WRITTEN STATEMENT

of

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UNITED STATES CELLULAR CORPORATION

before the

SUBCOMMITTEE ON COMMUNICATIONS, TECHNOLOGY, INNOVATION, AND THE INTERNET

U.S. SENATE COMMITTEE ON COMMERCE, SCIENCE AND TRANSPORTATION

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Chairman Wicker, Ranking Member Schatz, and members of the Subcommittee, my name is LeRoy T. Carlson, Jr., and I am Chairman of United States Cellular Corporation. Thank you for the opportunity to discuss the need for mobile broadband in our nation's rural areas and the important role that the Federal Universal Service Fund can play to address this need.

Introduction.

U.S. Cellular provides wireless service in nearly 200 markets across 24 states located in regional clusters across the country, including many of the states represented on this Committee such as Missouri, New Hampshire, Nebraska, Kansas, West Virginia, Wisconsin, and Washington. The overwhelming majority of the geography we serve is rural in character. We have participated in the FCC's universal service program for many years, using support to construct and operate network facilities in small towns and on rural roads that would not otherwise receive service, because they would never prove to be economically feasible without assistance.

In each of our company's previous appearances before this Committee to discuss universal service, we have made the point that Congress directed the FCC to ensure that rural citizens have access to modern telecommunications and information services that are reasonably comparable to those available in urban areas.[1]

Based on our deep experience in rural America, we have concluded that the current and proposed Mobility Fund mechanism lacks the necessary size and focus to ensure that rural communities have timely access to high-quality mobile broadband services needed to compete,

[1] *See*, 47 C.F.R. § 254(b)(3).

here in the United States and around the world, for jobs and economic opportunities. We fear that policy makers have grossly underestimated the amount of work that remains to be done in rural America before mobile broadband can be deemed comparable to what exists in our nation's urban areas.

As explained below, we urge the Committee to direct the FCC to develop a more accurate picture of mobile coverage and mobile broadband availability in rural America, and to estimate how much it will cost to bring mobile broadband networks in rural America up to the reasonably comparable standard that Congress set. Once these tasks are done, Congress can make the policy choice as to how best to complete the task.

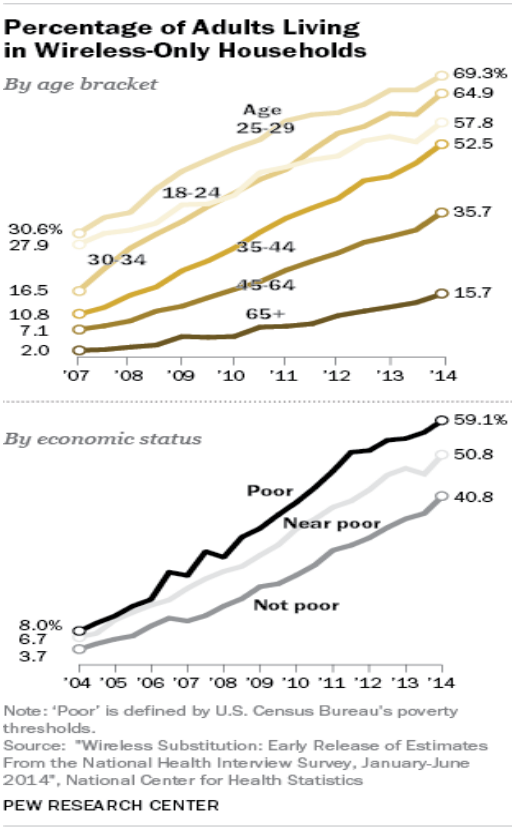
Today, my testimony touches upon three things: (1) The critical role that mobile broadband plays in enabling public safety, education, and our rapidly expanding information economy; (2) the insufficiency of mobile broadband deployment in rural America today to meet stated goals; and (3) the need to make smart and creative policy choices to allocate and target scarce federal universal service funds to rural and high-cost areas to maximize the value of such investments in extending the reach of mobile broadband service.

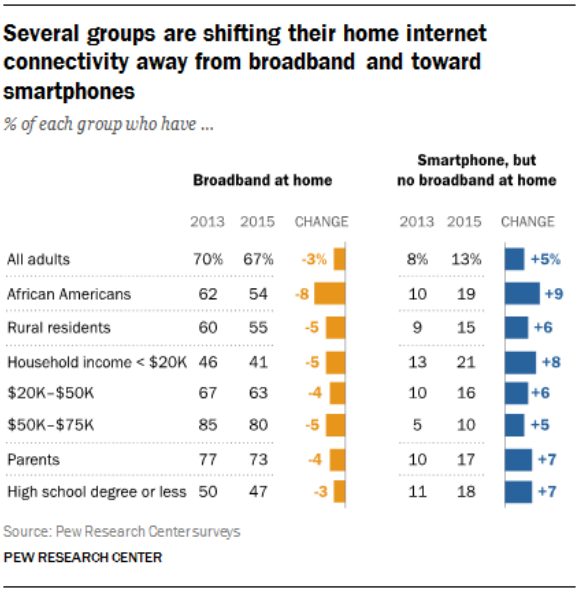
1. The Rise of Mobile Broadband as an Enabler of Public Safety, Education and Economic Development.

In the 1980s, experts projected that there could be 800,000 mobile phones in use by 2000. They came up short by 10,000,000. Today there are over 350 million mobile wireless subscriptions in the US. In 1984, the first commercial cell phone sold for $3,995.00. Today, there are more types of mobile wireless devices than I can list, capable of performing thousands upon thousands of tasks, at a small fraction of the 1984 price, with many having far more computing power than Apollo 11. However, looking back at how we have benefited from

mobile services dramatically undersells the future that consumers will enjoy, because we're just getting started.

At a time when consumer preferences are rapidly shifting to mobile broadband, policymakers must refocus universal service mechanisms to ensure that citizens in rural areas have access to high-quality service. For example, the Pew Research Center reports that adults living in households with a cellphone but no landline, and the number of households that rely solely on a smartphone for broadband have increased dramatically:[2]





[2] *See*, http://www.pewresearch.org/fact-tank/2015/01/07/pew-research-will-call-more-cellphones-in-2015/; and http://www.pewinternet.org/2015/12/21/home-broadband-2015/. Another barometer of consumer preference is mobile ad revenue, as evidenced in Facebook's most recent quarterly report: "Mobile ad revenue reached $4.5 billion, up 81% year---over---year, and is now 80% of total ad revenue." *See also,* http://files.shareholder.com/downloads/AMDA-NJ5DZ/1421180082x0x872005/02B28FAD-354C-4CA0-8CDE-3ADB6F8A4734/Q415_and_FY_2015_Earnings_Call_Transcript.pdf.

These compelling statistics gain further meaning when you consider just a few of the many benefits that mobile services provide:

- Public Safety. The ability to use 911/E-911/Text-to-911 depends 100% on high quality coverage, to fully enable location-based services.[3] When disaster strikes, first responders depend on mobile wireless and broadband networks, which are the first to return to service. The value and utility of FirstNet, our nation's mobile broadband public safety network, increase every time a new cell tower is constructed, as it provides a place to locate critical public safety communications equipment.

- Health Care. Mobile devices and applications capable of diagnosing, monitoring and treating various conditions are exploding into the marketplace and revolutionizing health care.[4] These advances improve patient outcomes, and increase efficient delivery of services. It is now possible for a diabetic patient to continuously monitor, store, and transmit glucose levels to health care providers through a mobile device.[5] Mobile video conferencing is increasingly important to emergency medical services and in delivering health care to remote areas where facilities are not easily accessible. These applications are but a small fraction of the incredible health care tools enabled by mobile broadband.

- The Internet of Things. Soon, almost any object will be capable of connecting to the Internet. Gartner expects 21 billion devices to be deployed by 2020.[6] According to General Electric, the Industrial Internet, defined as the combination of Big Data and the Internet of Things, may be responsible for $15 trillion (not a typo) of worldwide GDP by 2030.[7] Most of these connected devices, numbering

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[3] As of November, 2015, the FCC estimates that 70% of 911 calls are placed from wireless phones, and that percentage is growing. *See,* https://www.fcc.gov/consumers/guides/911-wireless-services.

[4] A list of mobile medical applications can be found at: http://www.fda.gov/MedicalDevices/DigitalHealth/MobileMedicalApplications/ucm368743.htm

[5] http://www.dexcom.com/g5-mobile-cgm. Someday soon, patients may wear a contact lens that constantly measures glucose level through tears, transmitting the data to attending physicians. *See*, https://verily.com/.

[6] *See*, http://www.gartner.com/newsroom/id/3165317.

[7] *See*, http://www.ge.com/digital/sites/default/files/industrial-internet-insights-report.pdf

in the tens of billions, will need the flexibility that mobile wireless provides. The amount of data flowing through mobile broadband networks will dwarf what we see today. Cisco predicts that, between 2014-2019, U.S. mobile data traffic will rise seven-fold, driven by four billion new mobile connections, a 2.5X increase in throughput speeds, and mobile video traffic reaching 72% of all traffic.[8]

- Education. Students are increasingly using mobile devices to access learning materials, do homework, create presentations, and communicate with teachers. Students with connectivity throughout the community are more likely to meet educational goals, especially in an age where learning through the Internet is essential.

- Agriculture. Connected tractors, irrigation systems, livestock management, commodity tracking, and many more applications depend upon mobile wireless connectivity.

- Low-income households. For households that cannot afford to purchase a desktop computer and subscribe to both mobile and fixed networks, a single mobile device is capable of meeting voice communications and Internet needs.

If the Committee takes nothing else away from these examples of how mobile wireless is enriching our lives, it should be this: ***None of the benefits described above will adequately benefit rural Americans unless high-quality mobile broadband coverage is available everywhere they live, work, and travel.***

In areas where emergency calls cannot connect, or where medical devices cannot transmit data, lives will be lost. In areas where tablets and laptops don't work, educational opportunities will be foreclosed. The enormous power of the Internet of Things cannot be fully realized without ubiquitous mobile broadband. As Deere & Company has previously noted to the FCC, a lack of connectivity on our nation's farmlands costs productivity and wastes water

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[8] *See, Cisco VNI Global Mobile Data Traffic Forecast, 2014–2019*, accessed at: http://www.cisco.com/c/en/us/solutions/collateral/service-provider/visual-networking-index-vni/white_paper_c11-520862.pdf.

and fertilizer.[9] The lack of mobile broadband denies low-income households the opportunity to fully participate in our nation's economy. Mobile broadband, which didn't exist thirty years ago, and was considered a luxury item just ten years ago, is now an essential part of our lives.

I cannot emphasize enough how important it is for Congress and the FCC to foster development of robust mobile broadband networks in rural areas. We are in just the second inning of a huge revolution in how Americans live their lives, a revolution that may never come to rural Americans who live in areas where it is too expensive to make a business case to build and upgrade networks. We at U.S. Cellular provide our customers with access to the applications they use, because we enable all of them. If coverage is weak or throughput is slow, devices will not work as designed.

We note that new investments in mobile broadband infrastructure each year will have multiplier effects, creating jobs and stimulating economic growth.[10] One wireless industry job supports over six additional jobs in the economy, almost one and one half times higher than that of the U.S. manufacturing sector.[11] Each dollar of investment in wireless results in $2.32 of economic activity.[12] In our experience, rural areas continue to support a tremendous amount of manufacturing, as well as a growing distributed service economy (for example, call centers

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[9] *See*, http://apps.fcc.gov/ecfs/document/view?id=7521752479.

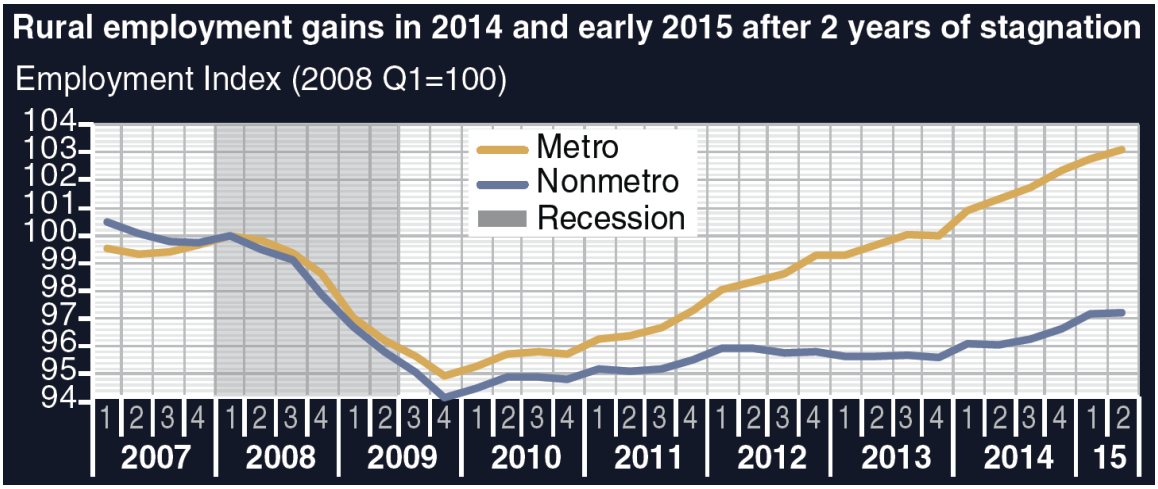
[10] *See*, http://www2.deloitte.com/content/dam/Deloitte/us/Documents/technology-media-telecommunications/us-tmt-impactof-4g-060612.pdf.

[11] *See,* Coleman Bazelon and Giulia McHenry, *Mobile Broadband Spectrum, A Vital Resource for the U.S. Economy*, at pp. 19-20 (May 11, 2015), available at: http://www.brattle.com/system/publications/pdfs/000/005/168/original/Mobile_Broadband_Spectrum_-_A_Valuable_Resource_for_the_American_Economy_Bazelon_McHenry_051115.pdf?1431372403.

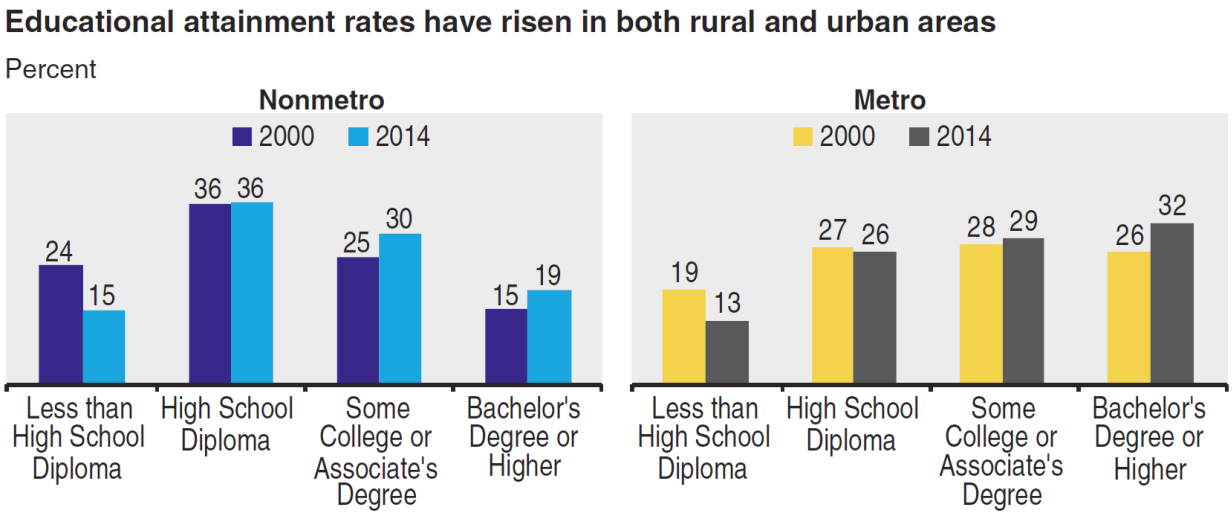
[12] *Id.*

and medical clinics). We hear directly from our employees and customers that managers and educated professionals no longer consider rural areas that lack high-quality mobile wireless services to be attractive to locate to, or to stay in. I'm sure members of this subcommittee have heard the same thing from their rural constituents.

This is not just anecdotal evidence. Rural areas have large gaps with urban areas, which gaps need to be closed. Data from the Department of Agriculture reveals that "2010-2014 is the first period of overall population decline on record for rural America as a whole."[13] The same report shows employment growth since the 2008 recession heavily skewing in favor of our nation's urban areas and a persistent rural/urban educational attainment gap:



[13] *See,* USDA, Rural America at a Glance, 2015 Edition, accessed at: http://www.ers.usda.gov/media/1952235/eib145.pdf (revised Jan. 2016).



One of the best ways to stimulate economic activity, attract talented people to areas needing an employment boost, and to increase educational opportunities, is to build mobile broadband infrastructure. It is therefore vital for policymakers to have accurate data about the state of mobile deployment in rural America. As a Committee that is forward-looking, I urge you to consider the essential role that mobile broadband services will play in the future, and to ensure that the universal service program provides sufficient resources to realize that future in rural areas.

2. <u>Mobile Broadband Deployment in Rural America is Insufficient</u>.

Let me continue by acknowledging that we are well aware of the misleading claim that the job of providing mobile broadband to rural America is largely finished.[14] When the FCC proposed Phase II of its Mobility Fund in 2014, it stated, "According to some sources, nearly

[14] *See*, http://www.theverge.com/2015/3/23/8273759/obama-administration-passes-goal-lte-for-98-percent-of-americans.

99.5 percent of the U.S. population today (and the road miles associated with that population) is covered by some form of mobile broadband technology."[15]

That statistic cannot be right. Based on our experience, the state of mobile broadband is nowhere near developed enough to conclude that rural Americans have access to a strong 4G LTE signal ***throughout the area where they live, work, and travel***. In a recent letter to the FCC, Senator Manchin astutely called out problems with available mapping resources, stating "the reality in my state is far different than what the maps indicate."[16]

Senator Manchin's experience is far from an isolated case and I'm sure each of you know from personal experience in your own states that mobile broadband coverage with a strong signal is far from complete and dead zones remain to be covered. In testing our networks, and those of our competition, we can confirm that the National Broadband Map and other publicly available mapping resources significantly overstate where rural citizens can actually use their devices to access rapid mobile broadband service, especially on rural secondary roads and in agricultural areas.[17]

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[15] *See, Connect America Fund*, Report and Order, Declaratory Ruling, Order, Memorandum Opinion and Order, Seventh Order on Reconsideration, and Further Notice of Proposed Rulemaking, FCC 14-54, 29 FCC Rcd 7051, 7127 (2014) ("Further Notice").

[16] *See*, Letter from Hon. Joe Manchin, III to Hon. Thomas Wheeler, September 22, 2015, at http://www.manchin.senate.gov/public/index.cfm?a=files.serve&File_id=D660F970-2859-46B3-8145-CFE461A47719.

[17] For example, we've heard directly from Senator Tester that he can't get any signal on and around his working farm in Montana, and from Senator Brown that southeastern Ohio lacks coverage.

In its recently released Eighteenth Mobile Competition Report, the FCC states that 25% of road miles and 50% of square miles in the US do not have coverage by two or more carriers, and concedes that its data sources likely overstate coverage.[18] This is significant because there continue to be two incompatible wireless network technologies in use today – the GSM standard and its 3G successors, used by AT&T, T-Mobile, and a number of other carriers, and the CDMA standard, used by Verizon, Sprint, U.S. Cellular, and a number of other carriers.

A person with a CDMA-only phone cannot complete a call when they are in an area served only by GSM, and vice-versa. As a result, the current reality in rural areas is a patchwork quilt of coverage by incompatible technologies, frustrating the goal of seamless access. Accordingly, for public safety, it is critical that rural Americans have access to wireless networks capable of connecting both kinds of devices, just as those who live in cities do.

In the run up to the FCC's 2011 Connect America Fund reforms, we warned of universal service mechanisms that pick a single winner in the auction room rather than allowing consumers to pick winners in the market. By limiting support to a single carrier, the current mechanism is promoting service by one carrier and one technology, thus limiting consumer choice in many areas that would otherwise support competition, and requiring additional regulation. We urge the Committee to encourage the FCC to adopt universal service mechanisms that direct support to high-cost rural areas without picking a winner in advance.

[18] *See, Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993*, Eighteenth Report, FCC 15-1487 (Dec. 23, 2015) at p. 28, Chart III.A.3 ("Eighteenth Mobile Competition Report").

Last year, we inaugurated new coverage and mobile broadband service in Paw Paw, West Virginia, a town of 500, a project that would not have been possible without the federal universal service program.[19] There are many more towns similar to Paw Paw that we would like to serve or upgrade, if support mechanisms provide us with a reasonable opportunity to succeed. It is low population density and traffic levels that make new construction infeasible and make necessary an effective universal service mechanism.

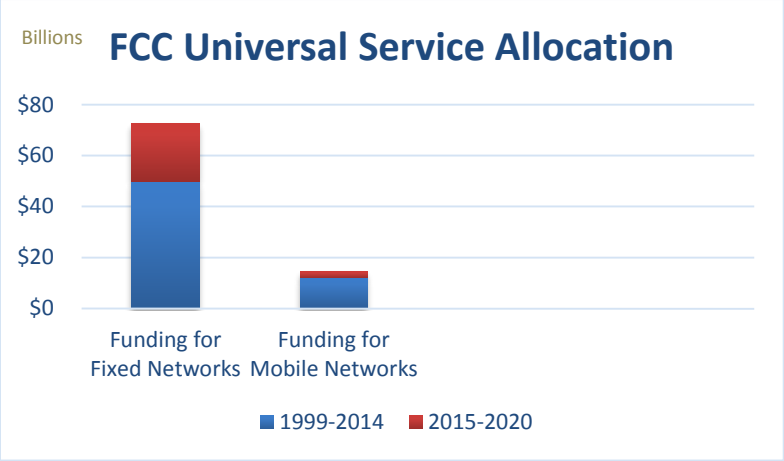
Today mobile broadband coverage and throughput speeds in rural America must receive a grade of "Incomplete." Using the "reasonably comparable" standard set by Congress in 1996, anyone telling you that rural Americans have access to mobile broadband networks that are reasonably comparable to those in urban areas has not taken a drive across this great nation. And that's not a surprise - no carrier can be expected to invest unless there's at least the possibility of earning a return. If it could be done, we wouldn't need a universal service mechanism because it would have happened already.

In sum, we cannot base critical policy choices on conflicting data and maps that the government admits overstate coverage. We must have accurate data in order to target funds where they are needed.

[19] *See*, http://www.morganmessenger.com/news/2015-11-18/Front_Page/Paw_Paw_welcomes_arrival_of_cell_service.html.

3. Allocating Scarce Federal Universal Service Funds Effectively Requires Smart Policy Choices.

Over the years, we have consistently advocated for a robust federal universal service fund that provides rural consumers with access to both mobile and fixed networks. We believe the FCC's historical allocation of support to wireless networks has been insufficient to close up coverage gaps and deliver mobile broadband to many areas. As shown in the chart below, between 1999 and 2014 the FCC allocated over $50 billion in support to fixed networks and less than $12 billion to mobile networks.[20] Over the next five years, fixed networks are projected to receive $22.5 billion in federal funding, while mobile networks are projected to receive $2.5 billion, a disparity in the universal service mechanism going forward of nearly 90/10.[21]



With wireless consumers nationwide now contributing nearly half of the total federal Universal Service Fund of $9 billion (which includes E-Rate, Lifeline, Connect America Fund,

[20] Source: Federal-State Joint Board Monitoring Reports, at https://www.fcc.gov/general/federal-state-joint-board-monitoring-reports.

[21] The fixed network allocation is estimated by summing Connect America Fund support with projected support for rate of return carriers. The mobile network allocation derives from the FCC's Further Notice, *supra*.

Mobility Fund, and Rural Health Care)[22] the proposed funding for mobile broadband does not accurately reflect consumer usage, preferences, and infrastructure needs in rural areas. Given rapidly expanding demand for high-quality coverage and fast broadband connections, the current level of funding shortchanges rural Americans who increasingly rely on mobile services.

Nor does the FCC's proposed budget account for investments that mobile wireless carriers have made over the years. Many carriers, including U.S. Cellular, have used support to build towers in areas so remote that revenues are insufficient to meet ongoing operating expenses and to earn a reasonable return. These investments were made with the understanding that support for ongoing operations would be made available, either in the original fund, or in Mobility Fund Phase II.

Although the FCC proposed to use at least some of Mobility Fund Phase II support to cover operating expenses on towers, it recently proposed to change course based on "substantial marketplace developments," nothing more than fallacious claims by some carriers that the job of covering rural America is largely done.[23] This course change may prove to be catastrophic for rural citizens in small communities, which often do not generate enough revenue to meet a tower's operating expenses.

In addition to our experience and the weight of data, I am troubled by these FCC claims of substantial marketplace developments leading toward a conclusion that a Mobility Fund of

[22] The most recently available FCC report from 2011 containing assessable carrier revenues for universal service can be accessed at: https://transition.fcc.gov/Bureaus/Common_Carrier/Reports/FCC-State_Link/IAD/quarterly_roll-upsasof050112.pdf .

[23] *See*, Further Notice, *supra*, FCC Rcd at 7126-29.

less than $400 million annually may be appropriate. When it comes to broadband, I agree that we as a nation should be setting big and audacious goals and working toward them.[24] In last week's 2016 Broadband Progress Report, the FCC reported that **87%** of rural Americans lack access to mobile broadband at 10 Mbps/1 Mbps:

Table 4
Americans Without Access to Mobile Broadband Services (Millions)

	LTE Technology		10 Mbps/1 Mbps	
	Population	Percentage of Population	Population	Percentage of Population
United States	1.682	1%	171.486	53%
Rural Areas	1.519	3%	52.231	87%
Urban Areas	0.163	0%	119.255	45%

Because the above data for LTE technology is based largely on advertised coverage at a single point within a census block, I don't agree that the job of populating rural areas with LTE technology is largely done. That said, if the data on 10/1 availability is even in the ballpark, it is beyond dispute that the job of getting to an adequate level in rural America is only beginning.

Because the big carriers continue to provide their customers with access to many rural areas by using the networks of rural carriers, it is fair to conclude that the future of 10/1 Mbps service depends on a universal service policy that encourages rural carriers to invest, as well as an FCC spectrum policy that ensures rural carriers have access to sufficient bandwidth to deliver speeds of the future. The critical role of universal service is to ensure that broadband technologies being deployed and commonly used in urban areas are made available to our rural communities in a timely manner. This is no different than any other infrastructure, whether it be roads, electricity, or water.

[24] *See*, *Separate Statement of Commissioner Jessica Rosenworcel,* at: http://transition.fcc.gov/Daily_Releases/Daily_Business/2016/db0129/FCC-16-6A5.pdf.

My takeaway from the past several years of uncertainty is that the FCC has not devoted sufficient attention to determining how best to maintain the investments that have already been made, how much it will cost to fill in slow broadband zones and dead zones, and what it will cost to deliver 5G services, and more, to rural citizens in the coming years. The Mobility Fund Phase I auction left many areas still without coverage, and bidders forfeited back to the FCC nearly 25% of the $300 million in original funding, for a variety of reasons. The Commission has yet to act on our petition to distribute forfeited support to "next in line" bidders who could move quickly to build towers in many states that need investment. Moreover, the amount projected for Mobility Fund Phase II is insufficient to do the job on a reasonable schedule. In sum, the Mobility Fund program has not fulfilled the goal of fostering, "an environment in which the widest possible variety of new technologies can grow and flourish."[25]

We also believe that the reverse auction approach for distributing mobile broadband support did not produce equitable results across the nation. Because reverse auctions allocate funds first to areas that cost less to serve, mountainous parts of the country are served last, or not served at all if funding runs out. I predict that with a reverse auction mechanism, many of you on this committee representing mountainous regions will never see your states receive meaningful assistance, even though the rhetoric of the program gives you false hope. And, we can assure members of the Committee representing flatter states that, based on our experience, the program is insufficient in those areas as well.

[25] *See*, https://www.fcc.gov/news-events/blog/2015/08/03/leading-towards-next-generation-5g-mobile-services.

In recognition of the fact that the fund is finite and consumer willingness to fund programs is an important factor, we suggest that the FCC solicit new ideas for how to leverage existing federal funds, in combination with state universal service mechanisms, and private investment, to provide an incentive for competitors to invest and improve service. Several states, such as for example, Nebraska, Colorado and New Mexico, have begun developing their own broadband universal service mechanisms, any of which could be trialed in a pilot program, something the FCC has recently done in the fixed service arena.

We suggest that the FCC consider a grant program in which the combined federal and state support funds could be used in a targeted way to address those areas most in need of mobile broadband coverage. States may be in the best position of all to know what is adequately covered and what is not. States that have been shortchanged by the legacy program (paying into the fund far more than they have drawn out for mobile voice, let alone mobile broadband coverage) and are willing to contribute state funds to the mechanism, should be given an opportunity to access some level of support, especially where the need for expanded coverage has been established. Equitable distribution of funding will likely not occur if the fund is administered at the federal level in an auction format, which disfavors the highest cost rural areas.

Separately, Congress can make all universal service fund support go farther by passing legislation to exclude universal service support from taxable income, similar to funds provided under the American Recovery and Reinvestment Act. By excluding support from taxation, we will be able to use 100% of the support received for investments in rural areas and not just the net amount after taxes.

Concluding Remarks

Just last month, Verizon announced an intent to begin limited deployments of 5G technology as early as 2017, technology that will provide speeds perhaps 50 times faster than 4G.[26] National carriers will continue to focus on urban areas, and they will invest billions upgrading networks to 5G. But make no mistake, these investments will take priority over building new coverage and upgrading rural areas that make less economic sense. In sum, if we fail to foster robust mobile broadband networks in rural areas, they will likely never have access to the amazing things described above.

Having studied this industry for many years, I'm humble enough to know that this task is easier said than done, in part because in a nation of entrepreneurs and risk takers and innovation, if there were a business plan to cover all of rural America, the free market would have done it long ago. Making rural infrastructure reasonably comparable is a big and multi-faceted task, as evidenced by the enormous efforts the FCC has made in over twenty years since the 1996 Act.

This year, we celebrate the sixtieth anniversary of Eisenhower administration's enduring achievement, the federal interstate highway system. My sense is that broadband networks will be as important to our nation's success in the next sixty years as our interstate highway system has been over the past sixty. Just as our highway needs have expanded, so too will our broadband needs, and it will be up to this Committee to give the FCC proper direction to ensure

[26] *See*, http://www.pcworld.com/article/3025461/mobile/verizon-vows-to-build-the-first-5g-network-in-the-us.html.

that rural Americans fully participate in modern life and remain comparable with their urban counterparts.