THE LOST ECONOMY™

THE ECONOMIC & CONSUMER BENEFITS FROM 5G

If State and Local Governments Streamline Costly Red Tape

The American Consumer Institute Center for Citizen Research

SUMMARY

Fueled by growth in the number of connected devices and the increased need for more bandwidth, wireless companies are planning to invest in 5th Generation (5G) wireless technology. However, meeting that accelerated pace of consumer demand for wireless communications services will require service providers to make massive upgrades to the current mobile service infrastructure. This upgrade, expected to provide consumers speeds that are at least ten times faster than the current 4G standard, promises to bring significant benefits to American consumers and the U.S. economy. In turn, that will enable a host of new advanced services, such as healthcare applications, high definition video streaming to smartphones, smart cities and grids, the Internet of Things, and so on – that is, assuming regulations enable and encourage the timely deployment of these consumer technologies and services.[1]

This inaugural Lost Economy™ report estimates the additional economic benefits of investing and building a 5G network to generate $533 billion in gross domestic product (GDP). Although this estimate does not include any of the economic benefits from operating and providing 5G services to consumers going forward, we estimate $1.2 trillion in long-run consumer benefits from these broadband wireless services.

While the economic and consumer benefits of investment and services appear impressive, this report cites a number of local government obstacles affecting investors, such as the imposition of onerous rules, delays in approval, deployment moratoria, and the imposition of high fees – effectively impeding private investment and postponing consumer benefits from state-of-the-art wireless services. Our research finds that states and cities that take steps to streamline regulations and encourage deployment will speed massive benefits to consumers and the economy.

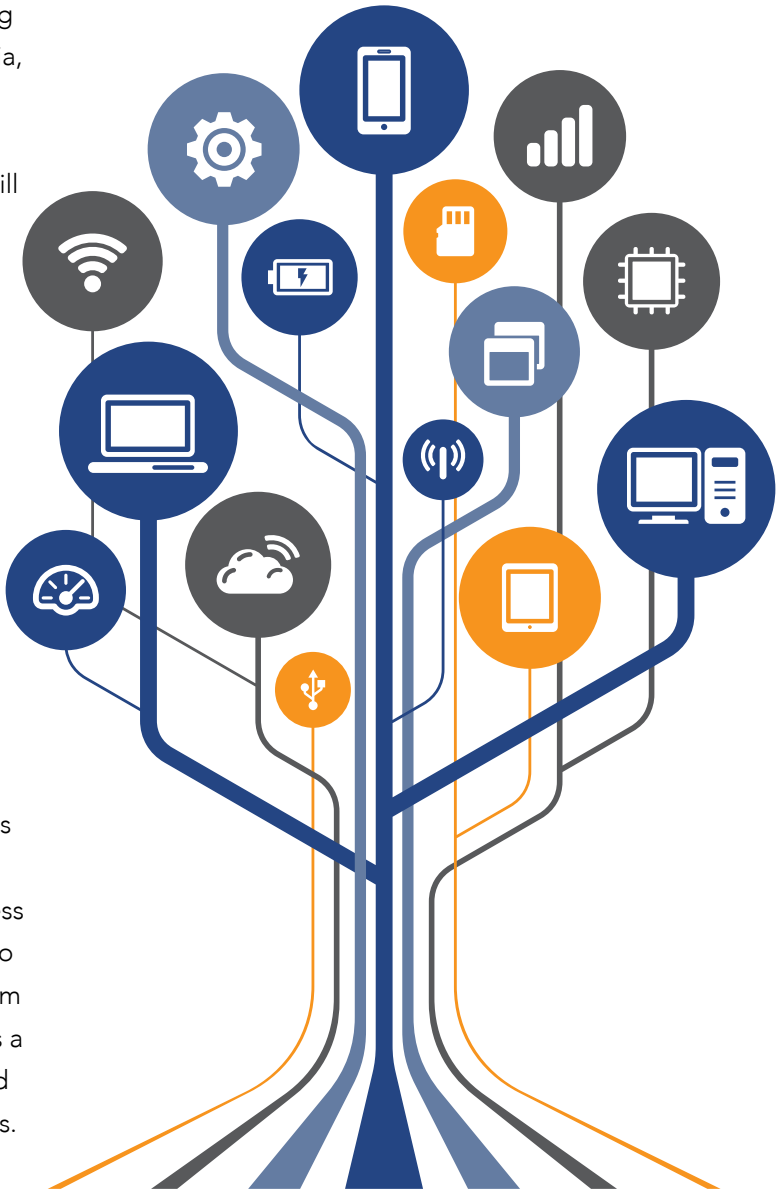
[1] Drew Dixon, "Mobile Devices to Get Much Faster with Impending 5G Data Upgrade, but May Take a While," The Florida Times-Union, June 8, 2017, at http://jacksonville.com/metro/business/2017-06-17/mobile-devices-get-much-faster-impending-5g-data-upgrade-may-take-while.

EXPLOSIVE BROADBAND WIRELESS DEMAND

In 2016, there were approximately 400 million wireless subscriber connections – a major milestone considering that the industry has only been around for about 35 years. Along with the growth in subscribership, data traffic per subscriber is expected to be robust, reflecting the surging demand for mobile broadband services. Mobile users benefit from a wide range of applications – from online shopping, banking, streaming video and music, entertainment and gaming to GPS and tracking, communications and social media, and many other services. Since 2010 alone, wireless network data traffic has increased 35 times.[2]

While data requirements for consumers soar, so will the millions of interconnected devices that will enable the creation of the Internet-of-Things, including machine-to-machine applications, self-driving vehicles, intelligent transportation systems, smart grids, health and public safety initiatives, smart cities, smart homes, virtual reality devices, and even Internet applications for home appliances. Studies find that smart grids could produce $1.8 trillion in savings over seven years, while self-driving cars and connected devices for health applications could produce annual economic benefits of $447 billion and $305 billion, respectively.[3] According to Cisco, the number of Internet connected devices will increase three-fold by 2021.[4]

Fulfilling this explosive consumer demand requires faster and better services, which means more wireless spectrum and deploying the next generation of wireless infrastructure based on 5G technology. Transitioning to this technology requires network operators to shift from deploying a few large wireless towers scattered across a service area to a mesh network of many small cells and micro towers that could reach well into neighborhoods.



[2] Annual Wireless Industry Survey, CTIA, May 19, 2017.

[3] "Wireless Connectivity Fuels Industry Growth and Innovation in Energy, Health, Public Safety, and Transportation, Deloitte, January 2017, p. 3; "What a Smart Grid Means to Our Nation's Future," U.S. Department of Energy, prepared by Litos Strategic Communications, 2009; and "The Green Grid: Energy Savings and Carbon Emission Reductions Enabled by a Smart Grid," EPRI, Technical Update, June 2008, p. 2.

[4] The Zettabyte Era: Trends and Analysis, document #1465272001812119, Cisco, June 7, 2017, see https://www.cisco.com/c/en/us/solutions/collateral/service-provider/visual-networking-index-vni/vni-hyperconnectivity-wp.html#_Toc484556816.

IMPEDIMENTS TO DEPLOYMENT

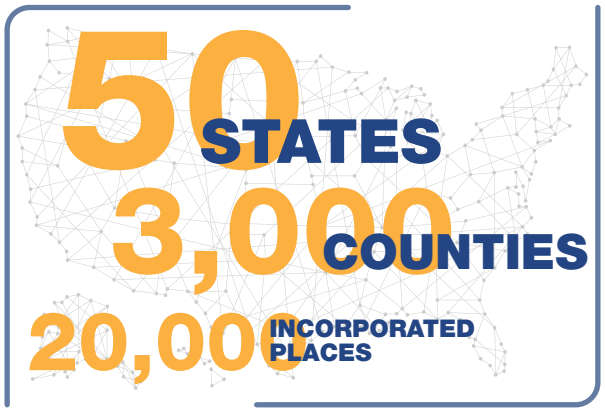
Costs are a major factor in making sound investment decisions, and this is certainly the case when it comes to building out the next generation wireless network. Going from today's network of 200,000 cell sites to a 5G network of a million small cells and distributive antenna systems (DAS), wireless providers already face substantial financial risk. According to a study by Accenture, the rollout of 5G services will take seven years and cost an estimated $275 billion in direct investment by wireless service providers.[5]

With 50 states, 3,000 counties and 20,000 incorporated places, upgrading the nation's wireless infrastructure can be a daunting task involving planning, engineering, construction, and operations – all contingent upon getting approvals of applications and permits from state and local governments.[6] While the former is under the total control of wireless providers, the latter is not, and it can be fraught with additional costs and requirements, jurisdictional differences and unanticipated delays – all of which will affect the efficiency, timeliness, and cost of service deployment.

Indeed, regulatory costs and uncertainty pose a substantial impediment in investment decision-making. Market choices regarding where and how much to invest have been a staple of economic and financial textbooks for a long time. The decision to invest is affected by uncertainty, which is influenced by regulatory changes that cannot reasonably be forecasted or estimated today.

The risks to 5G deployment are obvious. Because capital expenditures on plant and equipment have long lives, their value rests entirely on the present value of future cash flows. These cash flows are dependent and influenced by future regulatory changes, which can add, delay or create ambiguity, take away opportunities of value, lack transparency, lead to rent-seeking and gaming, and others risks.

State and local regulations that levy excessive fees for permits and applications, impose rights-of-way (ROW) and pole attachment restrictions, enact discriminatory zoning rules, and delay government approvals all raise the risk and cost of 5G deployment. The result from these regulations means less investment, less economic output, fewer jobs, lost consumer welfare, and reduced levels of innovation. Essentially, consumers will pay more for less.



In some cases, state and local governments have imposed lengthy delays to the approval of wireless applications and permits for antennas, despite the FCC's 2009 imposition of a "shot clock" rules designed to speed state and local approval processes.[7] In effect, many local governments and agencies have found ways to circumvent the shot clock rules, seeking excessive fees as an easy means to raise additional municipal revenues.

The list of impediments is long. Many government localities have required expert studies, levied environmental assessment fees, imposed spatial and distance restrictions, reviewed similar applications in sequential order rather than in batches, imposed procurement and aesthetic requirements, and discriminated against wireless providers for similar

[5] "Smart Cities: How 5G Can Help Municipalities Become Vibrant Smart Cities," Accenture, January 2017, at https://newsroom.accenture.com/content/1101/files/Accenture_5G-Municipalities-Become-Smart-Cities.pdf. The FCC has also cited this figure in "Accelerating Wireless Broadband Deployment by Removing Barriers to Infrastructure Investment," FCC, Notice of Proposed Rulemaking and Notice of Inquiry, WT Docket No. 17-79, April 20, 2017, at http://transition.fcc.gov/Daily_Releases/Daily_Business/2017/db0421/FCC-17-38A1.pdf.

[6] Two-thirds of the U.S. population live in incorporated places, according to the U.S. Census at https://www.census.gov/content/dam/Census/library/publications/2015/demo/p25-1142.pdf.

[7] "2009 Shot Clock Declaratory Ruling," 24 FCC Rcd at 14009.

land requirements provided to others. In some cases, municipalities have imposed moratoria, effectively blocking investments and service upgrades.[8] For example, one city set a $30,000 application fee for each utility pole and another locality imposed a $45,000 fee regardless of the amount of ROW use.[9]

The FCC has reopened the issue this year in a Notice of Rulemaking seeking to accelerate wireless broadband investment.[10] In that notice, they cited examples where the imposition of government fees required to site a tower, including rental and application charges, have exceeded the cost of erecting the tower.[11] All of these costs deter deployment and consumer adoption, and these costs flow through to consumers in the form of higher prices. Effectively, this represents progress denied; it is The Lost Economy™.

ECONOMIC BENEFITS FROM INVESTMENT

As noted earlier, the Accenture study estimated the nationwide investment cost for deploying 5G services to be $275 billion over the next 7 years, consisting of 34% construction costs and 66% engineering and equipment. Using economic state-level multipliers from the U.S. Bureau of Economic Analysis, the increase in gross state product, state employment earnings, and state jobs can be estimated based on the $275 billion investment can be estimated.[12] Over the 7-year period of construction, the investment is estimated to yield $533 billion in economic output or GDP, and payout $163 billion in employment earnings.[13] The investment in 5G will also create 3 million "worker years" or 435,000 jobs for the next 7 years. These benefits are listed by state in **Appendix I**.

Keep in mind, these economic output and job estimates reflect only the benefits from investment needed to build and deploy 5G services nationwide, and do not include the ongoing benefits once the network is operational, which could be substantial and is not estimated here. As cited earlier, several studies have explored the potential benefits from the adoption of new and innovative services, such as the implementation of smart grids, health applications and other programs – estimated in the trillions of dollars.[14]

In addition, as a first approximation, the consumer welfare for broadband wireless services can be estimated. Several academic studies have found the value of wireless spectrum auctions to yield roughly ten to twenty times the value of long-term consumer

[8] "In the Matter of Promoting Broadband for All Americans by Prohibiting Excessive Charges for Access to Public Rights of Way," Comments by Mobilitie LLC, FCC filing, Docket No. 16-421, November 15, 2016.
[9] Ibid. Also see "In the Matter of Comment Sought on Streamlining Deployment of Small Cell Infrastructure by Improving Wireless Facilities and Siting Policies," Comments by Crown Castle International Corp., FCC filing, Docket No. 16-421, March 8, 2017.
[10] "Accelerating Wireless Broadband Deployment by Removing Barriers to Infrastructure Investment," FCC, Notice of Proposed Rulemaking and Notice of Inquiry, WT Docket No. 17-79, April 20, 2017, at http://transition.fcc.gov/Daily_Releases/Daily_Business/2017/db0421/FCC-17-38A1.pdf.
[11] Ibid, p. 16.
[12] Multipliers for nonresidential structures and electronic equipment (which includes wireless equipment) were weighted by state and component. These multiplier effects measure direct, indirect and induced benefits, and they come directly from the Bureau of Economic Analysis. A full explanation of what multipliers are, standard methodology employed, and sources of data used, see www.LostEconomy.com.
[13] The gross product estimate calculated here is slightly higher than Accenture's estimate of $500 billion.
[14] See fn. 3 for 5G benefits associated with healthcare, transportation and smart grids.

welfare.[15] Adding up the history of wireless auction revenues, converting these values into 2017 constant dollars, and grossing these values up by a factor of ten provides an approximation of the long run consumer welfare for broadband wireless services – equal to roughly $1.2 trillion. Using state-level subscribership, we apportion these benefits to each state as shown in **Appendix II**. Keep in mind, these estimates do not include the billions of dollars in additional spectrum to be auctioned off in the next few years to deliver even faster consumer services, including 3.85 GHz of spectrum approved for auction under the FCC's Spectrum Frontiers Order, pending Congressional legislation, and a proposal that would free up as much as 15 gigahertz (GHz) over the next several years.[16]

SPEEDING DEPLOYMENT

Many states have already begun reevaluating rules designed to encourage wireless broadband investment, recognizing that states with a favorable regulatory environment will likely be the first targets for investment and, in turn, will be the first to see significant economic and consumer benefits. Still, other states are still far behind in terms of reforms. Without improvements, these state and local areas are likely to see less investment and will not get the full measure of benefits noted in this report.

There are some ways that state and local regulations can be streamlined in order to maximize the consumer benefits of 5G technologies and services. For example, government applications for siting, use of municipal poles, and ROW should be subject to a short shot clock covering the entire review process, instead of delays or moratoria on small cell investment. Batches of applications with similar facilities and equipment should be considered at once, instead of sequentially. Wireless providers should not be discriminated against for their access to similar land use requirements, compared to other industries. In addition, states and local government should not impose procurement and logistic requirements on wireless contractors and providers; and they should not place spatial and distance restrictions on facility placement or require subjective aesthetic requirements on small cells, DAS systems, and other 5G facilities.

While some states are moving ahead with reforms, other states need to follow suit in the interest of wireless consumers. Once these regulations are streamlined, it will result in significant private investments that will spur economic growth, create jobs and increase consumer welfare. That result is in the public's interest.

This Lost Economy report provides estimates of the immense scale of benefits derived from 5G deployment, but these opportunities can only be realized if applications and permits are reviewed and evaluated in an efficient, effective, low cost and timely manner. Absent policy action aimed at constructive reforms to the regulatory processes, there is substantial risk that economic progress and opportunity will be denied for millions of American citizens and workers.

[15] See Gregory L. Rosston, "The Long and Winding Road: The FCC Paves the Path with Good Intentions," Standard Institute for Economic Policy Research, December 2001; Thomas W. Hazlett and Roberto E. Munoz, "A Welfare Analysis of Spectrum Allocation Policies," The RAND Journal of Economics, Volume 40, Issue 3, p. 3, Autumn 2009; Thomas W. Hazlett, "If a TV Station Broadcasts in the Forest …," p. 2, May 19, 2011; Coleman Bazelon, Charles L. Jackson and Giulia McHenry, "An Engineering and Economic Analysis of the Prospects of Reallocating Radio Spectrum from the Broadcast Band through the Use of Voluntary Incentive Auctions," Research Conference on Communication, Information and Internet Policy, September 19, 2011; and Steve Pociask, "Consumer Welfare on Hold," American Consumer Institute, December 4, 2013, at https://ecfsapi.fcc.gov/file/7520961185.pdf.

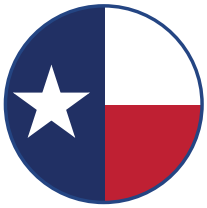
[16] See the FCC's Spectrum Frontiers Order (https://www.fcc.gov/document/spectrum-frontiers-ro-and-fnprm); proposed AIRWAVES Act (https://www.congress.gov/115/bills/s1682/BILLS-115s1682is.pdf); and CTIA's "Roadmap for High Band Spectrum" (see https://www.ctia.org/docs/default-source/fcc-filings/170714---filed-ctia-spectrum-frontiers-high-bands-roadmap-ex-parte-and-attachment.pdf?sfvrsn=2).

APPENDIX I

7-YEAR ECONOMIC IMPACT FROM 5G INVESTMENT: Top Ten States with Highest 5G Investment

(Billions of Current Dollars and Annual Jobs Required)

California
Investment: $34.59
GDP Effect: $68.91
Earnings: $21.95
Jobs: 51,706



Texas
Investment: $23.44
GDP Effect: $51.31
Earnings: $15.88
Jobs: 39,369

New York
Investment: $19.02
GDP Effect: $33.03
Earnings: $9.81
Jobs: 22,738

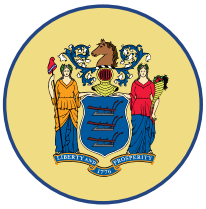
Florida
Investment: $17.28
GDP Effect: $32.77
Earnings: $10.36
Jobs: 31,202

Illinois
Investment: $11.33
GDP Effect: $24.56
Earnings: $7.35
Jobs: 18,634

Pennsylvania
Investment: $10.85
GDP Effect: $22.80
Earnings: $6.65
Jobs: 17,541

Ohio
Investment: $9.96
GDP Effect: $20.82
Earnings: $6.29
Jobs: 18,063

Michigan
Investment: $8.48
GDP Effect: $16.83
Earnings: $5.08
Jobs: 15,062



New Jersey
Investment: $8.09
GDP Effect: $15.78
Earnings: $4.54
Jobs: 11,150

North Carolina
Investment: $8.08
GDP Effect: $16.35
Earnings: $5.20
Jobs: 14,801

APPENDIX I (continued)

7-YEAR ECONOMIC IMPACT FROM 5G INVESTMENT

(Billions of Current Dollars and Annual Jobs Required)

	INVESTMENT	GDP EFFECT	EARNINGS	JOBS*
Alabama	$4.02	$7.56	$2.26	7,067
Alaska	$0.56	$0.89	$0.35	894
Arizona	$5.58	$10.39	$3.35	9,312
Arkansas	$2.41	$4.36	$1.32	4,155
California	$34.59	$68.91	$21.95	51,706
Colorado	$4.66	$9.32	$2.96	7,989
Connecticut	$3.02	$5.59	$1.67	4,116
Delaware	$0.81	$0.83	$0.30	769
DC	$1.24	$1.37	$0.09	186
Florida	$17.28	$32.77	$10.36	31,202
Georgia	$8.74	$17.67	$5.30	16,063
Hawaii	$1.25	$2.04	$0.68	1,851
Idaho	$1.29	$2.16	$0.70	1,979
Illinois	$11.33	$24.56	$7.35	18,634
Indiana	$5.22	$10.37	$3.03	8,758
Iowa	$2.46	$4.20	$1.30	3,606
Kansas	$2.57	$4.66	$1.31	3,854
Kentucky	$3.50	$6.67	$1.98	5,790
Louisiana	$4.23	$7.57	$2.51	7,163
Maine	$1.03	$1.77	$0.56	1,712
Maryland	$5.24	$9.00	$2.61	6,427
Massachusetts	$6.15	$11.36	$3.36	7,849
Michigan	$.8.48	$16.83	$5.08	15,062
Minnesota	$4.79	$9.76	$2.96	7,640
Mississippi	$2.31	$3.95	$1.19	3,796
Missouri	$5.01	$9.82	$2.98	8,784

* Jobs were divided by 7 to reflect workers per year of employment

APPENDIX I (continued)

7-YEAR ECONOMIC IMPACT FROM 5G INVESTMENT

(Billions of Current Dollars and Annual Jobs Required)

	INVESTMENT	GDP EFFECT	EARNINGS	JOBS*
Montana	$0.81	$1.30	$0.40	1,299
Nebraska	$1.57	$2.74	$0.85	2,516
Nevada	$2.43	$4.15	$1.33	4,080
New Hampshire	$1.06	$1.93	$0.56	1,390
New Jersey	$8.09	$15.78	$4.54	11,150
New Mexico	$1.68	$2.69	$0.86	2,447
New York	$19.02	$33.03	$9.81	22,738
North Carolina	$8.08	$16.35	$5.20	14,801
North Dakota	$0.61	$0.97	$0.29	739
Ohio	$9.96	$20.82	$6.29	18,063
Oklahoma	$3.13	$5.79	$1.87	5,352
Oregon	$3.30	$5.97	$1.82	4,766
Pennsylvania	$10.85	$22.80	$6.65	17,541
Rhode Island	$0.85	$1.44	$0.41	1,078
South Carolina	$3.89	$7.58	$2.25	6,973
South Dakota	$0.66	$1.11	$0.32	978
Tennessee	$5.82	$11.85	$3.42	9,932
Texas	$23.44	$51.31	$15.88	39,369
Utah	$2.29	$4.62	$1.47	4,322
Vermont	$0.46	$0.74	$0.23	661
Virginia	$7.00	$12.52	$3.61	9,669
Washington	$5.95	$10.91	$3.42	8,616
West Virginia	$1.30	$2.12	$0.64	1,954
Wisconsin	$4.51	$9.02	$2.68	7,556
Wyoming	$0.49	$0.74	$0.26	736
***** Nationwide**	**$275.0**	**$532.7**	**$162.5**	**435,089**

* Jobs were divided by 7 to reflect workers per year of employment

APPENDIX II

LONG TERM CONSUMER WELFARE FROM 5G BROADBAND SERVICES

(Millions of 2017 Constant Dollars)

	BENEFITS		BENEFITS
Alabama	$18,100	Montana	$3,654
Alaska	$2,539	Nebraska	$7,062
Arizona	$25,173	Nevada	$10,971
Arkansas	$10,873	New Hampshire	$4,785
California	$155,885	New Jersey	$36,469
Colorado	$21,002	New Mexico	$7,552
Connecticut	$13,625	New York	$85,733
Delaware	$3,673	North Carolina	$36,413
DC	$5,568	North Dakota	$2,745
Florida	$77,877	Ohio	$44,894
Georgia	$39,379	Oklahoma	$14,116
Hawaii	$5,650	Oregon	$14,865
Idaho	$5,830	Pennsylvania	$48,908
Illinois	$51,079	Rhode Island	$3,853
Indiana	$23,510	South Carolina	$17,512
Iowa	$11,091	South Dakota	$2,973
Kansas	$11,562	Tennessee	$ 26,217
Kentucky	$15,786	Texas	$105,663
Louisiana	$19,047	Utah	$10,300
Maine	$4,647	Vermont	$2,086
Maryland	$23,600	Virginia	$31,542
Massachusetts	$27,715	Washington	$26,835
Michigan	$38,229	West Virginia	$5,841
Minnesota	$21,571	Wisconsin	$20,316
Mississippi	$10,413	Wyoming	$2,213
Missouri	$22,559	***** Nationwide**	**$ 1,239,500**

Note: These benefits will increase as more spectrum is licensed.