



Research & Policy INsights

Job Creation From Rural Broadband Companies

Roberto Gallardo, Ph.D.

Purdue Center for Regional Development
& Purdue Extension

Indraneel Kumar, Ph.D.

Purdue Center for Regional Development

August 2019

Publication 007

PURDUE
UNIVERSITY



Center for Regional Development
Advancing Collaboration : Energizing Regions

ROBERTO GALLARDO



Roberto Gallardo is the Assistant Director of the Purdue Center for Regional Development and a Purdue Extension Community & Regional Economics Specialist. He has authored more than 70 articles including peer-reviewed and news-related regarding rural trends, socioeconomic analysis, industrial clusters, the digital divide, and leveraging broadband applications for community economic development. He is also the author of the book “Responsive Countryside: The Digital Age & Rural Communities”, which highlights a 21st century community development model that helps rural communities transition to, plan for, and prosper in the digital age.

INDRANEEL KUMAR



Indraneel Kumar is the regional planner: GIS and spatial analysis for the Purdue Center for Regional Development (PCRD). Indraneel joined PCRD as a spatial and GIS analyst in 2005. He focuses on regional economic analysis, development of GIS databases, and spatial decision support system using quantitative and GIS-based methods. He has a bachelor's degree in architecture and a master's in urban and regional planning from India. Indraneel earned a second master's degree in community planning with specialization in environmental planning from the University of Cincinnati, Ohio. On August 2014, he earned a PhD in civil engineering with a major in transportation and infrastructure systems from the Lyles School of Civil Engineering, Purdue University. He is a member of the American Planning Association and American Institute of Certified Planners. His 15 years of work experience includes comprehensive planning for large metropolitan areas, regions and counties in India and the U.S. with concentration on land use, transportation and regional economic analysis.

■ *Executive Summary*

This study finds that when evaluated as a snapshot of a single recent year, small, rural communications providers in the United States contributed to more than 77,000 jobs and supported more than \$10 billion in economic activities across a wide range of industries. The communications firms examined in this study are telephone cooperatives or small commercial companies serving rural areas of the United States. These rural broadband providers collectively serve nearly 35% of the nation's land mass and less than 5% of the country's telecom subscribers. On average, companies in the industry from which this study's data were drawn serve approximately seven subscribers per square mile. By contrast, larger telecommunications companies serving metro or large cities serve, on average, 130 customers per square mile. This study demonstrates the positive job creation and retention impacts of these small firms as well as the far-reaching economic impacts arising out of those jobs created.

■ **Table of Contents**

Data Outcomes _____	1
Methodology _____	2
Conclusion _____	6
Technical Appendix _____	7
About the Purdue Center for Regional Development _____	9
About the Foundation for Rural Service _____	9

Partners



**Rural Telephone
Finance Cooperative**



Your business
is our business.



**FOUNDATION FOR
RURAL SERVICE**



■ Data Outcomes

This study examined data culled from members of NTCA—The Rural Broadband Association (NTCA). NTCA represents nearly 850 independent, community-based telecommunications companies that serve the most sparsely populated, low-accessibility, and the highest-cost rural areas of the country. NTCA members provide reliable broadband, voice and data communications services in some of the hardest-to-serve corners of the United States and in the face of substantial economic challenges. The average population density in an NTCA member service area is seven people per square mile. On average, each NTCA member company employs 40 people in a range of administrative and technical roles.

This study examines sales activities of approximately two-thirds of NTCA members in 44 states. During 2017, these firms created and supported more than 77,000 jobs across

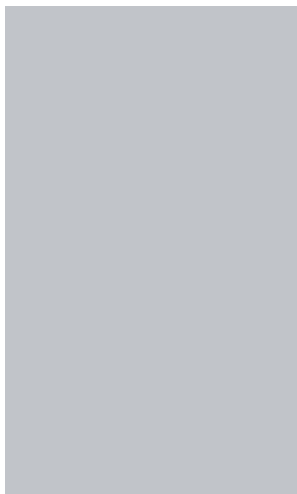
different industries (more on this in the next section). These jobs include (a) **direct** employment or jobs present within the member businesses, as well as (b) **indirect** employment or jobs created in supplier and other industries, and (c) **induced** employment or jobs created in services and support industries. In fact, for every job created by an NTCA member, almost two additional jobs (1.9) were created due to the interaction with many industries as described above.

The affected industries varied from communication carriers themselves to supplier industries such as manufacturers of semiconductors and engineering services, to offices of certified public accountants and legal counsel. These impacts are tied to total economic output of \$10 billion, including \$2.35 billion in compensations.

This economic activity plays a significant role as broadband technology continues to drive job creation, attraction, retention and community economic development. Moreover, broadband is increasingly essential for quality-of-life improvements. Adequate broadband infrastructure is one key element to unleash rural businesses' digital potential. A recent study by C_TEC (U.S. Chamber Technology Engagement Center) found that up to \$47 billion a year

could be added to the U.S. economy and more than 360,000 jobs would be created over the next three years if digital connectivity and adoption of online tools improved among rural businesses (U.S. Chamber Technology Engagement Center, 2019). The results of this instant study are consistent with the C_TEC findings as this study demonstrates positive job multipliers of the rural communications industry.

In summary, NTCA members—rural broadband companies—are significant economic drivers in their communities. This impact come from both the people the companies employ, as well as from the broadband services they provide for all businesses in their region and the follow-on impact or ripple effects of their operations. This high-speed connection technology enables a community's businesses to thrive and be successful.



■ **Methodology**

This study used the economic impact model available in JobsEQ SaaS (Software as a Service) platform from Chmura Economics & Analytics. This enables analysts to develop and assess economic impacts on a state-level basis through the use of North American Industry Classification System (NAICS) codes at the 6-digit level. NAICS codes are used by federal agencies to measure U.S. business market data. The Chmura economic impact model measures industry impacts by identifying corresponding activities across various NAICS codes.

For this study, the six-digit primary NAICS codes for NTCA members identified through the ReferenceUSA database, served as the initial data set. Since the Chmura model considers a broad and expansive set of industries within the economic input-output (IO) model for individual states, researchers can identify relationships between different vertical industries and then measure the positive impact that arises out of those industries interacting with each other through purchasing, selling and other economic interactions. In this study, the Chmura model was run more than 150 times to estimate the economic impacts of business sales aggregated by 6-digit NAICS codes in individual states. The statewide total economic impacts were the sum of the individual economic impacts by the 6-digit NAICS codes allowing to measure jobs and compensation levels. Results of the analysis are shown in the tables below.

State	Employment	Sales/Output	Compensation
AK	898	\$242,774,700	\$64,805,306
AL	377	\$67,129,496	\$14,783,772
AR	1,897	\$292,634,596	\$66,542,033
AZ	697	\$183,476,753	\$37,712,993
CA	979	\$143,431,016	\$45,735,050
CO	318	\$62,050,387	\$14,263,023
FL	29	\$4,972,905	\$1,230,675
GA	4,736	\$572,999,879	\$142,949,871
ID	958	\$119,773,234	\$28,794,757
IL	2,341	\$342,821,221	\$94,309,001
IN	1,282	\$363,302,828	\$96,543,436
IA	4,764	\$549,636,217	\$142,320,419
KS	2,061	\$274,373,111	\$65,645,904
KY	5,438	\$646,827,664	\$143,722,296
LA	205	\$68,124,566	\$12,257,378
ME	330	\$90,173,790	\$22,934,179
MD	175	\$30,307,295	\$6,542,412
MI	720	\$102,766,346	\$27,297,027
MN	2,039	\$225,674,665	\$56,410,227
MS	67	\$12,104,507	\$2,757,535
MO	3,129	\$284,103,216	\$62,690,840
MT	4,889	\$387,006,293	\$72,680,995
NC	1,471	\$238,837,227	\$52,621,548

State	Employment	Sales/Output	Compensation
ND	3,136	\$494,854,818	\$139,271,796
NE	865	\$159,300,292	\$40,267,720
NV	33	\$8,127,544	\$1,705,406
NH	24	\$6,404,725	\$1,353,509
NM	5,140	\$392,176,513	\$75,260,768
NY	1,114	\$170,048,227	\$36,316,689
OH	303	\$97,263,235	\$23,390,088
OK	4,397	\$384,502,731	\$74,546,055
OR	1,712	\$252,551,116	\$61,554,547
PA	372	\$32,903,266	\$8,896,123
SC	2,310	\$362,508,150	\$87,581,230
SD	2,014	\$285,983,828	\$57,595,291
TN	2,029	\$215,935,620	\$50,204,031
TX	9,251	\$1,090,320,196	\$237,792,407
UT	943	\$102,189,780	\$27,947,309
VA	404	\$66,807,861	\$17,765,672
VT	49	\$13,453,834	\$2,804,202
WA	242	\$47,068,893	\$11,870,230
WI	2,845	\$447,694,431	\$110,088,763
WV	177	\$33,787,556	\$8,286,303
WY	210	\$27,863,499	\$8,228,336
TOTAL	77,373	\$9,997,048,028	\$2,358,277,154



A major portion of impact of jobs created in telecom is amplified in 29 different industries in 44 states thanks to the “ripple effect” of economic activity in value chains. A ripple effect refers to the additional economic activity that occurs as a direct result of the underlying firm’s operations, including jobs. For example, the ripple effect of auto manufacturing is the manufacturing of the automobile components in supplying industries and spending of dollars from wages

in consumer and service industries in the local economy. Accordingly, this ripple effect can extend to multiple industries in the economy. In this report, the top five industries ranked by the ripple effects were included.

Overall, the impact of rural communications providers on a diverse set of industries is illustrated below. (Note that the table below shows only 27 industries. Full and limited service restaurants and temporary help services were also impacted but were not included because they appeared on all states at multiple ranks. Removing these two industries provided a clearer picture of the major extent of the telecommunications ripple effect.)

Rank one includes those industries directly employed and served by telecom, including: cable and other subscription programming; computer systems design services; corporate, subsidiary and regional managing offices; general medical and surgical hospitals; motion picture and video production; and, movie theaters.

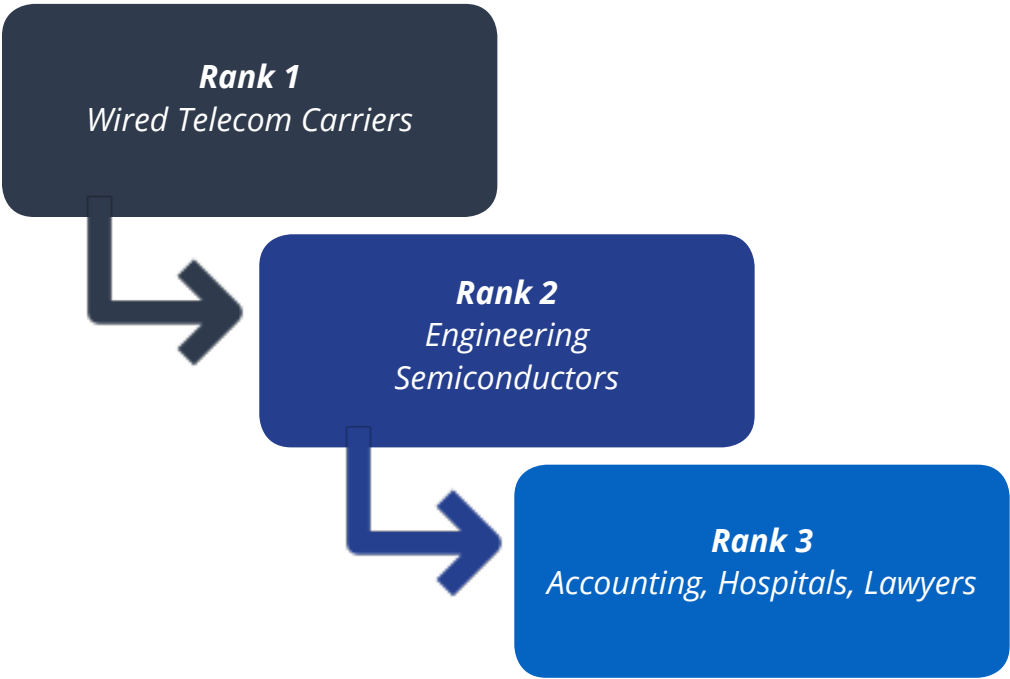
As the “ripple” generated by the telecommunications carriers sales/output trickles across the economy, additional industries emerged as benefitting under rank two: engineering services; gasoline stations with convenience stores; offices of certified public accountants; other electronic component manufacturing; semiconductor and related device manufacturing; and, sports teams and clubs.

Under rank three, additional industries were affected by the “ripple” effect: advertising agencies; hotels (except casinos) and motels; and, pharmacies and drug stores. This is to be expected as the “ripple” of the telecommunications carriers’ sales/output expands, as service industries indirectly related are affected. An additional six industries demonstrated positive impacts under rank four: colleges, universities and professional schools; commercial banking; independent artists, writers and performers; offices of physicians; postal service; and, printed circuit assembly manufacturing.

Lastly, an additional five industries were identified under rank five: administrative management and general management consulting services; lessors of residential buildings and dwellings; offices of lawyers; radio and television broadcasting and wireless communications equipment manufacturing; and religious organizations.

Figure 1 below illustrates how this “ripple effect” plays out thanks to the sales of rural telecommunications providers

Figure 1. Industry Ripple Effect Illustration of Rural Telecom Sales

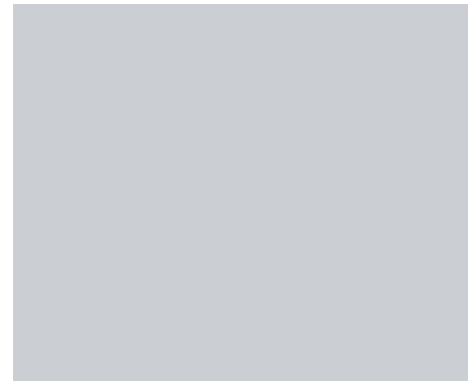


Industry	Rank One	Rank Two	Rank Three	Rank Four	Rank Five
Administrative Management and General Management Consulting Services	0	0	0	0	1
Advertising Agencies	0	0	1	1	0
Cable and Other Subscription Programming	1	9	1	1	2
Colleges, Universities and Professional Schools	0	0	0	1	2
Commercial Banking	0	0	0	1	0
Computer Systems Design Services	1	0	0	0	0
Corporate, Subsidiary and Regional Managing Offices	1	0	0	1	3
Engineering Services	0	9	20	7	4
Gasoline Stations With Convenience Stores	0	1	0	0	0
General Medical and Surgical Hospitals	1	14	12	11	3
Hotels (except Casino Hotels) and Motels	0	0	1	0	1
Independent Artists, Writers and Performers	0	0	0	1	1
Lessors of Residential Buildings and Dwellings	0	0	0	0	1
Motion Picture and Video Production	1	3	3	4	5
Motion Picture Theaters (except Drive-Ins)	1	1	1	0	3
Offices of Certified Public Accountants	0	2	4	13	8
Offices of Lawyers	0	0	0	0	6
Offices of Physicians (except Mental Health Specialists)	0	0	0	1	1
Other Electronic Component Manufacturing	0	1	0	0	0
Pharmacies and Drug Stores	0	0	1	0	0
Postal Service	0	0	0	1	0
Printed Circuit Assembly (Electronic Assembly) Manufacturing	0	0	0	1	0
Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing	0	0	0	0	1
Religious Organizations	0	0	0	0	1
Semiconductor and Related Device Manufacturing	0	1	0	0	1
Sports Teams and Clubs	0	1	0	0	0
Wired Telecommunications Carriers	38	1	0	0	0
Total Unique Industries	7	7	3	6	5

■ Conclusion

Although rural telecommunications providers are typically small, they make a significant economic impact in their communities. Data indicate that rural communications providers contributed to more than 77,000 jobs in the United States and supported more than \$10 billion in economic activity across a wide range of industries. For every job created by an NTCA member, almost two additional jobs were created due to the interaction with other industries served by or supported from the spending by the telecom employees.

These diverse sets of industries affected by rural telecom may reflect various conditions. They may reflect the demonstrable need of those industries, in varying degrees, for the advanced communications services offered by the small, rural broadband providers. The abilities and operations of those affected industries are also related to their ability to access high-quality, high-speed broadband communications services. Finally, the impacts may also reflect the increasing incorporation of broadband-enabled technologies in the “business of doing business”—for example, the use of broadband to support telehealth¹ or the need for broadband in supporting distance education.²



-
1. See, i.e., Rick Schadelbauer, “Anticipating Economic Returns of Rural Telehealth,” Smart Rural Community (2017) (https://www.ntca.org/sites/default/files/documents/2017-12/SRC_whitepaper_anticipatingeconomicreturns.pdf).
 2. See, i.e., Joshua Seidemann, “Rural Broadband and the Next Generation of American Jobs,” Smart Rural Community (2019) (<https://www.ntca.org/sites/default/files/documents/2019-04/SRC%20Middle%20Skills%20Web%20Version.pdf>).

■ **Technical Appendix**

Data for this analysis were obtained from ReferenceUSA, JSI and the Foundation for Rural Service (FRS). JSI is a telecommunications management firm that specializes in rural industry clients, derives its data from consolidated audit reports, and represents regulated and non-regulated activities, including but not limited to local service, broadband, video, cellular, security monitoring and fiber leases. FRS was established by the NTCA in 1994. It is a 501(c)(3) organization that seeks to sustain and enhance the quality of life in America by advancing an understanding of rural issues.

The dataset permitted impact estimations at the state level by using an input output (IO) model. The JobsEQ (Chmura Economics & Analytics) IO model used considers a broad and expansive set of industries offering the ability to identify relationships between different vertical industries and to measure the positive impact of those industries interacting with each other through purchasing and other economic interactions by aggregating business sales by 6-digit North American Industry Classification System (NAICS) codes.

In this analysis, the amount (\$ value) is entered into sales/output, which are the direct effects, and the model provides estimates of direct, indirect and induced effects on jobs, additional sales/output and compensation, respectively. The indirect effects are related to the supply chains and dependent on the proportion of supplies obtained from within versus outside the state. The induced effects are the result of increased household consumption and spending of wages due to direct, indirect and induced effects.

Economic impact analysis methodology is not devoid of limitations. Any IO model is a representation of the economic transactions (flow of dollars) happening within industry-to-industry, industry-to-household and vice versa, industry-to-governments, exports and imports. One limitation is the linear response of the models.

A wide variety of models is used to develop economic impacts. Results of economic modeling depend not only on the model used in any particular study, but also upon the data sets that were employed in the analysis. Numerous studies examining the impact of rural communications providers have been conducted in the past several years.³ For example, in North Dakota, rural telecommunications companies were found to contribute more than \$18 million in federal tax revenues and \$31 million in state tax revenues. These included impacts arising out of 1,100 direct jobs and 800 secondary jobs generated by rural telecommunications activity. The study described the sectors most affected by rural telephone and broadband company (rural local exchange carrier, or RLEC) spending. They included: food services and drinking places; real estate establishments; offices of physicians, dentists and other health practitioners; private hospitals; architectural, engineering and related services; nursing and residential care facilities; retail stores—food and beverage; motion picture and video industries; and, retail stores, general merchandise.⁴

-
3. See, i.e., Martin Shields, Harvey Cutler and Michael Marturana, "The Impacts of Colorado Telecommunications Association Members on the Colorado Economy," Regional Economics Institute, Colorado State University (2011); "Kansas Rural Local Exchange Carriers: Assessing the Impact of the National Broadband Plan," W. Frank Barton School of Business, Center for Economic Development and Business Research, Wichita State University (2011); James Peach, Anthony V. Popp and Leo Delgado, "The Potential Economic Impact of the National Broadband Plan on the New Mexico Exchange Carriers Group," Office of Policy Analysis, Arrowhead Center, New Mexico State University (2011).
 4. McKee, Gregory. "The Effect of Changes in Universal Service Funding on the Economic Contribution of Rural Local Exchange Carriers to the North Dakota State Economy," Department of Agribusiness and Applied Economics, Agricultural Experiment Station, North Dakota State University, at 6 (Dec. 2011).

Previous broadband impact studies sponsored by FRS relied on different methodologies and different data from this study. Despite the different methodologies, however, job contribution findings were consistent, and demonstrate a robust ability of the rural telecommunications industry to both create and retain jobs in their local and expanded markets. The table below shows the multipliers by state and overall. Multipliers are a measure of total change in the economy due to a single-unit change. For example, the employment multiplier of 3.4 in Arkansas means one job created or supported resulted in an additional 2.4 jobs.

State	Employment	Sales/Output	Compensation
AK	2.2	1.4	1.7
AL	2.8	1.6	2.0
AR	3.4	1.6	2.0
AZ	2.5	1.6	2.0
CA	3.0	1.7	2.2
CO	3.3	1.7	2.1
FL	2.7	1.7	2.1
GA	3.4	1.7	2.1
IA	2.8	1.6	2.0
ID	2.7	1.6	2.0
IL	2.8	1.7	2.1
IN	2.1	1.4	1.7
KS	2.9	1.6	1.9
KY	3.2	1.6	2.0
LA	2.7	1.6	2.0
MD	4.0	1.6	2.0
ME	2.6	1.5	1.9
MI	2.9	1.7	2.1
MN	2.8	1.7	2.2
MO	3.1	1.7	2.1
MS	2.6	1.6	1.9
MT	2.5	1.5	1.9
NC	3.0	1.7	2.1
ND	2.3	1.5	1.7
NE	2.6	1.6	2.0
NH	2.6	1.6	2.0
NM	2.6	1.6	1.9
NV	2.5	1.5	1.9
NY	2.8	1.7	2.2
OH	2.1	1.5	1.8
OK	2.8	1.6	2.0
OR	3.0	1.7	2.1
PA	4.4	1.7	2.6
SC	2.7	1.6	2.0

State	Employment	Sales/Output	Compensation
SD	2.5	1.5	1.8
TN	3.5	1.6	2.0
TX	3.5	1.7	2.1
UT	2.6	1.7	2.2
VA	3.7	1.6	2.2
VT	2.8	1.6	2.0
WA	2.7	1.7	2.2
WI	2.8	1.7	2.1
WV	2.7	1.6	1.9
WY	2.2	1.5	1.8
AVERAGE	2.9	1.6	2.0

■ **About the Purdue Center for Regional Development**

The Purdue Center for Regional Development (PCRD) seeks to pioneer new ideas and strategies that contribute to regional collaboration, innovation and prosperity. Founded in 2005, the center partners with public, private, nonprofit and philanthropic organizations to identify and enhance the key drivers of innovation in regions across Indiana, the United States and beyond. The five main goals of PCRD are to: 1) strengthen regional civic leadership; 2) strengthen collaborative leadership; 3) promote regional strategy and planning; 4) advance economic development and business growth strategies; 5) tap the talents of Purdue University faculty and staff.

Over the past year, PCRD has published multiple broadband-related studies, including estimation of the net benefits of Indiana statewide adoption of rural broadband as well as multiple regional “State of Broadband” reports to increase awareness about the importance of broadband and to jump-start vital conversations around digital inclusion.

■ **About the Foundation for Rural Service**

The Foundation for Rural Service (FRS) is a 501 (c)(3) nonprofit organization based in Arlington, Va., that seeks to sustain and enhance quality of life in America by advancing an understanding of rural issues. Established by NTCA–The Rural Broadband Association in 1994, the vision of FRS is to harness the power of the rural communications industry to enrich lives in America. FRS supports rural telecommunications companies, communities and policymakers with educational information, products and programs to increase their community development involvement.

The FRS mission emphasizes the benefits of rural telecommunications for the nation because FRS believes that America is stronger and more unified when all communities have access to affordable, quality communications services. For FRS, the success of rural America is not just a rural issue but a national imperative.



Center for Regional Development
Advancing Collaboration : Energizing Regions

PCRD seeks to pioneer new ideas and strategies that contribute to regional collaboration, innovation and prosperity. Founded in 2005, the Center partners with public, private, nonprofit and philanthropic organizations to identify and enhance the key drivers of innovation in regions across Indiana, the U.S. and beyond. These drivers include a vibrant and inclusive civic leadership, a commitment to collaboration, and the application of advanced data support systems to promote sound decision-making and the pursuit of economic development investments that build on the competitive assets of regions.



Purdue Schowe House

1341 Northwestern Avenue
West Lafayette, IN 47906



Roberto Gallardo

robertog@purdue.edu



765-494-3525

toll-free 877-882-7273
fax 765-496-9676