacturers rely on robots, cobots and other high-tech approaches.[14] Advanced manufacturing relies upon access to broadband that can facilitate ordering, inventory and cloud-based services. Broadband also is critical to manufacturers at initial design and production stages. These may include 3D printing to meet custom-order production from specialized and segmented markets – bringing local, regional and global business to rural America. Cloud services can also support data security needs.

Wireless broadband in these settings can increase efficiency, productivity and profits. These gains are not limited to the factory floor, which can be supported by a local Wi-Fi network, but extend to connections with fleet vehicles, equipment and technicians "in the field." Manufacturers can use RFID, barcoding and other tracking to oversee inventory, supply chains and productivity. Smart shelves and smart bins can track inventory in "real time." These data can

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[11] *See,* Manufacturing: NAICS 31-33, Bureau of Labor Statistics, U.S. Department of Labor (average hourly earnings of all employees, $27.21) (https://www.bls.gov/iag/tgs/iag31-33.htm) (last viewed Mar. 6, 2019, 18:47); May 2017 National Occupational Employment and Wage Estimates, Bureau of Labor Statistics, U.S. Department of Labor (average hourly wage for all occupations, $24.34) (https://www.bls.gov/oes/current/oes_nat.htm#00-0000); *and,* Leisure and Hospitality, Bureau of Labor Statistics, U.S. Department of Labor (average hourly earnings of all employees, $16.30) (https://www.bls.gov/iag/tgs/iag70.htm) (last viewed Mar. 6, 2019, 18:50).

[12] Kotkin.

[13] Emily Hanford, "A Company Short on Skilled Workers Creates its Own College-Degree Program," American RadioWorks (Sep. 17, 2014) (http://www.americanradioworks.org/segments/toyota-college-degree-program/) (Hanford).

[14] Deloitte at 5.

be used to support in-bound purchasing from suppliers and out-bound sales to customers. Wireless connectivity can also support predictive maintenance, anticipating the need for repairs before costly equipment failures arise. In addition to assisting the manufacturer's management of assets, these technologies can be incorporated into end-user products. IoT enables manufacturers to not only connect facilities within the manufacturing plant to each other, but also with the end-user product after it is sold. Manufacturers can then sell both the product *and* enhanced maintenance. Rather than rely upon the purchaser to seek out the manufacturer for scheduled or incidental maintenance and service, the manufacturer can maintain a connection (both literal and figurative) over the long-term with the consumer. While many consumers may be familiar with this model in computer and tech industry where remote software updates are provided routinely, the extension of these capabilities to products ranging from kitchen appliances to automobiles will change the need for fixed and mobile broadband capabilities for manufacturers. This can be particularly important for rural areas where affordable land and access to transportation corridors can play a critical role in site selection and, resultingly, rural economic health. Moreover, rural manufacturing plants demonstrate greater survivability rates than urban factories,[15] illuminating the beneficial imperatives of supporting rural manufacturing.

In addition to gains in manufacturing, broadband, both wired and wireless, is critical to the agriculture and its forward evolution with technology. In the heart of America, where a significant amount of the world's grain is produced, broadband speed is crucial to efficient production to maintain a competitive edge in the increasingly global marketplace. Precision agriculture enables real-time data from tractors, combines, implements and other sensor-embedded equipment used in production agriculture. IoT and the broadband upon which it relies

[15] Low.

changes the face of farming, revealing the underlying and essential role of logistics in modern agriculture. By way of example, corn can be harvested and stored in an elevator, but cherries have only 24 peak hours to get from farm to market. If growers do not have information is not available in real time, it is not useful. Access to broadband is also critical to growers who sell in the commodity market; incremental price differences multiplied by acres of production can create meaningful margins when up-to-second access to pricing is available.

A participant in a USDA roundtable last year proposed that precision agriculture is this generation's genetic engineering, lowering input costs and leading "agricultural artisans" to become scientists. A fifth-generation farmer explained away the misconception of planting a seed and letting nature take its course; variable rate seeding can lower costs by $5.00 per acre. Broadband everywhere is necessary, whether for row crops, specialty crops or livestock. Savings of $12.50 per acre have been found when smart farming is applied to cotton.[16] The Ohio State University found that variable rate applications in no-till situations can save $36-$88 per acre as compared to farming without smart agriculture.[17] Livestock and dairy production benefits from anti-infanticide technology, precision feedings and unmanned aerial vehicles. Non-food agriculture benefits, as well: by way of example, for its upholstered surfaces, Rolls Royce uses only A-grade hides.[18] These standards may be applicable in the textile and clothing industry, as well; connected cows can be monitored to ensure they do not roam near barbed wire fences.

[16] "4R and Precision Agriculture: Where's the Payback?" IPNI Plant Nutrition Today, Fall 2014, No. 5 (http://www.nutrientstewardship.com/implementation/4r-and-precision-agriculture-wheres-the-payback/).

[17] "Big Savings from Variable Rate Fertilizer," Ohio Farmer (Dec. 15, 2008) (https://www.farmprogress.com/story-big-savings-from-variable-rate-fertilizer-9-20801).

[18] *See,* https://www.rolls-roycemotorcars.com/en-US/bespoke/the-art-of-leather.html (last visited Mar. 19, 2019).

A robust broadband connection is necessary at both the homestead and in the field. Although precision agriculture, which relies upon wireless connectivity to the cab of a tractor, may be a relatively low-bandwidth application, the ability of a farmer to participate fully in the marketplace relies upon the farmer's ability to buy, sell and trade in the market via a robust connection. A fiber connection works in concert with wireless to ensure the accurate transmission of critical data from point A to point Z. Beneficiaries of these capabilities are not only the farmers, but also vendors and ultimately consumers who enjoy a better product.

The underpinnings of all this progress in mobile capability must not be ignored, however. In particular, policymakers cannot overlook that "wireless needs wires:" mobile wireless facilities—and the IoT and other applications they enable—depend upon adequate, wired backhaul capabilities to realize their full potential. An NTCA member from Iowa explained a farmer looking to modernize operations "could not use precision agriculture until the company put down fiber." Broadband at the homestead supports activities in the field: streaming video generally requires a threshold of 25 Mbps. This application is necessary for farmers who participate in on-line livestock auctions. As a director of an NTCA member company who herself ranches explained,

> The broadband most helpful to rural Americans is the high-speed data network. Streaming video and live performances (either livestock, family, or events) is the most critical infrastructure for our success. Anytime someone is buying or selling something that moves, the streaming data network is the most beneficial.[19]

[19] Another example of the importance of overall service quality comes in the form of "futures," agreements to purchase cattle at a set price in the future. In recent years, drastic price swings (in 3Q16, for example, cattle futures prices dropped nearly 33 percent) have cut into rancher earnings and prompted discussions about how pricing might be better guided in the $13B annual market. Although the Department publishes price indices, the delay in disseminating price data reported by traders may result in indices that do not reflect actual market positions. On-line cattle auctions direct trading to a cash market that offers near-instant dissemination of pricing information which, when aggregated across hundreds of producers using the broadband-enabled platforms, provides a more current picture of pricing. This, in turn, is proposed to potentially reduce uncertainty in the futures market. To be sure, not all cattlemen agree, and there is concern that on-line trading might not produce a sufficient amount of data. Nevertheless, on-line auctions offer cattlemen three distinct benefits: (1) the ability to participate in a process that is far more economically efficient than traveling to live auctions; (2) the ability to participate in hundreds of distant

Finally, as broadband increases efficiency, productivity and profitability on the farm, it also benefits the overall quality of life in agricultural communities. Farming communities must have access to broadband-enabled economic, educational and health-care opportunities if those communities are to remain viable and thrive. One rancher observed,

> The biggest problem with trying to explain the uses for high speed broadband is that they are endless. Rural life depends on many segments and the remoteness of our lives necessitates superior quality broadband infrastructure. Ag, healthcare, education, entertainment, communicating with family, tele-work, and so much more.

On the farm, IoT can help grain silo management, reducing the risk of injuries while increasing operational efficiencies.[20] By way of example, OSHA standards regulate the relative speed of feeding conveyors to bucket elevators; conveyors that run too fast can cause grain dust fires and explosions. Sensors can determine when speeds are approaching hazardous conditions, trigger alarms and stop the conveyor.[21] And, when product gets to market, block chain for agriculture can reduce food waste by quickly identifying the source of contaminated supply. This avoids the need for grocers and distributors to discard all of a variety of stock from multiple sources.

As described above, broadband underpins advanced manufacturing and agricultural industries. These sectors play substantial roles in supporting the rural, and by extension the national, economy. Broadband enables producers to operate more efficiently and to establish and

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auctions; (3) an alternative to cattle futures that may be more attractive in certain situations. These combine to serve greater economic efficiencies and opportunities for the agriculture industry.

[20] "Grain Dust Explosions Up, Injuries and Fatalities Decline," Agriculture News, Purdue University (Feb 21, 2019) (https://www.purdue.edu/newsroom/releases/2019/Q1/grain-dust-explosions-up,-injuries-and-fatalities-decline.html, https://www.nytimes.com/2012/10/29/us/on-us-farms-deaths-in-silos-persist.html).

[21] Jeanne Schweder, "The Internet of Things Inside Grain Operations," Automation World (May 15, 2015) (https://www.automationworld.com/article/topics/industrial-internet-things/internet-things-inside-grain-operations).

participate in broader supply and sales markets. The increasing presence of IoT devices in industrial and consumer settings will demand greater connectivity. Rural broadband plays a critical role in supporting rural and national economic activity.

B. ACCESS TO BROADBAND BY RURAL PROVIDERS IS CRITICAL

Having elucidated the many benefits of broadband for manufacturing and agriculture, policy makers are compelled to turn their attention to the formulation of policies that can promote access to wireless services in rural areas. Fortunately, the Communications Act of 1934, as amended, provides clear, principled guidance. The overarching purpose of the Act includes making radio communication service available "to *all* the people of the United States."[22] Section 309(j) of the Act articulates numerous including:

> (A) the development and rapid deployment of new technologies, products, and services for the benefit of the public *including those residing in rural areas,* without administrative or judicial delays; and
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> (B) promoting economic opportunity and competition and ensuring that new and innovative technologies are readily accessible to the American people *by avoiding excessive concentration of licenses* and *by disseminating licenses among a wide variety of applicants, including small businesses, rural telephone companies*, and businesses owned by members of minority groups and women.[23]

In Section 309(j)(4) of the Act, Congress further mandates that the Commission:

> (B) include performance requirements such as appropriate deadlines and penalties for performance failures, *to ensure prompt delivery of service to rural areas, to prevent stockpiling or warehousing of spectrum by licensees or permittees*, and to promote investment in and rapid deployment of new technologies and services; [and]
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> (C) consistent with the public interest, convenience, and necessity, the purposes of this Act, and the characteristics of the proposed service, *prescribe area designations and bandwidth assignments that promote (i) an equitable*

[22] 47 U.S.C. §151 (emphasis added).

[23] 47 U.S.C. §§309(j)(3) (A)(B) (emphasis added). The Supreme Court, in its *Adarand* and subsequent *VMI* decisions, struck down preferential treatment of minorities and women. *See Adarand Constructors, Inc. v. Pena,* 515 U.S. 200, 227-30 (1995) and *United States v. Virginia,* 518 U.S. 515, 531-34 (1996).

> *distribution of licenses and services among geographic areas, (ii) economic opportunity for a wide variety of applicants, including small business, rural telephone companies*, and businesses owned by members of minority groups and women, and (iii) investment in and rapid deployment of new technologies and services.[24]

In spectrum dockets at the FCC, NTCA has consistently advocated policies to promote the deployment of wireless services in rural regions. Large license territories do not promote the provision of spectrum-based services to rural consumers; large companies with the resources to bid on large areas generally focus on the more profitable highly populated portions of license areas, leaving rural portions unbuilt or, at best, underserved. In some instances, large, national providers have been compelled to seek extensions and waivers to avoid accelerated license term expiration for failing to meet construction benchmarks in rural areas, even though partitioning and disaggregation were available and despite the fact that other rural carriers were willing to acquire and build out spectrum that would have become available as a result of enforcement of the performance requirement.[25]

In contrast, small providers such as NTCA members strive to enhance or supplement broadband service to their rural communities. Unfortunately, public policy cannot rely upon voluntary disaggregation by winners of large geographic areas to provide rural carriers or other small businesses with access to unused spectrum through secondary market arrangements. One report concluded there is "little recent history of the larger carriers leasing, disaggregating or partitioning large sections of spectrum where they already have service."[26] The FCC itself found

[24] 47 U.S.C. §§ 309(j)(3)(B)(C) (emphasis added).

[25] *See, Promoting Investment in the 3660-3700 MHz Band: Reply Comments of NTCA–The Rural Broadband Association,* Federal Communications Commission, GN Docket No. 17-258, at 4, 5 (internal citation omitted) (Jan. 29, 2018) (NTCA 3660-3700 MHz Reply Comments).

[26] Richard Marsden, Dr. Chantale LaCasse, and Jonathan Pike, *Local and Regional Licensing for the US 600 MHz Band* (January 2014), listing dozens of recent transactions in which large providers obtained spectrum from small providers.

that secondary markets are neither a reliable source of spectrum nor a solution to the lack of coverage in rural areas.[27] The Wireless Internet Service Providers Association (WISPA) reported that about 25 percent of its survey respondents indicated that they had attempted to obtain licensed spectrum from four large national carriers, and fewer than ten percent of those respondents reported being successful.[28]

In light of the critical import that access to spectrum promises to rural areas, NTCA urges FSA specifically and the Department more broadly to work with the FCC toward policies that reflect holistic consideration of the instant imperatives. The importance of access to rural spectrum must be viewed within the full context of the benefits it empowers. The consolidated data arising out of industrial, agricultural and economic gains must give force to regulatory principles aimed at ensuring the Universal Service mandates of the Act. Congress is clear:

> Consumers in all regions of the Nation, including . . . those in rural, insular, and high cost areas, should have access to telecommunications and information services . . . .that are reasonably comparable to those services provided in urban areas and that are available at rates that are reasonably comparable to rates charged for similar services in urban areas.[29]

At the same time, the USDA can take the lead in facilitating the placement of facilities on its properties. Leadership actions such as those could serve as an example for other agencies that hold Federal lands and property, and speed deployment of broadband throughout the nation. Together, these comprehensive and coordinated actions can assure fulfillment of Universal Service mandates and the Agency's interest in promoting rural broadband deployment.

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[27] *See generally,* Federal Communications Commission, Connecting America: The National Broadband Plan (2010), noting, "While the FCC currently has rules that enable secondary markets the record is mixed" and that some public comments provide "that unused or underutilized spectrum is not being made available to smaller providers, especially in rural areas where spectrum goes unused."

[28] *See,* NTCA 3660-3700 MHz Reply Comments at 7 (internal citation omitted).

[29] 47 U.S.C § 254.

C. BROADBAND WILL SUPPORT THE ECONOMIC VIABILITY OF RURAL AMERICA

Rural areas are facing a variety of demographic and economic conditions. Forty-six million people live in rural America, which encompasses 72% of the U.S. landmass.[30] Data indicate declines in some rural areas, and positive upturns in other rural regions. [31] Over the past half-century, overall rural populations have declined. In 1950, rural spaces were home to 36% of the U.S. population;[32] by 2010, that proportion had dropped to 19.3%.[33] Overall, 35% of rural counties are depopulating;[34]more than 80% of farm counties are depopulating.[35] Remote rural counties have been hit hardest, experiencing negative impacts at nearly twice the rate of rural counties that are adjacent to urban areas that offer "labor markets, services and economic

[30] Kenneth J. Johnson and Daniel T. Lichter, "Rural Depopulation in a Rapidly Urbanizing America," National Issue Brief #139, Carsey Research, Carsey School of Public Policy, University of New Hampshire (Winter 2019) (Johnson and Lichter).

[31] At the outset of this discussion, it is useful to note that "rural" is not a consistently defined term, even among various offices of the U.S. government. The U.S. Census Bureau defines "rural" as any area that is not "urban": an urban area is one with (a) an "urbanized area" with at least 50,000 people, or (b) an "urban cluster of at least 2,500 and fewer than 50,000 people (United States Census Bureau website, "Urban and Rural Classification" (https://www.census.gov/geo/reference/urban-rural.html) (last visited Apr. 1, 2019)). In comparison, the Economic Research Service (ERS) of the USDA invokes population thresholds, but also considers whether "outlying counties" are "economically tied to the core counties as measured by labor-force commuting," among other criteria (United States Department of Agriculture, Economic Research Services website, "What Is Rural?" (http://www.ers.usda.gov/topics/rural-economy-population/rural-classifications/what-is-rural.aspx) (last visited Apr. 1, 2019)). In contrast, the U.S. Office of Management and Budget (OMB) utilizes a separate set of definitions for urbanized areas that revolve around Metropolitan Statistical Areas and Micropolitan Statistical Areas. Like the USDA approach, OMB considers economic ties, such as those evidenced by commuting workers, between places. OMB notes, however, that its classifications "do not equate to an urban-rural classification" (United States Office of Management and Budget, Bulletin No. 13-01, "Revised Delineations of Metropolitan Statistical Areas, Micropolitan Statistical Areas, and Combined Statistical Areas, and Guidance on Uses of the Delineations of These Areas," at 3 (Feb. 28, 2013) (https://www.whitehouse.gov/sites/default/files/omb/bulletins/2013/b-13-01.pdf)).

[32] Table of Urban and Rural Population, 1900–1990, U.S. Census Bureau (Oct. 1995) (https://www.census.gov/population/censusdata/urpop0090.txt).

[33] "New Census Data Show Differences Between Urban and Rural Populations," U.S. Census Bureau (Dec. 8, 2016) (https://www.census.gov/newsroom/press-releases/2016/cb16-210.html).

[34] Johnson and Lichter at 1.

[35] Johnson and Lichter at 1, 2.

activities."[36] Some positive trends, however, have emerged since the Great Recession. The Economic Research Service reports that some rural counties realized increased populations in 2016-17 for the first time this decade. Positive changes in net migration were seen in 1,100 rural counties (58%) between 2012-13 and 2016-17.[37] These data should steel policymakers' commitment to ensuring a strong rural future. And, given the economic and other interdependencies among rural and urban spaces, a strong rural future encourages a strong national future.

Data indicate that interdependencies among rural and urban areas support economic and other benefits that while sourced in one type region make their ultimate impact in the other.[38] Programs that support broadband deployment in remote and high-cost areas of the country enable benefits that accrue to the entire nation. In April of 2016 the Hudson Institute, in conjunction with the Foundation for Rural Service (FRS), released a report examining the economic benefits of rural broadband deployment. In the study, the Hudson Institute determined that rural broadband contributes $24.1 billion to the nation's gross domestic product (GDP) on an annual basis. Further, Hudson determined that $8.2 billion (34%) of that total accrued to rural areas, while $15.9 billion (66%) accrued to urban areas. These results indicate that investment in rural broadband brings returns that reach far beyond the confines of rural America. Moreover, Hudson estimated that 69,595 jobs are directly attributable to rural broadband. Again, these benefits accrue to both rural and urban areas: 32,014 (46%) of these jobs are in rural areas, and

[36] Johnson and Lichter at 2.

[37] "Rural America at a Glance: 2018 Edition" Economic Information Bulletin 100, Economic Research Service, U.S. Department of Agriculture at 2 (Nov. 2018) (https://www.ers.usda.gov/webdocs/publications/90556/eib-200.pdf) (ERS).

[38] *See, generally,* Joshua Seidemann, "Beyond Rural Walls: Identifying Impacts and Interdependencies Among Rural and Urban Spaces," Smart Rural Community, Arlington, VA (2015) (https://www.ntca.org/sites/default/files/documents/2017-12/SRC_whitepaper_beyond_the_rural_walls.pdf).

37,581 (54%) in urban areas. Other studies have examined the impact of rural broadband deployment, as well. A Cornell University research brief reports that median income, number of firms, and education levels in non-metro counties were all positively correlated to the level of broadband adoption in those counties.[39] At the same time, researchers found that both unemployment and poverty rates were inversely correlated to broadband adoption. Rural America's participation in e-commerce has been estimated at $1.4 trillion annually. The report, which relied upon a survey of more than 1,200 U.S. consumers, as well as data and statistics from the U.S. Census Bureau, Bureau of Transportation Statistics, Center for Disease Control and Prevention, and Federal Reserve, found that rural consumers are responsible for approximately 15% of all consumer, internet-driven transactions annually.

The rural economic condition reflects changes in manufacturing, agriculture and demographics. Rural broadband is essential to ensure competitive viability in regional, national and global marketplaces. Data demonstrate the economic interdependencies of rural and urban spaces. Rural broadband users rely upon connectivity as do their urban counterparts, though the distance-conquering advantages of broadband make the need for rural broadband especially compelling. Efforts to support rural economic viability must include sound broadband policies.

III. CONCLUSION

The positive impacts of a strong rural economy on the national condition have been quantified; the role of broadband in supporting those impacts is clear. Accordingly, NTCA submits its interest in ensuring adequate access to spectrum as well as other critical inputs

[39] Brian Whitacre, "Broadband's Contribution to Economic Health in Rural Areas," Community and Research Development Institute, Issue No. 64 (Feb. 2015) (https://cardi.cals.cornell.edu/sites/cardi.cals.cornell.edu/files/shared/documents/ResearchPolicyBriefs/Policy-Brief-Feb15-draft03.pdf).

necessary to ensure the deployment and maintenance of robust broadband networks throughout the nation.

Respectfully submitted,

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DATED: April 1, 2019