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BROADBAND: DEPLOYING AMERICA'S 21ST CENTURY

INFRASTRUCTURE

TUESDAY, MARCH 21, 2017

House of Representatives,

Subcommittee on Communications and

Technology,

Committee on Energy and Commerce

Washington, D.C.

The subcommittee met, pursuant to call, at 10:00 a.m., in Room 2322 Rayburn House Office Building, Hon. Marsha Blackburn [chairman of the subcommittee] presiding.

Present: Representatives Lance, Shimkus, Latta, Guthrie, Olson, Kinzinger, Bilirakis, Johnson, Long, Flores, Brooks, Collins, Cramer, Walters, Costello, Doyle, Welch, Clarke, Loebsack, Ruiz, Dingell, Eshoo, Engel, Matsui, McNerney, and Pallone (ex officio).

Staff present: Chuck Flint, Policy Coordinator, Communications and Technology; Adam Fromm, Director of Outreach and Coalitions; Gene Fullano, Detailee, Communications and Technology; Giulia Giannangeli, Legislative Clerk, Digital Commerce and Consumer Protection/Communications and Technology; Kelsey Guyselman, Counsel, Communications and Technology; Alex Miller, Video Production Aide and Press Assistant; David Redl, Chief Counsel, Communications and Technology; Dan Schneider, Press Secretary; Gregory Watson, Legislative Clerk, Communications and Technology; Jeff Carroll, Minority Staff Director; Alex Debianchi, Minority Telecom Fellow; David Goldman, Minority Chief Counsel, Communications and Technology; Jerry Leverich, Minority Counsel; Lori Maarbjerg, Minority FCC Detailee; Jessica Martinez, Minority Outreach and Member Services Coordinator; and Dan Miller, Minority Staff Assistant.

Mrs. Blackburn. [presiding.] The Subcommittee on Communications and Technology will now come to order.

The Chair now recognizes herself for 5 minutes for an opening statement.

And I do want to welcome everyone to the Communications and Technology Subcommittee hearing titled, appropriately, "Broadband: Deploying America's 21st Century Infrastructure".

Also, a thank you to the witnesses for appearing as we examine the barriers to deployment and consider discussion drafts to facilitate the deployment of communications infrastructure.

Broadband is the infrastructure challenge of this decade, and the digital divide continues to frustrate so many Americans. We must cut through the red tape by streamlining permitting processes and implement accurate availability of data in order to solve the broadband dilemma.

Lack of broadband access, particularly in our rural areas, is an issue which affects the constituents of numerous members of this subcommittee, Republican and Democrat. We are all tired of hearing stories about parents driving their children to the local McDonald's for internet access in order to finish homework assignments. We owe them better, period.

The 5G revolution is upon us, and we should modernize our laws to address issues such as tower siting and federal rights-of-way which are tying the hands of our private sector.

Let's consider the small cell phenomenon. Many carriers are now deploying small cells, the size of pizza boxes, as opposed to large towers. Small cells can be easily attached to freestanding poles, mitigate the risk of adverse environmental impacts, and are less likely to upset local zoning ordinances. They simply do not require the depth of review contemplated by outdated laws designed for larger towers.

Each administration has attempted to spur broadband deployment, beginning with the Clinton administration's efforts in 1995 when GSA tried to streamline the permitting process for wireless antennas. $7.2 billion in federal grants and loans were awarded through NTIA's Broadband Technology Opportunity Program and the RUS Broadband Initiative Program as a part of the Obama administration's American Recovery and Reinvestment Act of 2009. President Trump has signaled that broadband will be a significant part of his administration's planned infrastructure package.

Therefore, we will be considering two discussion drafts that expedite broadband deployment. The first will assist these efforts by doing things such as creating an inventory of federal assets that can be used to attach or install broadband infrastructure. And two, requiring all landholding agencies to use common templates when leasing space for wireless broadband attachments. And No. 3, streamlining processes for communications facilities location applications at the

Department of Interior and the Forest Service. The second, Representative Eshoo's "Dig Once" initiative, would mandate the inclusion of broadband conduit during the construction of certain highway projects that receive federal funding.

In addition to reducing barriers to deployment, we must accurately collect and aggregate data to update the National Broadband Map. The map has not been updated since June 2014, when BTOP funding ceased. It is imperative that we fix these maps, but doing so is a fool's errand without precise data. This will ensure that private and federal investments are targeted at unserved areas.

Unleashing broadband will create economic, educational, and healthcare opportunities for millions of hardworking taxpayers. A recent Accenture report notes that smart cities growth could result in a $500 billion impact on GDP over 10 years.

People want broadband as much as new roads. Republicans and Democrats are eager to work together to solve this problem.

Thank you, and I yield back.

At this point I recognize Mr. Doyle for 5 minutes for an opening statement.

Mr. Doyle. Thank you, Madam Chair, for holding this hearing today, and to all of the witnesses for appearing before us today.

Access to affordable broadband remains one of the great

challenges faced by people in this country, and far too many people in this country either have no access, limited access, or overpriced access. Broadband is an essential tool for participation in modern life. We use it to find employment, educate our children, get access to health care, and connect with our communities. But far too many Americans don't have the type of connectivity that they want or need, and certainly in many parts of the country the free market has failed to close these gaps.

As many of the witnesses point out in their testimony, carriers that provide connectivity under the Universal Service Program will not be able to raise enough capital to build out or sustain rural broadband networks on their own. As major cities are looking at the challenges and opportunities of gigabit or multi-gigabit 5G wireless deployments in the next few years, rural carriers will be working over the next 10 years to deploy basic LTE services.

I think moving forward with this program is critical, but the challenge we face as a nation is that servicing rural America will require greater sustained investment if we hope to prevent communities from being left behind. Tax credits and toll booths can't sustain infrastructure in places that don't have economically-viable markets.

The draft bills offered by the majority today are fine bills that address a number of challenges to deploying broadband, but

they don't get at the real problem, which is that there isn't a business case for investing in these regions. I was looking through some of the data submitted by CostQuest Associates from the second panel. Some members here have districts with as few as 11 percent of the household served by terrestrial broadband. Recent studies have also shown redlining in cities like Cleveland, which have resulted in low-income communities being left behind while affluent parts of the city receive upgraded service.

And access isn't our only challenge. The FCC found that 82 percent of the country has only one provider to choose from for high-speed broadband. With numbers like that, if we were talking about health care, Republicans would be fighting to repeal and replace internet service in this country.

The Consumer Federation of America found that a lack of competition results in Americans overpaying roughly $60 billion a year for broadband that amounts to $250 billion over the past five years. According to CostQuest Associates, that overage alone would pay for the buildout of a ubiquitous high-speed network that could support high consumer use, autonomous vehicles, and future demand. We can't ignore the impact that a lack of competition has on cost to consumers or the pace of deployment.

At this time, Madam Chair, I would like to yield the balance of my time to Ms. Matsui.

Ms. Matsui. Thank you, Mr. Doyle, for yielding me time.

Technology plays a role in nearly every sector of our economy. Yet, across our country too many families face a digital divide. This has real consequences on the American people and their ability to compete. Not having access to broadband could mean a child is unable to do research online or send a homework assignment on time.

In order to ensure our families are equipped with tools they need to participate in today's digital economy, we need to make real, sustained federal investments in broadband deployment. This is going to require more than tax cuts and deregulatory action.

Our country has always been committed to the principle of universal service and recognized that there is a public sector role for places the private sector will never go. Millions of Americans could lose out if we don't make a commitment now to build the infrastructure we need for all of us to compete in the 21st century.

Thank you, Mr. Doyle. I yield to anyone else who wants time.

Mr. Doyle. Yes, reclaiming, would anybody like the last minute? Yes, Mr. Lujan.

Mr. Lujan. Thank you, Madam Chair and Ranking Member Doyle, for the time today.

Access to broadband, as we know, is a critical resource for

all Americans today. It is how they learn, find jobs, do business, communicate with family, follow the news. But in my state and too many rural states, we have been left behind. Congress plans to advance a long overdue infrastructure package, and it must include meaningful investments in broadband.

We must also be creative in how we support such investments, which is why I am working to develop legislation that seeks to assist broadband buildout, not through direct government investments, but through federal incentives. My discussion draft, the Broadband Infrastructure Finance Innovation Act, creates low-interest financing opportunities for public/private partnerships as well as state and local authorities. These opportunities include lines of credit, secured loans, loan guarantees, and interest rates pegged to that of Treasury bonds.

So, I look forward to today's discussion and, with that, I yield back the balance of my time.

Mrs. Blackburn. The gentleman yields back, and we are waiting for a couple of members on our side to come from the Capitol. So, Mr. Pallone, I will recognize you for 5 minutes. I know you are just coming in, and I know Mr. Loebsack wants a portion of that time. So, I will seek the leadership, your guidance on this. Do you want to claim the time or Mr. Loebsack?

Mr. Pallone. Yes, I will.

Mrs. Blackburn. You will claim the time. The gentleman is

recognized for 5 minutes.

Mr. Pallone. I will make sure, yes, that I yield at the end to Mr. Loebsack.

I want to thank you, Madam Chairwoman and our Ranking Member Doyle, for the hearing, and our witnesses.

In these uncertain economic times, deploying more secure, high-speed internet means providing more opportunities for more people, opportunities to get a proper education, to apply for new jobs, or to train for a new career. And that is why the Democratic members of this subcommittee have introduced bills to maximize this potential, especially for those that are struggling to find good jobs.

Our bills also give the FCC a key role in keeping our networks secure. These efforts are critical because secure broadband could help give all Americans a fair shot, even in the corners of this country that are hardest to reach.

During the last Congress we worked to draft a discussion bill that had bipartisan support here in our committee. We are also happy to move forward with Congresswoman Eshoo's Dig Once bill. And we are ready to get back to work again this year.

But, without prior consultation, Republicans unilaterally revised this bipartisan bill, and at this point we are still reviewing the new draft. But I would have hoped that the Republican majority would have consulted with us prior to revising

the legislation and announcing this legislative hearing.

At the same time, the proposal in this bill will only get us so far. More critically, we must include broadband in our efforts to overhaul the nation's infrastructure. Congress needs to invest in a connected future, and I have seen some suggest that tax incentives will somehow increase broadband in rural and tribal areas. But tax cuts alone won't get it done, especially in areas where there is not a strong business case, like tribal lands.

The FCC staff recently released a report showing what it would actually take to deploy to these remote areas and explaining that it will cost at least $40 billion to reach 98 percent of the population. The costs go up dramatically to reach the last 2 percent, and that is a serious investment that we should be discussing as part of any infrastructure bill.

Unfortunately, the Trump administration is ignoring the needs of the people in rural America and tribal lands. The President's budget would brutally cut off agencies like the U.S. Economic Development Administration and the Appalachian Regional Commission. These agencies are critical to support deployment in the parts of the country that could use the jobs that come with more broadband. And this Congress must reject the President's budget and we must pass a real infrastructure bill that includes at least the $40 billion to make sure 98 percent of the country gets broadband.

So, today's witnesses are the types of experts we need to hear from to lay the foundation for that legislation.

And I would like to yield my time -- oh, I guess I am yielding 1 minute. You already spoke, Mr. Lujan? All right, then, I will yield the rest of the time to Congressman Loebsack.

Mr. Loebsack. Thank you, Mr. Pallone. Thank you, Madam Chair, for this hearing.

Broadband is not a luxury for rural America; it is survival. And I think everybody who is here today understands that.

Communities cannot thrive if they are left behind as the rest of the country moves forward. Investing in broadband creates jobs and it helps communities grow. There are two critical things we need to connect these communities, dollars and data. We are talking about dollars, but we also need data. We need direct investment in fixed and mobile broadband, just like we invest in other types of infrastructure, and we need data. Right now, the data the FCC is using to determine where to invest in wireless shows that the entire state of Iowa, for example, is covered.

Madam Chair, I would like to request unanimous consent to enter into the record a map I have here of coverage of Iowa.

Mrs. Blackburn. So ordered.

Mr. Loebsack. Thank you.

[The information follows:]

**********COMMITTEE INSERT 1**********

Mr. Loebsack. As you can see, folks, according to the FCC, all of Iowa gets 4G LTE coverage, according to the FCC, at the moment. Now I am constantly driving through my 24 counties to meet with constituents in Iowa, and I can tell you, and they can tell you as well, that this is not a reality. It is just not a reality. We have dead spots; we have dropped calls; we have poor speeds, and we have more in some areas.

That is why I have recently introduced the Rural Wireless Access Act to improve these maps. We have to have good data. We have to have good maps. We have to get the data right, so we can target the resources to fix the problem. So, data, absolutely critical folks, not just the money.

Thank you so much, Mr. Pallone, for yielding, and I will yield back. Thank you.

Mr. Pallone. I yield back the remainder of my time.

Mrs. Blackburn. The gentleman yields back.

Mr. Lance, you are recognized for 5 minutes.

Mr. Lance. Thank you very much, and I want to thank the distinguished panel for appearing before us today. And I certainly commend the Chair for her distinguished work in this area.

Commerce has always been reliant on infrastructure. Innovations from the Transcontinental Railroad in the 19th century to the interstate highly in the 20th century have

succeeded in connecting more businesses with consumers, decreasing the cost of doing business, expanding markets, and improving America's quality of life.

As the committee tasked with regulating interstate and foreign commerce since 1795, it is the Energy and Commerce's job to encourage the deployment of the infrastructure of the 21st century, broadband internet, which has the potential to connect every business and consumer in the country and around the world.

While the district I serve in New Jersey is not among the most unserved or underserved, I believe striving to connect those households that lack broadband access is a worthy goal that will benefit all Americans. As our economy becomes increasingly more digitized, bringing broadband access to more areas of the country, connects more consumers and small businesses to the internet economy for the economic benefit of all, improved broadband infrastructure will also pave the way for future technologies like 5G, which has the potential to add millions of jobs and billions of dollars in GDP growth to the economy.

However, as we seek to decrease this digital divide and expand our broadband infrastructure, it is imperative that we learn from the mistakes of the past and ensure that we have the necessary accurate data to deploy our resources efficiently and effectively.

I look forward to hearing the testimony of both panels and

continuing the subcommittee's work on this important topic.

And I am certainly willing to yield to other members who wish to have an opening statement.

Mr. Shimkus?

Mr. Shimkus. I thank my colleague.

And as the chairwoman said, in my district my district staff knows that I am a McDonald's afficionado and the No. 1 meal is my go-to meal. So, if my parents had a chance to get me to go to McDonald's to do my homework, I probably would have been all in on that.

[Laughter.]

But it is interesting listening to the comments on both sides because there is, obviously, a great opportunity, I think, to work together to move issues. A couple of things that I would like to talk about are, and Ms. Matsui mentioned Universal Service Fund should be properly directed, and I think that is a key for underserved areas.

We have adequate maps. The Chairwoman Blackburn mentioned adequate maps and real definitions. My point would be adequate definitions. What is high speed? You know, what are we going to decide? And many of you in this sector know that I talk about this all the time because what is high speed to one is not high speed to another. This should be part of an infrastructure package, as we tee this up. If there is ever going to be a $1

trillion infrastructure rollout, obviously, this should be part of that. Also, we are addressing Anna Eshoo's bill, too, which had a lot of support in the last Congress, and that dovetails right into infrastructure.

So, I think properly managed, as we move this process forward, Madam Chairman, I think we should be able to move on a bipartisan package that should have some legs, and I look forward to working with you on it.

I yield back.

Mr. Lance. Thank you very much.

Are there other members on our side who would like to speak?

Mr. Johnson?

Mr. Johnson. I thank you for yielding.

You know, this is a very, very important hearing. And I have heard some of the comments by my colleagues. I represent Appalachia. There are many places in my district that young people, high school children, college kids even, have to go to a neighboring town or a public library or some other facility to get access to the internet to do their school projects. You can't educate young people in 2017 in the kind of high-tech-driven world that we live in when they have to go to that extreme.

We have got to solve this problem, and I look forward to hearing what our panel has to say today. And I look forward to working with you, Madam Chairman, to address these issues.

Mr. Lance. Thank you very much.

Anyone else?

Seeing none, I yield back the balance of my time, Madam Chair.

Mrs. Blackburn. The gentleman yields back, and this concludes our member opening statements.

I will remind all that, pursuant to the committee rules, all members' opening statements will be made a part of the record.

[The information follows:]

**********COMMITTEE INSERT 2**********

Mrs. Blackburn. We want to thank all of our witnesses. We are so grateful that you are here today and grateful that all of that testimony got in early. We thank you for that, and we thank you that you are here to testify.

We will have two panels, just as a couple of our members have mentioned. Each panel of witnesses will have the opportunity to give an opening statement, followed by a round of questions from members. Once we conclude with the questions on the first panel, we will take a brief reset and bring the second panel forward.

Our first witness panel for today's hearings includes, and we welcome, Mr. Steve Berry, who serves as the president and CEO of Competitive Carriers Association; Mr. Michael Conners, who is the Sub Chief of the Saint Regis Mohawk Tribe from California; Mr. Thomas, or "Tam", Murray, who is the founder and managing member of Community Wireless Structures, which is based out of northern Virginia; Ms. Joanne Hovis, who is the president of CTC Technology and Energy, and Mr. Ted Carlson, Jr., who is the CEO of Telephone and Data Systems and chairman of U.S. Cellular.

We appreciate all of you being here today and preparing for this hearing. We will begin the panel with you, Mr. Berry. You are now recognized for 5 minutes for your statement.

STATEMENTS OF STEVEN K. BERRY, PRESIDENT AND CEO, COMPETITIVE CARRIERS ASSOCIATION; SUB CHIEF MICHAEL CONNERS, SAINT REGIS MOHAWK TRIBE; THOMAS A. MURRAY, FOUNDER AND MANAGING MEMBER, COMMUNITY WIRELESS STRUCTURES, AND CHAIRMAN OF THE BOARD OF DIRECTORS, WIRELESS INFRASTRUCTURE ASSOCIATION; JOANNE S. HOVIS, PRESIDENT, CTC TECHNOLOGY AND ENERGY; LeROY T. CARLSON, JR., CEO, TELEPHONE AND DATA SYSTEMS, INC., AND CHAIRMAN, U.S. CELLULAR

STATEMENT OF STEVEN K. BERRY

Mr. Berry. Chairman Blackburn, Ranking Member Doyle, and Members of the Subcommittee, thank you for inviting me to testify about broadband infrastructure.

I am here today on behalf of CCA, representing nearly 100 wireless carriers and nearly 200 vendors and suppliers.

I agree with your observations, Chairman Blackburn, that broadband is the infrastructure issue of this decade. Mobile broadband, in particular, drives jobs creation, drives economic development, connecting Americans while providing new applications for services that were really unthinkable only a few years go.

Demand for mobile broadband is growing exponentially, and we are on the verge of an evolutionary leap into 5G services. Qualcomm projects, with 5G, it will support 22 million jobs and generate $3.5 trillion in revenue. 5G will build upon 4G LTE,

and it is not a replacement for LTE, especially in rural America. So, there is no time to wait. This is not a telecommunication issue only. It is a jobs issue. It is an education issue and a public health and a public safety issue, and an American competitiveness issue.

I am pleased to support the committee's efforts to expand infrastructure. Also, FCC Chairman Pai is off to a good start with his Digital Empowerment Agenda and proposing the Broadband Deployment Advisory Committee. The record is sufficient for FCC to act now.

Let me identify five areas for action.

First, any infrastructure proposal must include support for mobile broadband. A bipartisan group of Members of Congress, including 12 members of this committee, recently wrote President Trump to that effect. This should include direct support, tax incentives, access to spectrum, reduced fees, and streamlined procedures. Most importantly, direct support should be distributed through the FCC and used to provide additional resources for the Mobility Fund.

Second, we must take steps to streamline the process at every level. Barriers to deployment remain. It sort of reminds me of that famous line in a classic movie Cool Hand Luke, "What we've got here is a failure to communicate."

To provide wireless service, carriers need to deploy towers,

small cells, conduit, antennas, and, yes, even wires. The process for approval is a regulatory nightmare. Let me share with you a visual of the incredibly burdensome steps and potential pitfalls that carriers have to endure. I think you have it up on your screen and before you.

One look at this infographic and it is abundantly clear that we need to simplify and streamline the process. We need to make it easier to build the infrastructure of the 21st century.

The discussion draft bills this committee is considering take important steps to address many of these challenges, and Congress should move forward without delay. Broadband is an immediate priority for the nation, and leadership starts at the federal level. Twenty-eight percent of the nation's geography is owned or managed by the federal government and 100 percent of all the spectrum.

Third, Congress should legislate now. For example the Dig Once bill is common-sense policy and would immediately help carriers to gain access to backhaul wireless data, as Ms. Anna Eshoo knows.

Congress should streamline and accelerate historic and environmental review and direct federal agencies to set real deadlines for action and decisions with consequences for missing deadlines, like shot-clocks with deemed granted provisions if an agency doesn't respond. The committee need not wait for a broader

infrastructure proposal.

Congress should also support swift action at the FCC, and I mean now at the FCC. Deploying the latest wireless infrastructure is totally different than constructing a large tower. And I ask you for a moment, imagine a 250-foot tower. Now let me show you today's tower. The pizza box that the chairman talked about, this is the new tower, and they are getting smaller, believe it or not. Too often the same rules applied to deploying small cells or even changing out antennas is as applied to tall towers. Streamlining the application process will also ease increased demand on municipal resources.

Fourth, application fees and other costs associated with reviews should be justified, consistent, and tied to actual review costs and rights-of-way management. Again, the same fees that apply to tall towers should not apply to small cells. Applications to deploy broadband need to be viewed as investments. Yes, that is correct, investments, to create jobs, to create an expanded economy, and not as a revenue-generator from the application itself.

Fifth, and maybe most importantly, as Mr. Loebsack said, we need better data. If you can't measure an issue, you can't fix it. The current FCC data for wireless coverage is not standardized or reliable. For example, the difference of only 5-decibel milliwatts in propagation measurement can overstate

geographic coverage by over 100 percent. We need to clearly identify and have better data.

Finally, spectrum is infrastructure. You can add capacity and coverage by adding spectrum and building sites, but this committee deserves credit for your launch of the Incentive Auction, and it is critical to put that 600-megahertz spectrum into use in the 39 months ahead of us and deploy it in rural America. This committee should be congratulated in your meeting the growing demands and empower our economic growth. And we believe that eliminating the regulatory morass --

Mrs. Blackburn. The gentleman's time has expired.

Mr. Berry. -- that delays our building of the infrastructure is well worth the time.

Thank you, and I ask for your kind indulgence. I was over 5 minutes.

[The prepared statement of Steven K. Berry follows:]

**********INSERT 3**********

Mrs. Blackburn. Thank you, Mr. Berry.

Mr. Connors, you are recognized, 5 minutes.

STATEMENT OF SUB CHIEF MICHAEL CONNERS

Mr. Connors. [Speaking Native language.]

Hello. My name is Michael Conners. I am a sub-chief of the Saint Regis Mohawk Tribe.

Chairman Blackburn, Ranking Member Doyle, and Members of the Subcommittee, it is my honor to be here with you today to discuss our tribe's successful efforts to build critical broadband infrastructure in New York, highlight our legislative priorities, and recommend the best practices for deploying broadband services on tribal lands and throughout rural America.

The Saint Regis Mohawk Tribe is a federally-recognized tribal government located in our traditional territory of Akwesasne in northern New York. Our tribe prides itself on being a good partner with our local, state, and federal leadership to promote the well-being of our community and to advance our collective legislative goals.

Being one of the primary employers in our region, the Saint Regis Mohawk Tribe, Akwesasne Mohawk Casino, Mohawk Networks, and Akwesasne TV provide more than 1600 employment opportunities and over $52 million in salaries annually to the residents of northern New York. The success of our enterprises allows our tribe to further provide economic development opportunities and increased access to critical infrastructure.

In 2009, the tribe was awarded $10 million through the American Recovery and Reinvestment Act, USDA's Broadband Initiative Program, to form Mohawk Networks, a tribally-owned telecom entity. By 2015, Mohawk Networks connected roughly 80 percent of all homes in our territory to high-speed internet service.

While we have seen the positive impacts this has brought to our community, our non-Native neighbors in the north country have not. Mohawk Networks estimates more than 100,000 homes in our neighboring counties have been overlooked. Twenty percent of homes are unable to access speeds greater than 6 megabytes per second, and 37 percent cannot afford the average monthly rate charge of $59.99.

For this reason, we have decided to expand our broadband service to our neighbors in the surrounding non-tribal communities. The first phase of expansion into Lewis County through the activation of five towers has been made possible by a $6.4 million grant received in round two of the new New York Broadband Program. Discussions are currently underway with Clinton County legislators regarding the expansion of Mohawk Networks' broadband infrastructure to Clinton County by the end of 2018.

A primary component of what allows the tribe to be competitive and keep our costs low is our utilization of 16 towers

throughout multiple surrounding counties and the reliability of our innovative technology. Working in conjunction with local stakeholders allows us to provide broadband services throughout the North Country and keep costs low. Currently, the average cost per household for the deployment of our wireless technology is $1700, far less than the traditional method of laying miles of fiber.

While we are moving forward and making progress, several hurdles have presented themselves. These include:

One, cumbersome grant requirements. While the tribe was fortunate to receive a $10 million grant, this only covered the initial implementation of the program and was received as reimbursements rather than direct funding. While we were able to cover these costs, this financial investment is difficult for many rural tribal communities who make lack successful economic development.

Two, grant funds are not enough, and opportunities seem to be disappearing. Opportunities benefitting Indian country and rural America tend to be hit the hardest by budget cuts and are inconsistently funded. We were disappointed to see that the tribal building incentive for the Connect America Fund was not included in this year's application, despite active outreach from members of this subcommittee.

Three, there is a lack of support and understanding about

the capabilities of tribal telecom entities. When we applied for phase 1 of the new New York Broadband Program for the expansion of our broadband infrastructure into surrounding counties, we were beaten up by large telecom companies. And they yet to expand broadband to our underserved communities. Fortunately, our phase 2 funding gives our neighbors equal access to broadband.

With these hurdles in mind, the tribe recommends that the House Energy and Commerce Committee consider the following:

One, provide setasides for tribal and rural infrastructure projects. This funding presents the opportunity to transform infrastructure projects into sustainable solutions that address a critical gap in our nation's infrastructure.

Two, support the passage of legislation that positively impacts Indian country. We request serious consideration of H.R. 1581, which increases access to telecommunication grants and services for programs in Indian country and other high-cost areas with a significant Native American population. This will give more tribes the opportunity to develop and expand broadband infrastructure in the way that we have.

Three, encourage partnerships to reduce costs and increase access.

Four, build upon existing infrastructure. We were happy to see the committee's consideration of broadband conduit installation and highway construction projects. This will

greatly increase the potential for conductivity between rural towns.

Thank you for taking the time to discuss broadband infrastructure on tribal lands and in rural America. The Saint Regis Mohawk Tribe looks forward to working with you to deploy broadband where it is needed most.

[Speaking Native language.]

[The prepared statement of Sub Chief Michael Conners follows:]

**********INSERT 4**********

Mrs. Blackburn. Thank you, Mr. Conners. He yields back.

Mr. Murray, you are recognized for 5 minutes for your opening.

STATEMENT OF THOMAS A. MURRAY

Mr. Murray. Thank you, Chairman Blackburn, Ranking Member Doyle, Members of the Subcommittee.

I am Tam Murray. I am here today wearing two hats. I am a small tower developer right here, right across the river in Arlington, Virginia, and I am also the chairman of the Wireless Infrastructure Association, WIA.

My firm, Community Wireless Structures, is geographically-focused. We have developed towers in 10 Virginia counties, northern Virginia, and central Virginia. We are one of an estimated number of 600 small tower developers throughout this country who work on a local basis. They get towers built in Nashville, Pittsburgh, Kalamazoo, wherever it might be. There are 200,000 telecommunication structures that are used for broadband towers in this country, and I am proud to say that my firm has built 50 of those.

So, if you go back, you know, I have been doing this for 20 years, and you have got to go back to 1996. So, what was the opportunity that I saw to leave my prior profession and come into this? It was one word, collocation. Collocation is the siting of multiple carriers on one telecommunication structure.

1996 was a very different world. My cell phone was a brick bolted in the trunk of the car. The lowly flip-phone had not even

been dreamed of, and carriers looked at infrastructure as a proprietary thing. Each was developing their own network. It wasn't unusual to come to an intersection and see three towers, each with one carrier on it.

So, the business opportunity that I pursued was collocation. I approached Loudoun County. I said, this road, this Dulles Greenway that is being built, it is 12 miles; it could be 16-20 applications. How about my firm develops four sites, one at each interchange down the length of the Greenway. And it was a home run for all parties involved. The county decisionmakers, the local government was happy. So, it wasn't clutter at each interchange and there was service for the citizens of Loudoun; there was service for the carriers. They didn't have to duplicate the spending of cap ex on three towers. There was one tower that worked.

So, what worked on the Greenway, we built more sites in Loudoun. Collocation has been used throughout the state of Virginia, throughout every state in the Union. It is a wonderful model. It is the envy of the world. And that is really how the small tower industry got started, and everyone else, all my colleague companies, if you will, throughout the country are building on the same model.

I have three asks. One is federal lands. Two is some expediency on tribal approvals, and the third is the small cell

definitions.

The first item, federal lands, really segues nicely with the Greenway. So, the Greenway, one of the special sauces, coming back to the McDonald's analogy, the special sauce on the Greenway was that we negotiated with one landlord to get four sites. Now, if you go to -- Congressman Pallone mentioned the hardest corners to reach in a state, if you will -- if you take a big piece of land that is owned by an agency, and a carrier or an infrastructure developer can approach that agency and secure 30 sites or 20 sites, whatever it takes to cover that given piece of geography, that is a huge benefit to the development of infrastructure. Negotiating 30 different leases versus negotiating with one party is huge.

So, we know that there is a draft federal lands bill. Tell us, WIA, what we can do to help push that along. That is really going to help the deployment of broadband.

On tribal review, my firm has developed 50 towers. Two of those are inside the Beltway. Everyone would describe inside the Beltway as disturbed land. I mean, it is a great place to be and live and work, but this is not the great outdoors.

And yet, our applications for towers inside the Beltway had to go through a tribal review. Now what we think, if those reviews could be done at less expense, there are fees from each tribe, and if it could be done expedited, somebody mentioned the term

"deemed granted," that would be wonderful. That will help broadband, too.

My third point -- 20 seconds -- is small cells. Small cells are new technology. The challenge with new technologies is defining them. There are parties in this country that will say that 120 feet is a small cell. It is not. That is hogwash. Our association, WIA, has studied this. A utility pole is 34 feet. Add 10 feet. Add a few antennas. You are at 50 feet. So, it is a very reasonable definition of small cells to say 50 feet or less. That should be expedited review. Above 50 feet, walks like a duck, quacks like a duck, it is a tower. It should be treated as a tower with the standard local responsible review.

So, the federal lands, expediting the tribal, and the small cell definition are the ways that would be very much helpful.

I welcome any questions after the panel is done.

[The prepared statement of Thomas A. Murray follows:]

**********INSERT 5**********

Mrs. Blackburn. I thank you, sir. He yields back.

Ms. Hovis, you are recognized for 5 minutes for your opening.

STATEMENT OF JOANNE S. HOVIS

Ms. Hovis. Chairman Blackburn, Ranking Member Doyle, Members of the Subcommittee, good morning and thank you very much for inviting me to testify.

I am Joanne Hovis. I am president of CTC Technology and Energy, and I am also CEO and co-founder of the Coalition for Local Internet Choice.

I make the case today for including broadband, particularly in rural areas, among the infrastructure categories in any infrastructure investment program, and recommend particular public/private partnership and related mechanisms that can be included to increase the likelihood of the necessary capital flowing to the areas with the greatest needs.

Broadband, like any other type of infrastructure, requires significant upfront capital for deployment of networks, and private capital will flow to areas where potential return is highest. In a number of densely-populated, higher-income areas, incumbent phone and cable companies have upgraded or are upgrading their networks to enable new services. A handful of these areas have also seen investments by new entrants seeking to outflank the incumbents. These are very fortunate communities, but metro area communities in general are more fortunate than rural because of the flow of private capital.

In contrast, obviously, in less-densely-populated and lower-income areas, the pace of progress has been much slower. These areas offer lower returns on private investment and, therefore, have seen their economies stagnate.

One of the ways in which we can improve these economics in rural areas is by leveraging state and local government capabilities. State and localities are increasingly motivated to incent private sector investment in next-generation broadband networks. States and localities have experience, capabilities, and assets that enable them to build broadband infrastructure that can be made available to the private sector for competitive services and innovation, with a public entity, building infrastructure and facilitating infrastructure, but uninvolved in the private sector role of operations and service delivery to the public.

Alternatively, the state or locality can partner with the private sector for shared investment in private networks that secure public sector goals, such as service in rural areas that would maintain such critical practices as home-based business and home-based schooling.

However, as we consider what might be coming in an infrastructure bill, the concern about the economics is that that infrastructure bill has to change and improve economics in those rural areas and at the local level. Based on my experience, I

would say that even a combination of tax credits and public/private partnerships together would be insufficient to attract the necessary investment to rural areas.

All things being equal, investors will go where the market is strongest, the returns are highest, the revenues are likely to be most robust. And in the case of public/private partnerships, capital will flow to where potential revenues are greatest.

For this reason, I suggest that the strategies considered for any infrastructure program include some of the following recommendations to make tax credits and public/private partnerships in rural areas more viable, attract them more to rural areas, as it were, more attractive to investors.

First, create a financing support mechanism to reduce public/private partnership borrowing costs. Creating such mechanisms would make public/private partnerships more viable at modest cost to the Treasury. For example, federal contribution toward a reduction of interest costs would improve viability.

Second, enable the use of tax-free municipal bonds to fund public infrastructure in public/private partnership situations or for least to private ISPs; thus, reducing municipal borrowing costs, enabling public/private partnerships and increasing project viability at modest cost.

Third, enable transferability of tax benefits such that

nonprofits and public entities can sell tax credits or other tax opportunities on the market; thus, making tax mechanisms more viable for areas that are of less interest for private capital.

Fourth, carve out funding and other support for areas where the local economy has been impaired by technology change and globalization, and where broadband could have a disproportionate impact relative to cost on improving economic opportunity. And this, I think, aligns with my broader point that tax credits alone, all other things being equal, will not flow to the rural communities where private investment has not gone already.

Finally, include Dig Once and construction efficiency strategies in other public/private partnership projects in order to capitalize on opportunities presented by construction. So, for example, envision a scenario of the reconstruction of a municipal water system through a Dig Once environment. Conduit for communications, fiber that could be utilized by private sector entities would be placed at the same time. At incremental cost, we would be building two networks, with the second network at a very low cost relative to what it would cost to build without that Dig Once insight. My written testimony includes some examples of such case studies.

And thank you very much for your consideration.

[The prepared statement of Joanne S. Hovis follows:]

**********INSERT 6**********

Mrs. Blackburn. The gentlelady yields back.

Mr. Carlson, you are recognized for 5 minutes for your opening.

STATEMENT OF LeROY T. CARLSON, JR.

Mr. Carlson. Thank you, Chairman Blackburn and Ranking Member Doyle and Members of this Subcommittee.

Now is the time to take bold action to improve mobile broadband networks in rural America. We at U.S. Cellular are excited that the FCC has now adopted a Mobility Fund Phase II order for further rural development of high-speed wireless broadband networks. We are also excited that Congress is considering additional infrastructure policies targeted for rural communities.

It is clear to me that there is bipartisan realization that the funding being made available under the Mobility Fund II program is insufficient to achieve the goal of providing ubiquitous, high-quality mobile broadband to all Americans. For over a year, we have been discussing with Congress the fact that the FCC does not have standardized data showing the extent and quality of mobile broadband in rural America.

The FCC Form 477 for mobile broadband data that was used to size Mobility Fund II, and which is planned to be used to determine the list of areas eligible for funding, is substantially flawed. It is flawed because instructions to carriers for filing Form 477 data do not produce maps of consistent data signal strength resolution. These filings also do not depict variations in

signal strength, which dramatically affects the quality of service customers can expect.

I have included in my filed testimony a propagation map of signal strength coverage from several of U.S. Cellular sites in the state of Tennessee which is representative of our rural coverage throughout the country. This map shows where service quality is comparable to urban areas, as well as areas where signal strength coverage is weaker.

The FCC's Form 477 instructions do not produce maps like this. Instead, the data we file shows the entire area as served by broadband without distinguishing between strong coverage that allows for streaming of video and lesser coverage that does not. This FCC collection data flaw must be addressed before distributing Mobility Fund Phase II resources.

We recommend that the FCC modify its rules for Form 477, so that every carrier is required to submit propagation maps at a standard negative 85 dbm level, which equates to typical wireless performance metrics that urban consumers experience today. Maps produced at this urban standard will increase the areas available for rural investment. If we were asked to produce these coverage maps for our service areas, we could so in a relatively short period of time and at a low cost.

The FCC, thus far, has decided not to follow our recommendation to address flaws in the existing Form 477 data

collection process. Instead, they have opted for a process by which carriers and others could challenge the coverage maps. We are concerned that this challenge process will place significant and tremendous burdens on wireless challengers, burdens that would not be required if the Form 477 rules were simply fixed.

There is another issue that Congress should be very concerned about. The FCC intends to make no funds available for any rural area that has service today at 5 megabits per second, even though, going forward, the construction requirement for Mobility Fund II is 10 megabits per second. This will leave large 5 megabits per second rural areas lacking the high-quality 10-megabits-per-second service, and with no investment available to them for up to a decade, causing them to fall farther behind the nation's urban areas.

Action is needed. Once Congress and the FCC agree on a consistent methodology for gathering coverage and network performance data, all areas that are not currently receiving 10-megabits-per-second service should be eligible for funding.

Your leadership in making sure the FCC collects this data, so you know the scope of the challenge, will help target policies to be most effective. Better data will ensure scarce resources are used in areas where the greatest impact will be achieved.

I appreciate this committee's continued leadership on these issues, and we look forward to helping you achieve your

objectives.

Thank you for the opportunity to be with you today.

[The prepared statement of LeRoy T. Carlson, Jr. follows:]

**********INSERT 7**********

Mrs. Blackburn. Thank you, sir, and that concludes the testimony from our panel. We are going to move to questions. I will begin by recognizing myself for 5 minutes for questions.

Mr. Berry, I want to come to you first. We talked a lot about data. We agree with you and, Mr. Carlson, with you that the data is, you know, not being utilized as it should be. Looking at the Tennessee map, that area with nothing, that is in my district. And so, unlike Mr. Loebsack, I am out there. I can tell you where the signal drops.

And I would like for you just to comment on data for a second. And then, let's go talk about the USF because we have had a lot of hearings and looked at USF and the problems that are there, including fraud. We know that that exists. And I want you to comment on a couple of things.

Should we be looking to do better through the USF? Should we be looking to do something different other than the USF? Should the USF be expanded to include a grant-making operation or should the federal government be looking to take on this burden? So, if you will comment on the utilization and the application for USF and, then, a couple of comments about data?

Mr. Berry. Thank you, Chairman.

Well, the USF, it is a well-recognized, well-used mechanism that has encouraged broadband buildout throughout the United States for a long time. It is a process that we are familiar with.

Does it need to be improved? I think it does. I think that mobile broadband, i.e., the Mobility II, could be substantially enhanced in terms of dollars committed to mobility.

I mean, you look at it, and I think in Mr. Carlson's testimony, very clearly, 87 percent of the United States, of the citizens in the United States, do not have 10-1 megabyte speed. If you look at 47 to 49 percent of the households in the United States are wireless-only households, but, yet, the mobile broadband fund, the Mobility II Fund, is substantially less than what is currently provided on the wire-line side.

I am not saying that you don't need wire-line and wireless, but I think we can do a better job of providing more funds to Mobility II, because the facts are that in many instances, especially those economically-challenged, they are using their mobile phones as their access to the internet. And the FCC has a process, and if we can get the data correct, if they can actually get the numbers and the knowledge of where there is coverage and where there is not -- I remember when I met with you and showed you the FCC data of Tennessee, and you took one look at it and said, "That's not right." Well, if it is that obvious to everyone that travels their district, it is that obvious to your constituents. I think we can do a much better job, as Mr. Carlson said. And the Mobility II Fund could be not only expanded, but it could handle additional revenue that would be targeted in a

very targeted fashion for unserved and underserved areas.

Mrs. Blackburn. Okay. Let me stay with you and, Mr. Carlson, I am going to bring you in on this. Both of you talked in your testimony about barriers for deployment and moving past some of these barriers, and how deployment will help with investment and education and economic development, all of those components we want to see that I call quality of life.

And what I would like for you to comment on is kind of next-generation services and next-generation deployment. What are you all investing in? What are you looking toward? If you could get rid of some of these barriers to deployment, what additionally would you be able to do? Where are you going next?

Mr. Berry. Do you want me to --

Mrs. Blackburn. Yes, go ahead.

Mr. Berry. My members tell me that, No. 1, the job isn't done; that we are going to build 5G services on top of 4G LTE and VoLTE. So, the first priority is coverage. If you don't have a signal and if you don't have access to a wireless signal to do voice or text or data, then it is hard to get to the next generation.

So, I think if we don't get to 4G LTE and VoLTE, get to an IP network, then your ability to get to a 5G IoT, Internet of Things, connectivity is extremely impaired. And I would note that in rural America industrial IoT probably has the greatest

promise for economic growth and sustainability for those rural areas to bring new jobs in. And I think that is where we have to finish the job that we have started and, then, I think we will be ready for the 5G world.

Mrs. Blackburn. Mr. Carlson?

Mr. Carlson. Yes, I would just like to emphasize the education aspect of 4G and very high-quality 4G signals. A student who wants to go onto the internet and look at -- let's say they are interested in history. Maybe they want to look at history of World War II and they want to look at movies about what happened in World War II. They won't be able to download those movies in a satisfactory state if they don't get that signal.

And they need to get that signal at home. They need to be able to get that signal in the backseat of the car when their parent is driving them to school or driving them somewhere else. They need to get the signal. They shouldn't be forced to go to a local library, which may be 20-30 minutes away, to get a signal, which is only open a certain number of hours a day.

Students need full access to a high-speed signal. I mentioned the 10 megabits per second. That is today's urban standard. The urban standard I believe is growing about 15 percent per year. So, that doubles in five years. So, five years from now, it is going to be 20 megabits per second. We need to get a strong signal out to all of rural America today, so that

rural America's children can be educated to compete in the modern world.

Mrs. Blackburn. My time has expired. Mr. Doyle, you are recognized for 5 minutes for questions.

Mr. Doyle. Thank you.

Well, let me just stay on that for a second, Mr. Carlson. Tell me, what challenges do you face in getting access to affordable backhaul for cell sites?

Mr. Carlson. Well, affordable backhaul for cell sites is a big challenge. We many times have to put in backhaul ourselves to cell towers that we put up because they are in remote areas. And we have to lay in sometimes even roads. I mean, there was one case where we even had to have a team of horses. We couldn't get roads in. We had to have a team of horses pulling a fiberoptic cable.

So, it is a cost element, but it is also an access element. I think the proposed draft that would say Dig Once I think is an excellent solution to allowing fiberoptic cable to run under highways that are being built, so that that kind of backhaul could be better produced.

I mean, we need all the help we can get in terms of backhaul. Siting, you know, for cell sites is a big issue. We connect a lot of our cell sites with microwave. So, getting siting and approvals more rapidly to get those cells built would be great.

Mr. Doyle. Yes. I mean, I think access to affordable backhauls, you know, that is a real barrier to deployment, and we need to work on that.

Mr. Berry, tell me this. In your written testimony you say in some cases tax credits may not go far enough to foster infrastructure investment. Can you explain why tax credits alone won't be able to get the job done?

Mr. Berry. Thank you, Congress.

And I think Ms. Hovis also addressed that issue. You know, if you have tax credits, you have to assume that at some point in time you can actually make a profit at what you are doing. So, the tax credit actually helps.

I think one of the innovative ideas that has been suggested is maybe those grants or those USF funds could be non-taxable, so that you could actually increase the amount of value of the contribution by 40 percent, 35-40 percent, because that is essentially what Uncle Sam takes out of the grant to USF, to a USF Mobility II entity.

In rural areas you are barely meeting an economic model. And so, you are putting enormous pressure on the private sector to fully fund or fully support a network. And accelerated depreciation, immediate acceleration of depreciation might be helpful. But the fact of the matter is, the economic model in many of these areas, it is so critical because there is not a great

--

Mr. Doyle. Yes, there is not a strong case to make --

Mr. Berry. There is not a strong case for the model, for the economic model, to begin with.

Mr. Doyle. Thank you.

Ms. Hovis, in your testimony you talked about some of the benefits of public/private partnerships in enabling municipalities to address a number of the challenges they face in getting their communities connected. And you have worked with a number of these communities. But I am aware in a number of states they have passed laws really to prevent municipalities from engaging in these types of partnerships.

What do municipalities lose out on when they are denied this option, and what can Congress do to help that situation?

Ms. Hovis. Thank you, Ranking Member Doyle.

What exists in a number of these states are various kinds of barriers that are opposed to allowing collaboration at the local level between public and private entities. I think many of these laws are frequently cast as supposedly protecting private sector opportunity, when, in fact, what they frequently do is tie the hands of local communities to work with the private sector to achieve better broadband outcomes.

In my experience, there are hundreds of communities throughout the country, thousands of communities who are looking

for ways to enable to private sector opportunity around broadband and to attract private capital and to work with the private sector to improve the broadband environment. And when we tie their hands with regard to, for example, building and leasing public assets, such as fiber or conduit, and son, we are removing from the equation one incredibly important player. And that seems to me very unfortunate. And frankly, it is not in the national interest. It would seem to me, also, that it subverts all of the goals that we all share here, which is better broadband, particularly for rural communities and communities that have been left out.

Mr. Doyle. Yes, I couldn't agree with that more. Thank you.

I see my time is almost up, so I will yield back.

Mrs. Blackburn. The gentleman yields back.

Mr. Shimkus, for 5 minutes.

Mr. Shimkus. Thank you, Madam Chairman.

This has been a great hearing, and I appreciate your time. And I have written a lot of notes.

What struck me, though, is, as you were talking about the high speed and stuff, usually, historically, members would say, "Oh, I need this information," "I need that information," and we would turn back to our staff. But now, we are all gathering -- I was looking up National Forests, Mr. Murray, just to find out

-- I have the Shawnee National Forest, so I was trying to find out, well, what is the National Forest around. I know I have got the land between the lakes, not a National Forest, but it is a government federal land in Kentucky. It got the Hoosier National Forest in Indiana.

Of course, these National Forest areas, especially when you go out West, they are the size of states. So, I think you just make a compelling argument that they ought to have one application to get sited in National Forests. Maybe through 30 different locations, do it one time, because that is an area that is tough for my constituents to get signals in the Shawnee National Forest. It is just has been a difficult process.

So, I wrote down that note. I think that is a good thing to propose. And I don't know if we would have to work with the Resources Committee on that, but that is why we have this testimony. So, I appreciate that comment.

The other thing, I wanted to turn to -- it is really kind of Ms. Hovis, but it is also Mr. Connors, because I was intrigued. There is concern when government grants or low-interest loans go in to compete against established providers. Even though maybe they are not serving at the speed that we want, that it is unfair for tax dollars to go to compete against a private sector who is trying to meet that need.

So, we are kind of talking on both sides. We want to

incentivize people to deploy, but, then, we incentive a competitor through tax credits or something to compete against the incumbent, which makes it difficult.

Mr. Connors, in your testimony you talk about going to North County, talking about them not having the same access. A hundred thousand have been overlooked and they are speeds no greater than 6 megabits. And then, in your testimony you are talking about $24 million in grants received through round two of a state -- is it a state buildout?

Mr. Connors. State, yes.

Mr. Shimkus. Which I think is great because we want everybody to have high speed. But is there someone trying to provide service in that North County area?

Mr. Connors. Well, the North Country region is where we are. We are providing the service on our Akwesasne territory. What we are doing is we are branching out, but we are right now in Lewis County, which is about an hour-and-a-half away. They came to us looking for additional services based on how successful we were in our territory.

Mr. Shimkus. But there is no one trying to provide service there, right? I see people shaking their heads behind you. But there is no one trying to provide service there now?

Mr. Connors. They have service, but it is not adequate. So, they are getting our quality service there. And we won round

two of the state grant, and that is providing additional service in Lewis County.

Mr. Shimkus. Which is great, and I am not saying what you are doing -- but there is a concern that if you are a provider who is trying to provide in that area, and then, you use state tax credits or grants or stimulus dollars -- we have seen this before in the ARRA where people came in, put in a bid, got federal dollars. They didn't have the numbers to support an operating system, and that system went for lacking.

And so, I think there is a balance between trying to ensure that, if we are going to incentivize using tax dollars, that there is a real need and that we are not competing against an incumbent who is trying to provide the service at the same time. Does that make sense?

Mr. Connors. Yes. In our area the service providers are only going down the main hub, the main street area. What we are doing is we are branching off of that, going into the unserved areas.

Mr. Shimkus. And that is the importance of having proper maps, to identify served versus unserved. And as we will find, we still don't have that.

Mr. Connors. That is right.

Mr. Shimkus. And I had much more I wanted to talk about, but my time pretty much has expired.

Madam Chairman, I thank you and I yield back.

Mrs. Blackburn. The gentleman yields back.

Mr. Loebsack, you are recognized.

Mr. Loebsack. Thank you, Madam Chair.

Well, as I noted in my opening statement, broadband access is critical for rural communities. I am going to show that map one more time. Okay? It claims that, basically, all of Iowa is covered, but that is not true.

And I really appreciate the Chair's comments about this as well. So many of us on this committee really struggle with this issue, and it is a bipartisan issue. We live in these rural areas and we get dropped calls. Our constituents get dropped, all the things that are happening out there in rural America. And it really does bring us together on a bipartisan basis. That is why I appreciate this hearing today.

You know, it is a jobs issue, too. There is no question about that, no matter how you look at it. It is a survival issue in many ways, I think, for rural communities around this country.

I have often said that, if we can't get proper coverage in places like rural Iowa, but rural anywhere, we are not going to have these communities survive into the future. It can provide them economic growth. It can help provide the jobs that we really need in these areas. But, without it, these places are going to continue to struggle and a lot of them are simply going to wither

and die on the vine in some ways. I hate to be overly dramatic, but I think it really is that dramatic. I think that is the future that we are talking about here. I mean, it comes down to, as I said, dollars and data.

Mr. Carlson, I appreciate, of course, your explanation and comments regarding the challenges raised by using the current Form 477 data to determine wireless coverage and USF eligibility. And I mentioned my bill that I introduced, H.R. 1546, the Rural Wireless Act, to require FCC to improve data collection for developing these coverage maps. Because, really, it is the case; it is kind of, if it is garbage in, it is going to be garbage out, basically.

Did you want to mention anything about my bill? Hopefully, you have had a chance to look at that as well.

Mr. Carlson. Yes, Congressman, I have had a chance to read your bill, and it is an excellent bill. I applaud you for getting the process started, because this is something we need, to get good data, so that rural America can get policies made by Congress and by the FCC that is data-driven, that is accurate, and that will give rural citizens not the chance, but to give them the opportunity to have services that are reasonable comparable to those that exist in rural areas.

We would be delighted to work with you to make sure that the bill really gets the FCC to do what you want to get them to do.

Mr. Loebsack. Thank you so much, and I do appreciate your testimony.

Obviously, Mr. Berry, the same question.

Mr. Berry. Absolutely, CCA strongly supports your legislation and really look forward to seeing a standard that is a usable standard that really provides guidance to the FCC for the future.

Mr. Loebsack. Thank you.

Mr. Berry. Thank you.

Mr. Loebsack. Thanks to both of you. And, look, as Co-Chair of the Rural Broadband Caucus -- you mentioned, I think, Mr. Berry, that a number of us sent a letter to the President advocating for the inclusion of rural broadband in any infrastructure package. I think we are all agreed that that ought to be the case.

But the policies we are talking about today are a good first step. There was bipartisan consensus surrounding many of these issues last Congress, but they only get us so far. For example, tribal lands, we all want more coverage in tribal lands, but in Iowa that is only .3 percent of our land. So, that is important, but we have got to go further than that.

I want to make sure that whatever we do makes a difference in places like Iowa. And there is no doubt, of course, that we do need real direct investments for fixed and mobile broadband,

as well as, if we are really going to get the kind of broadband we need in rural areas. And I think this whole funding question is something we are going to be struggling with. We are going to have more time to discuss that. But, clearly, it is going to have to be some kind of a balance, some kind of a mix of different mechanisms going forward. And I am looking forward to having that discussion in this committee and, then, beyond as well.

But any of you want to have any further comments about funding and how we go forward on this? I know we have heard from you, Ms. Hovis. Any others?

Mr. Carlson. I could make a comment. As I said, I don't think the funding that is there today in Mobility Fund II is sufficient to bring rural America up to urban quality standards. And I think when we get the accurate maps, all of us will see how short that funding is. But that is okay. It is okay to see the problem as it really is because, then, we can decide where we should start on the problem and how we should think about the size of broadband infrastructure spending, as we look forward to working on a bipartisan basis to get that infrastructure spending put in place.

Mr. Loebsack. Thank you, Mr. Carlson.

Thanks to all of you. If you would like to respond in writing, that would be wonderful. I have reached the end of my 5 minutes. I certainly don't want to ask the Chair to go over.

Thank you, Madam Chair. Thank you all.

Mrs. Blackburn. Thank you. He yields back.

Mr. Johnson, for 5 minutes.

Mr. Johnson. Thank you, Madam Chair.

You know, before I start my questions, I would just like to point out to our committee and to our panelists the importance, as we migrate from 4G to 5G, it is going to be very important that we change siting rules at the federal and local levels for wireless carriers because that modernization is needed, so that it is not going to take years to site something the size of a pizza box on a tower or on a fixture, and that the rent to the carriers is reasonable, so that we can begin to see some real progress in expanding broadband coverage throughout or internet coverage throughout rural areas.

With that, Mr. Murray, you highlight what appears to be a success story with regard to the Navy shortening the timeframe for siting of commercial towers on Navy and Marine installations. Are we to understand that this success has not bee replicated across DoD and the other branches of Service?

Mr. Murray. I am going to defer to the written record. The Wireless Infrastructure Association, they will dig deeper into that. I do know, just from my discussions with them, that certain agencies are receptive; others aren't. Much of the discussion of federal lands, you know, we think of, although Iowa doesn't

have many federal, well, it doesn't have many Indian lands, but there are lots of federal lands even in just Fairfax, Virginia. I guess some agencies are more receptive than others.

Mr. Johnson. Do military personnel use their personal phones to contact public safety services when on base? Do you know?

Mr. Murray. I don't know the answer to that.

Mr. Johnson. Mr. Berry, you are shaking your head.

Mr. Berry. Yes, and I think it does go a lot to the manager of the facility or the federal land itself, and it is even for DoD. I have been called by commanders of a couple of Air Force bases asking which carriers in the area can they work with to ensure that their base residents can have access to wireless. And I think we have introduced them to several ideas: that not only can you get access to quality broadband wireless, but they could actually utilize that even in some of their deployment scenarios on base. And I don't think that many, especially in DoD, were under the impression that they could do that and not interfere with the tactical communications systems that they have and utilize in deployment.

And so, education is part of the issue. At least the couple of Air Force generals I spoke to were very interested in sharing that they had an improved methodology.

Mr. Johnson. I can tell you I spent 26-and-a-half years in

the Air Force, and I was an IT officer. I know what my response would be. It would be let's get her done. You know, make it as quick as we can.

Mr. Murray, also, we have a whole system of infrastructure siting rules at the federal as well as the local level that probably made sense for 200-foot macro-wireless towers. But does it make sense to use rules designed for macro-towers when wireless carriers will be rolling out small cells, as many as 300,000, around the country? Don't we need to update rules for updated technologies?

Mr. Murray. Yes, we absolutely do. The networks today, they are a combination of solutions. If you drive to Baltimore, the phone works in the Baltimore Tunnel and that is a distributed antenna system. If you have a good signal at the Metro stop, it is through DAS.

A good deal of the discussion this morning is coverage in rural areas. The macro-site, the tall tower, 199-foot monopole or a lattice tower, that still has a long, healthy future in this country. But the solution is going to be a combination of solutions, a Swiss Army knife, if you will.

Mr. Johnson. Yes.

Mr. Murray. As far as the rules go, no, we have a challenge. The small cell, and there is an entity that is claiming that a small cell is 120 feet. I mean, there has to be respect for the

standards that have been in place for 30 years.

In our thought -- and I will repeat -- I mean, to us, you take a utility pole. You add 10 feet. You add some antennas. That is roughly 50 feet. And that is a good definition of a small cell. That and stature less than that we believe should be expedited in some fashion.

But local control, responsible local approval is a good idea. A pet peeve of mine is I would love to see Congress fund the FCC more on the proceeding that they are doing on health. I can't tell you how many very difficult hearings I have been through, hearings to get a single tower approved on a given night. And there is a tremendous fear among a lot of citizens who live near a tower application about the dangers of this, and there really aren't.

There is all sorts of data. But the FCC was studying that, starting in 2013. We would like, I, as a tower developer, and those who develop new towers would like to see more information updated by the FCC on the safety of living within the vicinity of wireless infrastructure.

Mr. Johnson. Okay. Well, thank you, Mr. Murray.

I am sorry for going over, Madam Chair. I yield back.

Mrs. Blackburn. The gentleman yields back.

Ms. Matsui, you are recognized for 5 minutes.

Ms. Matsui. Thank you very much, Madam Chairman.

I want to follow along on some of these siting concerns. We have heard that it often takes a long time for a broadband infrastructure company to gain the relevant approvals necessary to site the infrastructure on federal land. In addition, we have heard that lease terms are short for siting such infrastructure, resulting in the situation where broadband developers that site on government property are frequently renegotiating.

And the discussion draft under consideration today seeks to increase some of the lease terms that some agencies offer. Do you think, asking Mr. Berry, this provision strikes the right balance?

Mr. Berry. I think definitely we need to address it. And I can tell you individual horror stories about a carrier that got approval for Mobility Fund II monies to build towers on a Park Service property, and the timeframe that the FCC set to actually build the tower expired before the Park Service would actually give them a license, a permit. Even though in one instance the federal entity asked the FCC to grant an extension, the extension wasn't granted. So, we have those problems that constantly occur, and it would be very helpful to have a little more flexibility on both the federal entities' sides.

Ms. Matsui. Okay. So, we need to ensure that we enable more timely broadband deployment then?

Mr. Berry. And another thing we are learning is that the

master plans that many of these agencies deal with, like BLM, the Department of Interior, the Department of Defense, Forest Service, are 20-year master plans. And so, how do you get in and chance a 20-year master plan when the agency says, "No, we are not going to really address that for another five years."?

Ms. Matsui. Oh, okay.

Mr. Berry. And I think they did that in an Executive Order. Ensuring that those types of services, i.e., wireless and telecommunications services, is an acceptable, approved activity on federal property will go a long way to helping some of these land managers that do want to find solutions.

Ms. Matsui. Okay. One of the discussion drafts that were offered today would create an inventory of federal property that could be used to help deploy broadband infrastructure. In addition, this draft would also permit local and municipal governments to add their existing facilities to the inventory, so they might be better utilized by broadband developers.

This question is to Mr. Berry and Mr. Murray. Would your members be interested in having their infrastructure added to such an inventory?

Mr. Berry. I think many of our members would like to have the knowledge that their network is there. Obviously, you get into concerns about the type of facility or the type of access, and there are different rules for different types of broadband

services and mobility services. So, that would always be a concern.

Ms. Matsui. Sure.

Mr. Murray?

Mr. Murray. Yes. There are many small tower developers who are already in partnerships with non-private entities. In Fairfax County, for example, a competitor of ours has made an arrangement with the public schools. So, they have developed tower sites at public schools and replaced light poles, and that has worked beautifully.

I will throw out that we at the Wireless Infrastructure Association are tremendously in favor of longer lease terms on these federal lands. I am local, and I welcome anyone in the room, if you want to see a tower site and visit an actual telecommunications tower, I will set the tour up.

But, when you see a tower, you realize, holy mackerel, this thing needs to be here for a long time. It is a huge amount of steel. There are utilities coming in. There is fiber coming in. This is not something, "Oh, well, we'll just move it somewhere else in four years." I mean, there has to be long duration.

Sorry for the time run.

Ms. Matsui. No. Is there currently coordination between federal and state and local governments? And would this discussion draft help foster this sort of cooperation? Anyone

here?

Mr. Berry. There is some coordination, but not nearly enough. I think the legislation that you are considering would facilitate that greatly.

Ms. Matsui. Okay. Mr. Murray?

Mr. Murray. The industry, the carriers have all sorts of holes in their network. This is, again, from the macro-side perspective.

Ms. Matsui. Right.

Mr. Murray. And they hire consultants to go out and try to find places where they can plug these holes. So, the consultants are aware of this county is receptive; this other county is not. But the general perception, at least among my colleagues nationwide, is that the federal lands, I mean, good luck; I will see you in four years. I mean, there are so many hurdles, if you will. But I am not aware of good coordination between local, state, and federal.

Ms. Matsui. Okay, fine. I have run out of time. So, I yield back. Thank you.

Mrs. Blackburn. Thank you.

Mr. Olson, for 5 minutes.

Mr. Olson. I thank the Chair.

And welcome to our five witnesses.

My first question will be for your, Mr. Carlson, and you,

Mr. Berry. And this morning I want to empower you all. And so, we are going to trade places.

Like many Americans, you are about to move to Texas.

[Laughter.]

You are coming there most at income tax zero and the cheap price for a gallon of gasoline, just around $2. You may move to Plano, Texas, Congressman Sam Johnson's district. Sam is retiring. You want to run for Congress, join that massive fray that will happen November of 2018.

Plano is kind of urban, so a little different concerns there. But my question is, you are having a townhall. I am a constituent. Broadband is the issue. I will ask, "What can Congress do, what would you do to improve broadband access? What is the FCC's role? And can you eliminate rules and other issues, as a Congressman?"

So, Mr. Carlson, you first.

Mr. Carlson. Oh, yes, thank you for asking the question.

Well, the first thing, you can see from my speech, that I would say needs to be done is the FCC needs to be encouraged or a bill needs to be passed requiring them to collect the proper data about what the coverage really is in Plano and the surrounding area, because I am sure Plano depends on its surrounding rural communities. It is a two-way street, right? Rural America supports the urban areas, and vice versa. So, that is the first thing.

And then, I would want to find out whether or not the FCC had allocated enough funds to accomplish the job in terms of bringing urban quality service out to Plano and the area that surrounds it. And if the FCC had not contemplated enough funds to do that throughout America, including the great state of Texas, I would want to find out how we could get that funding, whether in the broadband or the infrastructure bill that is being talked about, bipartisan, which is a great thing, or otherwise.

Because the job needs to get done. Broadband service is critical infrastructure for life in America today, in Plano, and in all communities like Plano throughout this great nation.

Mr. Olson. "Congressman," Mr. Berry, your suggestions? FCC, Congress, and other things we connect?

Mr. Berry. Well, I am going to assume that Congressman Olson has already established that we need a new set of data at the FCC, and you fix that by the time I get there.

But what I hope is that the other issue is that we will adequately fund the broadband deployment and broadband coverage in rural America. I mean, it is an issue of jobs and economic stability in rural America. If you want someone in the back 40 in Texas to be able to compete with somebody in Tokyo or Korea or in China, you have got to have access to connectivity and you have got to have an ability to experience and engage in the economy, the global economy that is going on. That is what is

going to keep your constituents in their district and not have to move to LA.

Mr. Olson. Well, welcome, my friends, to Texas. Howdy, you all.

[Laughter.]

The last question, Mr. Carlson, I work for Texas 22. It is a suburban Houston district, mostly suburbs, but probably one-quarter agriculture. But they have good access to broadband. Ninety-two percent are served; 2.5 percent are underserved, and 5.6 percent are unserved.

But I am intrigued by the cost savings for cities and towns that come from 5G services by adapting a, quote/unquote, "smart community". For instance, a Deloitte study found that the adaption of smart grid for 5G could create $1.8 trillion in revenues for our economy. How do we educate our cities, both urban and rural, how to access this, because this is lots of jobs, lots of money? Any suggestions, Mr. Carlson?

Mr. Carlson. Well, 5G is coming. I just had a chance to go to the Mobile World Congress. So, I would suggest that, if your city is big enough to fund a trip to next year's Mobile World Congress in Barcelona, you take the appropriate leader or leaders of the city over to that Congress and you see what the reality is that is being talked about, because it is going to be coming in the year 2020 for commercial deployment for mobility. It is

going to be real.

It is already going to be in Korea in 2018 at the Olympics and in Japan in the Olympics in 2019. It will be here. It is mostly going to be an urban phenomena at the beginning, but it is going to be very important in increasing people's speeds, so that downloading a movie or getting access to a big data file will be almost instantaneous.

It is a wonderful development, and it needs to be spread throughout the country, but people need to be educated as to what its potentiality is. One way to do it is to call in the vendors, people like Ericsson, Nokia, Samsung. Call them in and they will be glad to make a presentation, I think, to the city leaders about what 5G could mean for their city. They all want to get into the smart city business. So, invite them in and have them pitch you on it.

Mr. Olson. Thank you, sir.

I am out of time. I yield back. Thank you so much.

Mrs. Blackburn. The gentleman yields back.

Mr. McNerney, you are next in the queue.

Mr. NcNerney. I was going to yield my place to Mr. Ruiz, Dr. Ruiz.

Mrs. Blackburn. Dr. Ruiz, you are recognized to take his time.

Mr. Ruiz. Thank you very much. Thank you, Madam Chair.

Thank you, Mr. McNerney.

I want to take a moment, step back, and highlight the human story behind the deployment of broadband infrastructure. Stories like that of the whole Indian tribe located in northwestern Washington State where the reservation and surrounding communities completely lack access to broadband internet; like the story of the Torres Martinez tribe in my district and eastern parts of the Coachella Valley in rural areas where they also lack access to broadband internet.

For them, this means that students are forced to take a bus over an hour away to complete their mandatory testing. Local residents cannot take advantage of educational opportunities, such as online college courses and career development classes, and the tribal governments cannot access webinars and online technical assistance, resources which are vital to successfully applying for federal grants and programs.

Unemployed individuals cannot access the internet for job opportunities. Hospitals cannot build their ITs and the Indian Health Services cannot provide care because they don't have the internet support. And residents do not have access to the internet to learn about public health measures to better their health care.

This is just one story, but part of a bigger picture where broadband deployment on tribal lands continues to lag behind that

of the rest of the nation. And that is why today's hearing is so important, because supporting broadband infrastructure on tribal land is a part of supporting our federal trust responsibility.

But we have a responsibility to do more than take testimony on this issue. We must act and pass legislation to help make access to broadband a reality for all. And that is why I introduced the Tribal Digital Access Act, to help close the divide throughout Indian country, and why I am very pleased that we invited the Saint Regis Mohawk Tribe today to speak on behalf of their tribe that has successfully deployed broadband in rural New York.

So, this question is for Sub-chief Michael Connors. It is good to see you today, and thank you for taking the time to testify.

The Saint Regis Mohawk Tribe has worked hard to provide broadband internet service to its members and now the surrounding community. What is the biggest challenge the tribe has faced in getting to this point and developing further?

Mr. Connors. Thank you for having us today, Dr. Ruiz.

Our biggest challenge has been the sustainability of the broadband operations on territory. We received the grant in 2009, and over the next several years it was deployed and the fiber was laid out on territory. In the past several years, we have learned that just being on territory is not a successful business

model for us. We have had to expand off territory.

We are able to provide a small amount of funding for some of the expansion, but we couldn't do it all. That is why we got to apply for the New York State grants. We didn't get round one, but we received round two. So, that off-territory expansion is coming in the future, and that will get us towards a sustainable business model.

Mr. Ruiz. So, it sounds like a win/win situation where not only you can provide broadband for tribal members, but the surrounding non-tribal lands as well, where the incentives currently are not there --

Mr. Connors. Right.

Mr. Ruiz. -- to provide the broadband infrastructure. So, if we invest in tribal communities, the tribes will have broadband infrastructure and the neighboring communities will also have broadband infrastructure, is that correct?

Mr. Connors. Correct. In our testimony, we talked about Lewis County and Clinton County. The counties are coming to us. Based on our success, they are coming to us looking for the expansion, and that is how we received the grants in Lewis County, because they were lobbying their own representatives in their area to further their expansion.

Mr. Ruiz. Can you give me an example of how this has helped tribal members or the tribe in your area?

Mr. Connors. Well, just some small examples are educational opportunities, economic development opportunities, and employment. In today's world, education has all gone digital and online, and our students are being able to have their educational opportunities at home, something as small as emails going back and forth with the teachers at the schools.

Mr. Ruiz. Thank you.

There is a classroom in my district that has to print a YouTube video from home. Teachers do this and they show a YouTube video on sheets of paper and try to narrate what it is about. So, this is unacceptable in schools throughout our nation.

Mr. Berry, can you shed light on some of your successful practices? I understand you have tribal members as part of your organization. Can you talk about how working with tribes has been a success for you?

Mr. Berry. Yes, and thank you for the question, Congressman.

Yes. Yes, we do. We have several tribal carriers that are members of the CCA. We also have several carriers that specialize in providing not only rural, but services to tribal lands. And I think they have been very successful working with the tribes.

I mean, again, this is an investment opportunity, and many of the tribes understand that they have to get to that coverage area. I know that we talk a little about 5G all the time, but

when you don't have a signal and you don't have coverage, your first priority is to ensure that you have the capability.

And I think in the rural areas in the tribal lands they have successfully brought in services in economical ways. What you will learn is most of the rural and small carriers face the same challenges, whether it is on a tribal land or not. You know, the 1996 act clearly identified reasonable, similar services should be the goal, and then, Congress has already stated that.

I think tribal lands have for far too long have not had the resources directed, not only through the Mobility Fund, but through the other funds at the FCC. I think that is one area that we need to address.

Mr. Ruiz. I think we can work in a bipartisan fashion to pass the Tribal Digital Access Act and get the resources that they need.

Thank you.

Mrs. Blackburn. Yields back.

Mr. Lance, for 5 minutes.

Mr. Lance. Thank you very much, Madam Chair.

Mr. Berry and Mr. Carlson, 5G is estimated by Accenture to bring over $67 million in GDP growth and 409 jobs to the district I serve over the next seven years. However, I understand that, in order to realize these benefits fully, there will need to be considerable investment in physical infrastructure to deploy 5G

small cells. In your expert opinion, how are the barriers to 5G deployment unique and how are they similar to the barriers we still face for 4G LTE deployment?

Mr. Berry. Well, first of all, thank you for the question.

First of all, again, you have to have coverage. The second issue is, in a 5G world, you are going to have to have substantial requirement for backhaul. And getting back to either fiber or getting through a microwave link, or even using an LTE aggregated spectrum platform that you can use backhaul off your own network, it is going to be very, very difficult.

And so, I hope that the infrastructure investment opportunities that have been talked about not only here on the Hill, but downtown, actually bring some more dollars to the table to build not only the backhaul, but build out the networks at the 4G LTE. Because that is going to be the building block for the 5G world.

And I know that we talked about 5G for the cities, the smart cities. That is happening now in many areas. And if we can't sufficiently build out the coverage in 4G LTE, we are going to have a very difficult time in rural areas. And some of your district in the far-western end does have some rural areas. So, I know that you are interested in that, too.

Mr. Lance. Well, thank you very much.

Mr. Carlson?

Mr. Carlson. Yes, I will just add to that. Well, first, let me reemphasize the fact that you need a base layer of 4G in existence before you can get the 5G built on top of it, because 5G is really a supplementary service that integrates well because the standard for 5G is being designed to integrate with 4G. So, we need the 4G service ubiquitous at a high-quality level and, then, layer 5G on top of it.

But I would emphasize spectrum availability for 5G as a critical need. There has been some spectrum made available by the FCC, and we are certainly grateful for that, but there is more spectrum that needs to be made available, and made available on a basis where carriers can have confidence that they will have access to that spectrum over a longer period of time.

As was noted by the other panelists, when you make an investment in building out a network, you need to have assurance that your investment will have a long life to it because the equipment has long lives, 10 years, 20 years in some cases where you are putting in fiber. So, we need licensing that is consistent with the timeframe of the investments we are making.

Mr. Lance. Thank you very much.

Mr. Murray, in 2009, the FCC used its authority to impose a shot-clock by municipal reviews of sitting applications, and that shot-clock was upheld by the United States Supreme Court in a 2013 decision. Given that the shot-clock is now the law of the

land, are you still experiencing delays in dealing with municipal authorities and, if so, what sort of problems are you encountering and how should we remedy them?

Mr. Murray. Thank you, Congressman.

Shot-clock has worked okay, not great. We have developed in northern Virginia and central Virginia -- northern Virginia has -- I don't mean to be pejorative -- but there are a lot of NIMBY households, and central Virginia there is a ton of history. So, I chose to develop towers in some tough areas.

The shot-clock in northern Virginia, there are two or three occasions where my zoning attorney has said to us, "We're held up. They're not going to make the timeline. Do we want to grant them an extension?" And we can either be denied tonight or we can agree to an extension. So, it is sort of a gun-to-the-head thing.

I think it, in general, has put localities, made them more aware that they can't drag their feet forever, but there are still cases where we sort of have to agree to a deal that we don't like in terms of extensions.

Mr. Lance. Thank you very much.

And, Madam Chair, I yield back 16 seconds.

Mrs. Blackburn. I will tell you what; you might win the prize.

Mr. Welch, you are recognized for 5 minutes.

Mr. Welch. Thank you very much. First of all, Madam Chair, I want to thank you for having this hearing, and our Ranking Member, Mr. Doyle.

This question of rural broadband and infrastructure in rural areas is like incredibly important. And Mr. Latta and I, working together on the Rural Caucus, know that.

And I wanted to say a couple of things. No. 1, this is important not just for rural America. Rural America is on the ropes. I mean, commodity prices are down, whether it is in coal country or it is dairy country, farm country, and rural America is vital for the strength of all of America. And we believe that or we don't.

But what is strong about rural America is when it has a solid local economy, the folks who have value of family, of community, of services, of building up the local fire department, of serving on the local bank, they have an economy that can work for them and they have that community cohesion that I believe this country needs.

And that is true whether you are in Vermont or you are in Ohio or Texas. Rural America matters. We cannot have rural America without full commitment to the tools it needs to be successful.

We have got some folks from Vermont here. We have got a company that absolutely is dependent on the infrastructure of the

broadband.

And the question for us, we agree on that in this committee, and you have been providing leadership on this. But I also think we have got to get serious on this where we get a commitment to real funding and real policies that are going to give these folks who are here and are committed to rural America an opportunity to be successful on behalf of the people we represent. So, we have got to get moving on this.

And it is not going to happen on its own. If we need regulatory changes, we need investment, money, with public policy, my view, we have got to do it. We are not getting it done. We don't even have an infrastructure plan before us to consider in Congress. And I think our committee should be taking the lead on conveying a sense of urgency that we have got to get moving.

Now I just want to ask -- I will start with you, Mr. Carlson -- how would you define broadband that would be in the spirit of the 1996 act relatively comparable, reasonably comparable to what we have in urban areas?

Mr. Carlson. Well, I can speak to mobile broadband. A recent study came out. It was dated the middle of last year. So, it is already a little bit obsolete, right, but not significantly obsolete. And that showed that in urban America -- excuse me -- across all of America that the broadband speeds, the mobile broadband speeds now are at 12.5 megabits per second.

Mr. Welch. Let me ask you to speak in a little more --

Mr. Carlson. 12.5 megabits per second. And as I indicated, I think those are growing about 15 percent a year. So, by the time the Mobility Fund II auction is concluded, you should anticipate that that standard across America, which includes rural areas -- so urban areas are higher -- is probably going to be 15 megabits per second.

Mr. Welch. Okay.

Mr. Carlson. Megabits per second. So, any area that is significantly lower than that is going to be substandard.

Mr. Welch. Okay. Ms. Hovis?

Thank you.

We have got to agreement on what the goal is.

Ms. Hovis?

Ms. Hovis. When I think about this infrastructure, wired or wireless, a lot of it in my experience just comes back to fiberoptics. None of this mobility, none of this wireless, and certainly not 5G, is possible without fiberoptics.

So, I guess my answer to you, Congressman, is that whether it is a metropolitan area or a rural area, we need as much fiber infrastructure as possible, because faster wireless speeds won't be possible unless we have the fiber. And the greatly escalating speeds on the wire-line side in metro areas, we are moving toward gigabit speeds in certain markets.

Mr. Welch. Okay. I am going to have to stop you there. In just a few quick words -- I only have 40 seconds left -- starting with you, Mr. Murray, and going down, Mr. Connors and Berry. Success, your definition for rural America?

Mr. Murray. I completely agree with the need for fiber. One thought I had -- and it is in its infancy -- is I am hearing from everybody we don't know, there aren't good standards, there isn't good knowledge of what the coverage ought to be. Maybe what Congress should do -- you are saying, how can Congress help? -- maybe what Congress should do is insist that localities have better maps. Do the mapping that they, for whatever reason, need to report back up to where their infrastructure is. And that may be a way to get better maps. Without good maps, you cannot tell where the problems are.

The issue I have is maps of tower sites. I get into a county and say, "Well, where are the other towers?" I say, "You're the county" --

Mr. Welch. Thank you. My time is up.

Mr. Murray. Sorry.

Mr. Welch. But I thank you.

And I yield back.

Mrs. Blackburn. Mr. Latta, you are recognized.

Mr. Latta. Well, thank you, Madam Chair, and thanks again for having this hearing today. It is very, very informational.

I also want to thank all of our panelists today for being with us today.

As the gentleman from Vermont just mentioned, he and I serve on the Rural Caucus here in this committee. My area goes from urban to very, very rural. And so, when you are looking at rural America, you know, as again has been mentioned, you have got safety issues, the small business issues. You have got agricultural issues.

But we have also worked on the Internet of Things together. And so, we have been seeing things across the board as to how we can get this country moving and get this out there.

But one of the other things about serving on this committee, you hear great things that are going to be happening. You are not looking kind of at the end of the car. I remember I took driver's ed a long time ago, and I can remember my teacher saying, "Don't look at the end of the car because you've passed it. You've passed it."

And so, I know that a couple of years we were told that, by the end of this year, that worldwide we would have 1.6 mobile devices per capita across the globe, or about 6 or 7 in the United States. Recently, I saw a statistic that said we will have between 25 to 50 billion interconnected devices by the year 2025, and that number is probably wrong.

But, Mr. Berry, when I looked at your testimony, because,

again, you brought up some statistics here, and again you cited a Cisco report that said that the mobile data use grew 63 percent in 2016 and 18-fold over the last five years. But, then, they also say that, when you go out looking over that horizon again in the next five years, we are going to see another seven-fold increase.

Question: from what you presented us right here, when you look at what you are facing out there, how do we get that seven-fold increase out there when we are moving, trying to get everybody connected out there, but also have the situation where you have something that looks like this?

I am going to ask everybody real quickly, if I could, what would be your dream? I know, Mr. Carlson, you talk about data that the government needs to really have. But what would be your one desire or goal for us or the regulators that could help this problem right here?

Mr. Berry. Wow. I will note that, after you look at that, you wonder how in the heck we actually have a wireless network even built with those type of impediments. But the study, the Cisco study, a seven-fold increase on top of what would be an 18-fold increase. You are going to have to have more spectrum and you are going to have to have greater builds.

With those type of impediments, you are going to come up to a roadblock, especially when the small cell site that we are

talking about right here is treated like a tower. And so, streamline that --

Mr. Latta. What were we doing before we started it?

Mr. Berry. I think deem granted, deem approved, if not responsive from federal and state and local levels. Education is a big issue. If I were a local municipality and I wanted to make sure that my citizens were adequately served for a broadband product, I would actually put together a model plan to say, "Hey, come...." Investment is sort of like water; it is going to go to the point of least resistance. I would say, "Come to my town because here is the deployment plan that we put together and here is what you can guarantee that we are going to get approved post-haste in 30, 60 days."

That is the type of investment that Mr. Carlson and other wireless carriers are going to have to make. Those are the types of predictable assurances that you are going to need at the federal, state, and local level. The federal level, I think you do have a lot to say about improving and streamlining that process post-haste.

Mr. Latta. Just real quickly because I have one minute left, Mr. Connors.

Mr. Connors. From a tribal land, we need to have the federal government respect the trust responsibility to consult with tribes. And decisionmaking, we need to sit at the decisionmaking

table and be seen as partners in the decisionmaking process, not just a requirement to check off a box, but to be partners and to move forward in a positive manner as partners.

Mr. Latta. Mr. Murray?

Mr. Murray. Yes.

Mr. Latta. Just real quickly.

Mr. Murray. Just continue to encourage collocation on the macro-structures. Let's define small cells. It is great that we have the visual aid here. That is not a tower. And I think opening federal lands will help in a lot of areas.

Mr. Latta. Ms. Hovis?

Ms. Hovis. Congressman, a lot of the processes on that diagram with regard to local governments don't really exist in rural communities. There is not a lot of that kind of process or fees or jumps, hoops you have to jump through, in rural communities. In rural communities the challenge is the economics just don't attract private capital and we have to change that.

Mr. Latta. Madam Chairman, I see my time has expired.

But, Mr. Carlson, I know I have written down on yours --

Mrs. Blackburn. Go ahead, Mr. Carlson.

Mr. Latta. Again, Mr. Carlson?

Mr. Carlson. I would agree that the deem granted would be a great advance.

Mr. Latta. Well, thank you very much, Madam Chair. I

appreciate it and yield back.

Mrs. Blackburn. Yield back.

Ms. Clarke, for 5 minutes.

Ms. Clarke. Thank you, Madam Chair. I thank our ranking member. I thank all of our panelists for their testimony here this morning.

I would like to add another dynamic to the conversation coming from Brooklyn, New York. This question is directed to Ms. Hovis. We have heard a lot about the challenges with respect to rural America. I can certainly appreciate those challenges.

One of my observations is that there is some disparity as well with deployment in urban environments. And I don't want us to be under this impression based on generalized conversations about the fact that there are challenges for urban environments, particularly for a city like New York where we are severely behind in the deployment of fiberoptics.

In the context of broadband, can you discuss how public/private partnerships can be used to bring affordable high-speed broadband to communities that are currently unserved and underserved? And I think it applies across the board. Because certainly in cities like New York where you have disparities based on socioeconomics, it is very similar to what people are experiencing in, say, tribal lands and perhaps also the urban environments. Would you share your thoughts with us?

Ms. Hovis. Thank you, Ms. Clarke.

Yes, I totally agree. I see those kinds of challenges in urban areas all the time, in part, because there are certain urban neighborhoods that simply aren't as well-served; for example, small business neighborhoods that may have the benefit of some old phone company infrastructure that might be providing some broadband, might be sufficient to service small business need, but there may not be cable infrastructure in that area because cable traditionally just went to residential areas. So, there is no competition. Pricing is high and service is not very good, exactly what you would expect in an environment where there is not competition.

And residential neighborhoods will have the same kinds of challenges because private capital is upgrading networks in better neighborhoods. Where a public/private partnership can help there would be, if a city, for example, can build and lease its own infrastructure to the private sector and, thus, allowing private sector opportunity and competition in those neighborhoods, using some public assets potentially, and if there are mechanisms for enabling and supporting and rewarding cities for that, rather than punishing them, then we can see ways that public and private would both benefit and we could fill some very substantial broadband gaps.

Ms. Clarke. Would say that tax incentives in and of

themselves can fix this problem?

Ms. Hovis. Well, I don't think so because, all other things being equal, the tax incentives will just make more lucrative the deployment patterns that already exist, which is that private capital -- and this is not a pejorative statement; this is reasonable -- private capital will flow to the places where revenues are greatest and build costs are lowest. And that doesn't mean rural areas and that usually doesn't mean very low-income areas, either.

Ms. Clarke. Very well.

Mr. Murray, you talked about 5G, Internet of Things, and the next generation of wireless networks. How can we ensure that some communities are not bypassed? What is needed to deliver 5G to urban and underserved markets as well?

Mr. Murray. Well, small cells, I think I have a sense of Brooklyn, just thinking of your district; I have two children that live in Brooklyn.

Ms. Clarke. Everybody's children live in Brooklyn.

Mr. Murray. Yes, right.

But my guess, from what I know about deploying a signal, is that small cells will play a huge role in a place like Brooklyn for decades to come. You have huge capacity problems, and small cells, essentially, bringing the antennas from 199 feet down to 40 feet. Put them on the corner of the building.

So, I think to the extent every cell site needs fiber today, which is daunting to think about the mule dragging the fiber up in a rural area that Ted was referring to. But in a place like Brooklyn, I think you are going to end up with really good service because the carriers are densifying these networks. More fiber needs to be laid, obviously, but it is a good place for small cells.

Ms. Clarke. Are you confident, for instance, that wireless providers will be able to deploy small cell technology at a volume sufficient, so as to provide universal coverage?

Mr. Murray. I would expect so. What is the definition of universal coverage?

Ms. Clarke. To make sure that across the spectrum of communities that everyone is accessing.

Mr. Murray. Yes. Again, Brooklyn's greatest playing card in this whole game is density. You can put these inexpensive small cells literally on street corners. And to the extent you can connect fiber with them, you are going to have unbelievable service.

Ms. Clarke. Thank you. Madam Chair, I yield back.

Mrs. Blackburn. Thank you.

Mr. Long, 5 minutes.

Mr. Long. Thank you. Appreciate it.

Mr. Carlson, to get ubiquitous coverage of 5G, it is going to take more than 300,000 small cells deployed across the country.

And I saw an interesting story recently that suggested that the fees charged to small cells are increasing exponentially. In fact, in a Minnesota city, in the span of just three years, they increased the fees for siting small cells from $600 to $7500. I appreciate that some cities and states find themselves in economic straits, but how do you make sure that siting application costs and management fees don't become a deterrent to deployment?

Mr. Carlson. Well, I think it is an excellent question. I haven't really thought about that question in depth. I think there needs to be answer to it, but I would respectfully ask that maybe we could get back to you with our thoughts on that, because it is a big challenge.

Mr. Long. It is.

Mr. Carlson. On the one hand, you have the right of the city to charge what it wants. On the other hand, you have the need of the carrier to deploy. Should you overcome the right of the city to charge what it wants? I would really like to think about the answer to that.

Mr. Long. If you will and get back to me, I would really appreciate it because it is from $600 to $7500. I understand your point, but that is a little bit of an increase.

Mr. Carlson. Right.

Mr. Long. And let's see, for Mr. Berry, in Japan, South Korea, China, and the EU, they are all working to regain a position

of leadership in the wireless space. What has the benefit been of U.S. leadership in 4G and what would be lost if we don't set the pace in the deployment of 5G services?

Mr. Berry. Thank you, Congressman Long.

I think we have benefitted greatly by the new jobs and new services and new technology that we have been encouraging and been able to deploy on the 4G LTE systems. I think if we are not the leader in the 5G system, the 22 million that Qualcomm said would be attached to 5G with $3.5 trillion may not be coming to the United States. It may be going to those other areas. And I would like to think that somebody in rural Missouri is just as innovative and has just as great a capability of being productive in a rural area in Missouri as they are in downtown Tokyo.

And I would go back to your first question to Mr. Carlson. That is a huge problem, increasing the fees. This small cell site right here costs $6,000. If you are going to have to pay $7500 to put it in and also pay annual renewal fees on top of that, then that municipality is losing the opportunity to do just what you would like to do globally, which is be the leader in the 5G world.

I think education is a huge issue there, and I think hearings like today go a long way to make that point. But they need to understand, if they look at it as a revenue stream, then they are not going to get the capabilities. And you have the legislation before you that tries to tie the value of the cost to the actual

cost of the license and the license application review and the management of the right-of-ways.

Mr. Long. Okay. Let me get one more in quickly here for you and/or Mr. Carlson, whoever would like to tackle it. But in my front office here in the Rayburn Building I have a sign that says, "Bring back common sense." And it is the most popular sign in my office.

We can all agree that there is a digital divide between urban and rural America. It is imperative that we promote the deployment of broadband networks in rural, unserved areas like in my home state of Missouri. However, to fix the problem, we need to correctly identify the problem. I think a common-sense first step we can take is correctly identifying where broadband is needed before spending the money.

For you, Mr. Carlson or Mr. Berry, both of you talk about the importance of data and Form 477 in your testimony. In fact, Mr. Carlson, you make a great point when you say making smart, targeted investments begins with accurate measurement.

My question is, what has the FCC done to improve its data collection and what more can they do?

Mr. Carlson. Well, my view is that we haven't done nearly enough or I should say the FCC hasn't done nearly enough. I am sure that they were well-intentioned when they originally designed that 477, but that was years ago and needs have become

more apparent, more obvious now. And now, they need to improve that data collection process.

We have volunteered for our company to provide that data on the urban quality level standard within weeks of the time that they would ask us for that. We believe that large carriers, most carriers, can provide similar data within a period of months. All they have to do is ask or, if a carrier won't provide the data, to require it. It is not a big job. Most of the data sits on computers, and the data can be gotten easily.

Mr. Long. Okay. I am way over time, but do you have anything real quickly on that?

Mr. Berry. I will do ditto on that. We strongly agree, and I really do hope that the FCC will address this immediately because the Mobility Fund II, which they just approved, over the next 10 years is going to spend $4.53 billion, not enough, but certainly not enough if you don't have the data to know where to spend it.

Mr. Long. Okay, thank you.

Madam Chairwoman, I have no time, but if I did, I would yield it back to you.

Mrs. Blackburn. I appreciate that.

Ms. Eshoo, the time is yours.

Ms. Eshoo. Thank you, Madam Chairwoman, and congratulations on your chairmanship of the subcommittee.

I think that this hearing today is maybe not equal to

importance as the nomination hearing for the Supreme Court, but I think it comes in as a close second because the subject matter is an essential for our country. It is an essential for our country.

Broadband access is a basic necessity for full participation in modern life. It cuts across, as other members have said, as the witnesses have stated, that connectivity is an essential tool for education, for health care, for civic discourse, for opportunity in our country.

Every time I heard the questions asked and the answer given, and the excellent testimony that was given, my heart sank even more because we have a patchwork in our country relative to not only access, but speed. Many years ago, the action was all about access. We have areas in our country that have no access. This is the second decade of the 21st century. These are technologies that Americans invented. So, I think we have a huge challenge, and I think that we need to in this committee advance this the way the Telecom Act was advanced at another time. That was in 1996. That is now a long time ago. So, when we have 39 percent of households in rural communities have no access -- no access; we are not even talking about speed -- they have no access to a fixed broadband provider, I should add.

So, I appreciate the good words that you said about my legislation, Dig Once. Congressman Long talked about common

sense. My grandmother used to say, "The most uncommon of the senses is common sense."

Now, on January 24th, the House voted by a voice vote to pass H.R. 600, the Digital Gap Act, which would make it a policy of the United States to promote build once broadband policies to foreign governments. I think we should start at home. So, all of the evidence points to that.

Of all of the recommendations that you have made, I just want to go one sentence from each one of you. Because what I am looking for out of this subcommittee is a package that is going to move us to where we need to land.

So, starting with Steve Berry, one sentence, one item, what do you think you are top item is to get us to where we need to be?

Mr. Berry. Well, that is difficult, but I have got to start off with data. If you can't measure it, you can't fix it.

Ms. Eshoo. Okay, data. Okay.

Mr. Connors?

Mr. Connors. Including tribes and respecting tribal sovereignty.

Ms. Eshoo. All right.

Mr. Murray. Continue to encourage collocation.

Ms. Eshoo. Okay. Ms. Novis?

Ms. Hovis. Enabling public/private partnerships.

Mr. Carlson. Collect the accurate data.

Ms. Eshoo. Okay. So, we have two out of five on data. Well, I appreciate that.

I think, Madam Chairwoman, that with all of the knowledge that has been presented to us, the collective knowledge that we have on both sides of the aisle here, I really think that we need a package for the 21st century. We say the United States of America, except there are whole areas of our country that are left out. That is just not acceptable. Rural America, and in terms of tribes, I mean, it is shameful. It really is shameful that parents have to drive children I don't know to where to see if they can pick up a signal, so that they can get their homework done. That is something that should be from other centuries, not this century.

So, I will work with you to put a package together because I think this issue deserves it. And we are not going to progress economically or otherwise in our nation unless we can achieve the full benefit of the technologies that are there. Knowing whole parts of our country, whether they are underserved, whether they don't have competition, where there is absolutely no access or that they are lacking speed, we need, I think, to put a package together.

Otherwise, I think all of these parts, we are going to have hearings on all the different parts. But we know in medicine that

you need to treat the whole body. And I think the body of this issue deserves our attention and that a package containing the top recommendations here is the way we need to go.

So, I thank you. It is worth staying here to hear what you all have to say, and we appreciate it. Thank you.

Mrs. Blackburn. The gentlelady yields back.

And that is why we are having the hearing and that is why we are working so hard to push broadband forward, as is the FCC and the President. All right.

Ms. Eshoo. I ask, Madam Chairwoman, that this letter from Public Knowledge, with unanimous consent --

Mrs. Blackburn. Without objection, yes.

Ms. Eshoo. Thank you very much.

[The information follows:]

**********COMMITTEE INSERT 8**********

Mrs. Blackburn. Mr. Flores, you are recognized, 5 minutes.

Mr. Flores. Thank you, Madam Chair.

Mr. Berry, in your testimony you mentioned the challenges that arise as networks move toward 5G and also toward smaller cells. And Mr. Long brought up one of those a minute ago that I thought was particularly noticeable related to the costs that some local governments imposed. Can you elaborate on somehow the other current barriers that exist and deployment will become more problematic as small-scale architecture becomes more prevalent?

Mr. Berry. Barriers in the sense of permitting or licensing or?

Mr. Flores. Just elaborate on -- I mean, you see them now, based on the architecture that exists today of the various cell technologies. But, as small cell and 5G become more prevalent, looking at the current barriers, how do you think they are going to become more problematic as you go to smaller and smaller cells?

Mr. Berry. Well, I think a lot of it goes right to the heart of those people that are responsible for managing the property and the land. They need to understand that this is an opportunity to not only expand a network, but get new capabilities and new services.

One of our CEOs of one our companies said, "As we get to the 5G world, it is a river of pennies." The problem is that I don't want to only have one or two of those streams of pennies; you need

it all in order to be profitable.

So, I hope that small cities, towns, counties, they will recognize that there is a small margin of profitability when you build out a network, even if you are using small cells. And you are going to have to use a lot of these, and you are going to have to bring it back to fiber as fast as you can.

So, I think that recognizing that the benefit is actually in the services, in the economic activity that will occur because of this capability, is a lot more important than the location, you know, than having a standard location that is inaccessible.

And I would note that collocation, while we like collocation, there should not be collocation to the detriment of multiple locations.

Mr. Flores. Right.

Mr. Berry. And that is what is going to allow you to have competition in most of these areas.

Mr. Flores. Right. I think as soon as some of these cities begin to look at this as basic infrastructure for the community like a road, that they will be better off, instead of as a source for fees and permits, and so forth.

Mr. Murray, in your testimony you discuss the need to diversify wireless infrastructure with rooftop sites, small cells, distributed antenna systems, et cetera; also, with WiFi hotspots and traditional macro-cellular towers to promote

spectral efficiency and to provide carriers with the capacity they need to meet increasing data demands on their networks.

And so, my question is this: I think you sort of answered it in your testimony, but just to be clear, is there a danger in relying too much on one type of infrastructure technology?

Mr. Murray. No, I don't think there is. Mr. Carlson runs a network. I develop one type of infrastructure. And he has to take a look at 2018 and figure out what is the best return on his capital. And that might be 30 percent of his budget goes to small cells and 60 percent to towers and the last 10 percent to DAS in a given area.

So, all of these technologies are complementary. Small cells are new enough that we are still struggling to define what a small cell is. I mean, that is a small box. But if that small box is integrated on a 120-foot pole that was built without approval, local approval, then you have issues.

Mr. Flores. Right.

Mr. Murray. But, no, it is going to be a heterogenous network going forward. The towers, the macro-sites, if you will, will dominate in rural areas because they just cover so much more. And there typically aren't capacity problems in a place where there is a town of 5,000 and one main road.

Mr. Flores. Okay. Thank you.

Madam Chair, I yield back the balance of time.

Mrs. Blackburn. The gentleman yields back.

Mr. McNerney, for 5 minutes.

Mr. NcNerney. Thank you, Madam Chair.

First, I want to direct my question to Mr. Carlson. In your testimony you discussed the benefits of investing in mobile broadband, but there is approximately 5.3 million veterans living in rural areas, accounting for about a quarter of all the United States veterans. Can you provide some examples about how investing in mobile broadband in rural areas would benefit these veterans?

Mr. Carlson. Yes. Thank you for the question. I haven't thought about that, but, certainly, to great medical care is something that veterans dearly need. I mean, we have had stories about veterans not getting the kind of access that they should have, and whether that is remote access in rural areas or it is access to the local clinic that may be some distance from where they actually live in the rural areas, would be a great thing.

Of course, education for veterans, you know, so that they can gain great employment opportunities in our society is another thing. So, continuing education and getting that access to continuing education at home, so they don't have to drive some significant distance to go to school. Those kinds of things would be very important.

Mr. NcNerney. Thank you.

All of the written testimonies show significant benefits to broadband, but I am concerned about the growing cyber threats that we face. I would like sort of a yes-or-no answer, and then, I will drill back, if anyone wants to, from each of you on, would it be beneficial to invest early in our cyber protection in the broadband planning and development?

Mr. Carlson. Oh, well, I can just comment on cyber. We are investing millions of dollars per year, and that has grown dramatically. It has probably grown 20-30 percent a year over the last several years, because we are worried about cyber attacks to our network.

Mr. NcNerney. So, the question is, how beneficial is it to make those investments early in the process as opposed to waiting --

Mr. Carlson. It is very important for every company that is involved as a carrier to make investments today in cybersecurity and to get cooperation, even more cooperation than what we get today from the government informing us about threats that they see that we could, then, anticipate.

Mr. NcNerney. Thank you, Mr. Carlson.

Ms. Hovis?

Ms. Hovis. Yes, I agree, critical to do it soon.

Mr. NcNerney. Okay.

Mr. Murray. I agree.

Mr. Connors. Definitely, it is better to invest early and get ahead of the problems before there is a problem.

Mr. Berry. I totally agree, and we would encourage best practices and better education on how we build and deploy networks, especially for the networks, but also for the consumers that utilize the network.

Mr. NcNerney. So, Mr. Carlson, it has been two-and-a-half years since the National Broadband Map was updated. And I know you have spoken strongly on this, Mr. Carlson. But, Ms. Hovis, is having accurate data important for identifying geographical areas that are underserved or unserved?

Ms. Hovis. Yes, it is absolutely critical, and I spend a good amount of time on fixed broadband as well as on mobile, but I will agree with everything that Mr. Carlson said.

And I would say the granularity of data is critically important as well. Because when we are seeing data only at a very high level, such that there is the implication that there is service throughout a community, when perhaps a small part of that community is served, but we don't have the granularity to know who is and is not, can't really make useful decisions about where to invest or where the needs are.

Mr. NcNerney. Would it also be helpful for public/private partnerships to have that granularity?

Ms. Hovis. It absolutely would because it would allow both

parties to know where they should invest, where they might want to target their efforts, how the market is served or not served, so that they can understand market dynamics. But it also helps the public sector to understand where the needs are.

So, for example, in many urban areas I work in, whole areas of small business concentration have almost no broadband or the small business services that are available are just a few megabits, which doesn't fit the federal definition of broadband. We would want to know to target that, and you can't find that out from the National Map at this point.

Mr. NcNerney. Are there specific types of public/private partnerships that would be beneficial in rural areas?

Ms. Hovis. Yes, we have seen some really interesting innovation around these kinds of partnerships. So, for example, the Commonwealth of Kentucky, in a very visionary, bipartisan effort, has entered into a public/private partnership with the consortium of private entities that are bringing private capital and full private execution, construction, operations, customer service, and so on, to a statewide initiative that will also open up new opportunity for other companies.

Mr. NcNerney. Too many questions, too little time, Madam Chairwoman.

Mrs. Blackburn. The gentleman yields back.

Ms. Walters, 5 minutes.

Mrs. Walters. Thank you, Madam Chairman. I would like to thank Chairman Blackburn for holding this important hearing and the witnesses for appearing before the subcommittee today.

The impact of broadband in our everyday lives is significant, particularly in my home state of California where wireless technology is growing at an explosive rate. In fact, over 41 million California residents access the majority of their high-speed broadband connections wirelessly. These numbers will continue to grow, which is why the deployment of 5G technology is so important to my state, and particularly in my district.

In fact, the recent Accenture study mentioned in Mr. Murray's testimony estimates that the wireless industry will invest $275 billion in communities across the country over the next decade to build out our next-gen 5G wireless infrastructure, which will support 3 million new jobs and contribute $500 billion to the economy. Over $200 million of that investment will incur in my district, creating over 2300 new jobs.

Unfortunately, the current process to site wireless infrastructure is cumbersome and can impede 5G rollout, to the detriment of investment and job creation To that end, I would like to ask the members of the panel about the obstacles related to the current sitings process.

Mr. Murray, as I just mentioned, the Accenture study you raised in your testimony highlights the significant broadband

investment scheduled to take place over the next several years. The most obvious way to continue to encourage this type of investment in job creation would be to make significant changes to the sitings process for 5G infrastructure. And I know some of my colleagues have touched on this, but can you share any specific examples where the siting process has disrupted or discouraged 5G rollout?

Mr. Murray. Well, 5G rollout is still sometime in the future. And I think we should also recognize that, quote/unquote, "5G infrastructure" is essentially layering new gear on top of the existing structure. So, in the case of a tower, a carrier is going to come back to that tower if they have 4G antennas and other gear on the top of the tower. They are just adding gear to that.

So, it is not as if we need to build -- we will need more small cells. We will need more towers. But it is not a unique type of infrastructure. It is just more of the same.

I am not sure I answered the question, though.

Mrs. Walters. Okay. No, that is fine.

Mr. Berry, according to the chart submitted with your testimony, mobile infrastructure sitings require the involvement of at least four federal agencies and state and local requirements, which in California can oftentimes be more burdensome than environmental reviews. Is the process outlined

by the chart a reasonable expectation of what carriers can face when seeking to deploy technology?

Mr. Berry. Yes, the chart, I assume you are talking about this chart here. I must say that it is actually not as inclusive a chart of what it actually would have been, had we had more paper. So, yes, it really boils down to whether the local community or land manager wants to cooperate with the carrier or the provider. From this chart, you can find 1,000 different boxes to put a "no," "X" in, and make a carrier resubmit, reapply, do a new study.

Unless you have this ongoing requirement that this is in our national interest, and it should be a priority to have services like this in our communities throughout the United States, I don't think you are going to change the attitude. That is why I say, yes, it is structure and it is organization, but it is also local citizens and the communities need to decide, do we want the platform to be built so that we can have a 5G? And I think it really boils down to where there is a will there is a way.

Mrs. Walters. What relief will the proposals that you outline in your testimony do to streamline the deployment process?

Mr. Berry. Well, I think having an entity that is responsible, and a federal, state, and local entity that you can contact that has an application, responsibility for the application, that will respond to you. Many of the land managers, at least many of our carriers say, "Listen, we would just

appreciate a phone call back telling me the status of my application."

I mean, it should be a priority to receive and get the services into the economy. That is part of the missing piece of the puzzle, is how do we encourage those that actually have the authority at all levels to actually act on it. And I think that is why at the federal level the leadership starts there. And I think that that attitude can have an indelible impact on everyone else down the chain.

Mrs. Walters. Okay, thank you. And I am out of time. Thank you.

Mrs. Blackburn. The gentlelady yields back.

Mr. Engel, for 5 minutes.

Mr. Engel. Thank you, Chairman Blackburn.

As many of you know, New York City, which is my district, and the northern suburbs, are doing reasonably well when it comes to broadband access. New York has made the decision as a state that broadband access needs to be priority, and we have made the kind of targeted investments we need to build out access for New Yorkers, not just in New York City, but beyond. And you know that New York does have a number of rural areas.

The biggest reason for the difference between my district and my colleague's district isn't a difference in need, but a difference in density. So, what we need, I think, is, then,

something to make the buildout more economically attractive to areas that aren't as dense as my district. And my district is relatively easy because so many people live so closely together. We have highrises and dense suburbs. So, it takes less cable to connect to people because they are already so close together. The less dense the people are, the more towers and the more cable you need, obviously.

So, I know we have talked some already this morning about the need for public support to make broadband buildout economically viable. And I appreciate that this subcommittee is all on the same page when it comes to the need to do that buildout.

But the White House, and they have spoken about infrastructure investment before, has talked about using tax credits to try to improve the economics. My feeling is that direct investment would not only be more straightforward than tax credits, but do a better job, also, of bending the cost curve, which means it would be that much easier to hire the folks to build and maintain the towers and the cables while also bringing the internet and all the economic activity that comes with it to more of the country.

Mr. Berry, let me ask you, based on your work, do you have a sense of how much a tax credit program would do to improve the economics?

Mr. Berry. You know, I hesitate to give you a number

because, quite frankly, I don't know, especially all situations are different. And my initial impression would be straight tax credits, unless it is an accelerated tax credit or an immediate tax credit or a reduction in your out-of-pocket expenses, will have very little, will create very little incentive to build out in rural America.

Quite frankly, I think it will be the same in urban/suburban America. What you need is lower-cost deployment opportunities for devices like this, like the small cells, and bring that service -- it is the service itself that is going to bring the economic opportunities to the constituent.

I just think that there has to be some real money attached to the support, the subsidy. In many of these rural areas, the economic model to build out and provide these services is very strained.

Mr. Engel. Let me ask you, in your written testimony you talk about direct predictable support. Can you explain what you mean by that and why do you feel it is so important?

Mr. Berry. Direct?

Mr. Engel. Direct predictable support.

Mr. Berry. For example, under USF Mobility II, we have languished almost for five years, not knowing that we are going to have a Mobility II, not knowing how much money it is going to be. And when we had Mobility I, most of our carriers had spent

the money out of Mobility I, built the towers, had to wait for over a year to get paid.

So, their planning process of how do we expect to spend our money and eventually maybe get a return on our money is sort of unknown. And so, I think direct predictable support from a Mobility II that gives our carriers an opportunity to say, yes, I am going to go out there and build this and I know it can sustain the cap ex, the cost to build it, and I know it can sustain the op ex, i.e., the cost to continue to support that cell site or that service, is predictable.

I think we need more. I think that, with this committee's help, with good data and information there, you are going to find out where you can spend that extra $10 and maybe have a substantial impact.

Mr. Engel. Anybody else, with 33 seconds left, have any idea about this? Any difference of opinion or agreement?

Mr. Murray. A quick thought is that, if there is less regulation, then the carriers can spend those monies on building out more sites. I mean, in the rural areas it is just a question of building more sites.

Mr. Engel. Thank you. Thank you, Madam Chair.

Mrs. Blackburn. The gentleman yields back.

Ms. Brooks, for 5 minutes.

Mrs. Brooks. Thank you, Madam Chairwoman.

I am a former Deputy Mayor of Indianapolis. And so, I fully appreciate the importance of building out infrastructure in a community. Because if we invest, it attracts businesses and grows jobs, and so forth.

And our legislature in Indiana is also embracing innovation and, in fact, is considering legislation that empowers the deployment of small cell devices to bring 5G buildout to Indianapolis. Because the city of Indianapolis is currently a test site for 5G, the buildout is attracting that 21st century infrastructure.

And so, while I am learning more and I am a huge fan of 5G, what I am curious about, Mr. Murray, with respect to many state legislatures, I understand, including Indiana, are considering the type of legislation that would prevent municipalities from adopting burdensome and unneeded and local regulations that would impede the deployment of small cell technology necessary for 5G. Do you believe that that type of state legislation is needed to ensure the rapid deployment of 5G technology, and do you believe there is a continuing federal rule to ensure there are proper guideposts around local regulation for the placement of this type of technology?

Mr. Murray. Yes, I think we are struggling as an industry right now in defining it. It is a matter of scale. Again, the Wireless Infrastructure Association believes, if we talk about

height, it is 50 feet, and it is a limited number of antennas. That magnitude or less is a small cell. Anything larger is a tower that should go through the normal, responsible local review.

WIA has model legislation that is a much longer version of what I just described. I think that legislation will be guidepost to states as each state wrestles with this question of how do we define this new technology.

Mrs. Brooks. Mr. Berry, last week another Energy and Commerce Subcommittee held a hearing on smart communities and the way technology can enable more efficient transportation systems, better policing, and so forth. Can you address what your members of your group are doing to partner with localities to enable cities like Indianapolis to leverage 5G technologies?

Mr. Berry. Thank you.

Well, first of all, you have to get to the gigabit network if you are going to find yourselves in a 5G, even if it is testbed. So, it is the backhaul and the fiber that is the first requirement. And then, it is the deployment, not only the small cells, but the coverage.

So, many of our carriers, U.S. Cellular included, are already doing testbeds for 5G. What do we have to do? Some of our smaller carriers have said, "Listen, Steve, my most difficult challenge is figuring out the business model for a small town or city when I have a No. 1 priority to get a 4G LTE VoLTE buildout. And then,

how do I figure out how do you invest and build that 5G system that has a return on investment?"

And so, they are reaching out to the communities. Many of the smaller carriers -- like in Mr. Shimkus' district, I think the largest town is 33,000. Well, they are going into those towns and they are saying, "What can we do together and how can we do it in an efficient, effective way, because we don't have a lot of money?"

So, that is educational process. That partnership process is absolutely critical. And I salute you and those in Indianapolis that have reached out and taken that very serious step of addressing deployment scenarios that may not be particularly popular in some venues.

Mrs. Brooks. In fact, I wanted to ask, then, maybe Mr. Murray, or back to you, Mr. Berry, when you have communities, what are the educational tools you are using? This is very, very complicated information to try to relay to whether it is city councils, state legislatures, and others. How are you educating people on these things?

Mr. Berry. It is a problem because you are right, it is a very technical -- I mean, this is extremely technical. There is more computing capability in your smartphone than put up the first Apollo 1 mission. So, it is very technical, but I think it is just a matter of working with the localities and sitting down in

a forum that not only explains the growth and the economic opportunities, but also can explain what it will take in order to build that out. It is changing minds, and that is sometimes one of the more difficult things to do. But I think as they see the rest of the world moving very quickly in this regard, and they see economic growth and jobs attached to it, I think that is a pretty powerful message to be sending.

Mrs. Brooks. I agree. Yield back. Thank you.

Mrs. Blackburn. Mr. Bilirakis, for 5 minutes.

Mr. Bilirakis. Thank you, Madam Chair. I appreciate it so very much. I thank the panel for their testimony today.

Mr. Berry and Mr. Murray, in order to realize the full potential of emerging technologies, it is important for governments at all levels to make their permitting and regulatory process more efficient. Under the discussion draft, state and local governments may opt into the information database. What are the incentives for local governments to opt-in? And we will start with Mr. Berry, please.

Mr. Berry. Well, as we were just talking, I think the incentives are economic growth and job opportunities. But don't forget mHealth, mobile health, and education, two huge drivers in most local communities, and the convenience that that brings to the table. And those communities, they are going to be bypassed if they don't have a program or at least a methodology

of addressing a buildout, and how do you accommodate an architectural buildout within a larger area. I think that is something that the state and local governments have to address.

In my early years before I went to law school, I did city management, city planning and city management, and went to something easier. I went to law school. So, that is a tough job. It is a tough job.

Mr. Bilirakis. Very good.

Mr. Murray, please.

Mr. Murray. Yes, I will have WIA get something for the record on that.

Mr. Bilirakis. Thank you. Thank you.

Next, this is for the panel. In a prior hearing on these discussion topics, a witness testified he had experienced an unexpected fee of $30,000 on a project site on DoD management land. Is that representative of the unexpected cost you face related to fees? And are you given any notice by any agency that you may be subjected to a significant fee for a project? Or are you just handed a bill? Who would like to begin? We will start from here.

Mr. Berry. Well, I would just say that it is not unheard of to have troubles like that when you are trying to build out a network. It normally doesn't happen exactly that way. You have some indication that you are not going to get the license or you are in the appellate process.

But, again, I will refer to the chart here. As you go down and hit all the boxes and try to check off all the requirements, it can be a huge expense. With small carriers that are serving small rural communities, and they only have a limited footprint, they don't have the resources.

I mean, this chart was put together with a lot of time, effort, and energy from attorneys. Most of my small carriers don't even have an attorney on staff. They may have a person they call an engineer. So, it is very, very difficult and could be cost-prohibited.

Mr. Murray. We have worked sites through that -- I don't even know what is on that paper, but I know our process is very, very complicated to getting DS.

I will say, Steve mentioned, you know, you need to give the parties in each box some incentive. I think that the localities are getting it. They realize that there are tradeoffs. If you want these incredible services, well, maybe we will have to see a telecommunications structure on the horizon. Are we willing to pay that price? It is not a big price. But there are tradeoffs to it. I think that the municipalities are moving along.

I agree with my colleague Joanne in that many of these issues are now sort of flow of capital. I mean, it is hard for us to build in rural areas right now because the carrier cap ex is so focused on indensifying the network in the urban areas. We, as

a business, need a lead tenant and we need a second tenant. And the second tenants are just not there as readily as they were in the past because of this need to densify in the urban areas.

Mr. Bilirakis. Has anyone else received a large, unexpected fee on the panel, similar to the $30,000 fee?

Okay, well, then, let me go on with the next question. I know I don't have much time. I have 15 seconds.

A followup: have you or your member companies ever created a feasible broadband proposal, only to abandon the project due to repeated and unexpected fees? And does the discussion draft address this issue? Who would like to respond on that from the panel? Yes?

Mr. Carlson. I can just comment that I don't know the answer, but I know we have abandoned cell sites --

Mr. Bilirakis. Yes.

Mr. Carlson. -- when the difficulty of getting them sited and agreed to by the local community was too much. I don't know whether it was specifically fee-related, but we have had to abandon cell sites --

Mr. Bilirakis. Yes.

Mr. Carlson. -- which we think was harming. And that abandonment we believe harmed those communities.

Mr. Murray. We have absolutely had the same experience. In western Loudoun County, we had a whole network of sites that would

have brought broadband to that whole community. In 2008, a whole network of sites was denied just on sort of unreasonable community opposition. We believe it was unreasonable and they still lack service.

Mr. Connors. We were close to abandoning the project a few times based on putting the money out ahead of time, not based on the fees, but based on the cost of the project and waiting for reimbursements. Reimbursements from the grant had to wait sometimes 6-12 months, a couple of years. It was the upfront costs that were making it cost-prohibitive for a while.

Mr. Berry. And we have had members, several members have told me that they had to not only abandon sites because of expectations that they are not going to get a USF. You remember they cut the USF, the Universal Service Fund Mobility II funds in the last administration significantly. And some carriers actually went out of business because they are so small and their boards said, "We can't sustain another 20-, 30-, 60-percent cut in reimbursements." And they sold their operations. And so, for small carriers, that is always a concern. Are you going to build or overbuild your capacity?

Mr. Bilirakis. All right. I am sorry, Madam Chair. Thank you very much. I yield back.

Mrs. Blackburn. The gentleman yields back.

Mr. Collins, last in the queue.

Mr. Collins. Oh, my, thank you, Madam Chair.

I want to thank the witnesses here today.

Just a little background. I have eight rural counties in upstate New York. We are talking Buffalo, Lake Erie, Lake Ontario. Four of my counties do not have acceptable broadband coverage. In fact, my "get out of jail free," if somebody is on the phone, I just say, "I'm up in Wyoming County now. I just lost my cell signal." So, one of my counties I don't even have cell coverage.

Recently, Verizon turned down $170 million on broadband buildout in New York State. Fortunately, Ajit Pai, the new Chair of FCC, saw the rationale of keeping that money in New York, and one of the first things they did was designate that $170 million to stay in New York, but we will have to figure out exactly where that goes.

So, Mr. Berry, part of my question for you. One of my neighbors in the shopping plaza at my district offices in Blue Wireless is a CCA member, very small, a very small provider.

So, my thought goes around this: first of all, Congress does a lot of things. And rule 1 is do no harm. But, No. 2, the FCC, now under Ajit Pai, will be doing a lot of regulations that I think will really benefit this topic today without legislative work by Congress.

I guess the question I have got, in particular, is, in New

York State, western New York, upstate, a desperate need for monies and buildout of broadband. What role do you think Congress plays versus FCC regulations? Because, again, let's not get ahead of ourselves here, and especially addressing someone like your fellow member, Blue Wireless, a smaller provider. I think in some cases they will step in where Verizon won't. But to make sure we are not doing something in either way, FCC or Congress, to somehow cut these small guys, like your clients and my neighbor, cut them out of the process.

Mr. Berry. Blue Wireless is a great member. They also participate in our Device Hub, where we essentially put a consortium together to ensure that the small carriers can get the state-of-the-art devices at the lower costs through aggregation of acquisitions of handsets. So, they are one of the smaller carriers that are out there, really unique, making a unique imprint in their territory.

Yes, I think what the FCC did here on the USF Mobility II was a real improvement. We are not out of the woods yet, though, on the data issue. We are going to have a challenge process, and the data is still not available.

So, those carriers like Blue Wireless, MTCPs, and some of the other smaller carriers, are going to have to challenge the data that, No. 1, we know is incorrect. And they are going to have to spend a lot of money to make sure that the data that they

submit is actually correct and for the FCC to make a decision on whether or not they are going to get access to USF funds.

And so, Blue Wireless is courageous in the fact that they are out there competing with the larger carriers in a very small area and on a shoestring. So, I think some of the regulations that Pai is doing away with may help them just as much on reporting requirements and some of the other issues.

But, on USF, that predictability of those funds is critical. And the next phase, once we finish the legacy, you know, the drawdown of the legacy, it is the new-build funds that they are going to have to challenge and they are going to have to be ready to fight for. Hopefully, we will help them fight for them.

Mr. Collins. Well, I thank you for that because we all share the same concern going forward. We don't have enough time to get into some of the delays. But I noted in your testimony the concern of 2020 is still three years away, and we sometimes get frustrated with moving at a snail's pace. But, you know, we can cover that another day.

So, Madam Chair, I am going to yield back 48 seconds, so you can't blame me for going over. Thank you very much.

Mrs. Blackburn. I will accept that time back, and seeing no further members to ask questions, I want to thank all of our witnesses that are with us today.

Mr. Berry, the ranking member and I were talking about the

small cell site. What we would like to know is range of coverage for that cell site. It would be helpful to us going forward. And you can submit that to us for the record, if you would like.

Mr. Berry. Okay. And I have got the specs for the cell site. One of my members, Nokia, provided it. So, I thank them.

Mrs. Blackburn. Okay. And if you will submit that for the record?

[The information follows:]

**********COMMITTEE INSERT 9**********

Mrs. Blackburn. And to all of you, thank you. You are dismissed.

We are going to quickly reset to the second panel, spend about 2 minutes doing that, and then, move forward with the second panel.

Votes are expected sometime between 1:10 and 1:25.

[Recess.]

Mrs. Blackburn. In the interest of time, we are moving forward with our second panel. I do want to welcome all of you back.

The same format as with the first panel. You will each be given 5 minutes for your opening statement. And Ms. Clarke and I have agreed that we will do 3 minutes for questioning per member on each side and, hopefully, move forward with this panel. We are thrilled that you are here.

Mr. Darr, Mr. Bryan Darr, who is the CEO of Mosaik Solutions, and I think a Tennessean.

Mr. Darr. Yes, I am.

Mrs. Blackburn. And we welcome you.

And, Mr. James Stegeman, who is the president at CostQuest Associates, we welcome you.

Mr. Stegeman, we will begin with you with 5 minutes. You are recognized.

STATEMENTS OF JAMES W. STEGEMAN, PRESIDENT, COSTQUEST ASSOCIATES, INC. AND BRYAN DARR, CEO, MOSAIK SOLUTIONS

STATEMENT OF JAMES W. STEGEMAN

Mr. Stegeman. Good afternoon, Chairman Blackburn and Vice Chairman Lance, Ranking Member Doyle, and Members of the Subcommittee.

My name is James Stegeman. I am president of CostQuest Associates. It is an honor to be here to discuss the status of broadband in the U.S.

Let me first start with a brief introduction of my firm, CostQuest Associates. My company specializes in understanding costs, assets, and the geography of broadband deployment. We work with the largest ILEC, cable, and wireless carriers in evaluation of their networks. We work with a number of cities and states in understanding fiber deployment issues, and we have created both the economic model behind the National Broadband Plan as well as the FCC's current Connect America cost model that is used to disperse over $3 billion annually.

Now let me jump to the heart of my testimony today. Let me first focus on terrestrial coverage using the latest FCC 477 data. If we look at the nationwide map on the screen, 76.3 percent of homes have access to service with download speeds at or above 100 megabits per second, what I refer to as "served". 13.6 percent

have access to speeds between 25 and 100 megabits per second, or what I refer to as "underserved". And 10 percent of homes remain unserved with speeds under 25 megabits per second. It is an interesting picture that shows, while the majority of the population is served, the majority of the land mass is unserved.

In the next chart I have summarized the coverage in your congressional districts. The blue represents the portion of your district that is served. Orange represents what is underserved, and gray represents what is unserved.

If we move to the mobility side, we used access to LTE as a basis to prepare the map you see now on the screen. This map shows, based upon the FCC's current 477 data, that 10 percent of roads do not have access to LTE. Conversely, 99.5 percent of household appear to have LTE access.

In my filed testimony, I have provided maps of both terrestrial and mobile coverage for your districts, in part to let you view the data, but to see if it lines up with your on-the-ground experience.

With current coverage reviewed, I moved to the question of how do we encourage the expansion to all homes and roads. I will focus on what I believe to be the key hurdle, economic viability. And that is, commercial broadband networks may be too expensive to make a fair return for commercial entities.

In the chart on the screen, I provide the estimate by state

of building out new fiber networks in the non-served portions of the country using our cost model output. Nationally, the total is over $90 billion. In the next chart, I have broken out the capital requirements for each of your congressional districts.

Now let's move to the cost of wireless buildout for portions of the nation's roads unserved by mobile LTE. My firm recently developed an estimate for the investment to build out wireless. The results show that bringing 4G LTE to the remainder of unserved roads would cost an estimated $12.5 billion in initial investment.

And not to sit on our Gs, we also looked at cost of 5G. In the table on the screen, I provide a summary of the estimated upfront investment needed to deploy a meshed 5G network to the entire U.S. under a number of scenarios.

Under the most aggressive deployment assumptions, with high demand and support for autonomous vehicles on all primary roads, $250 bill in capital would be required, of which $56 billion is for the underlying fiber network.

I have focused my discussion on the coverage data provided by the FCC. While it is the best public source of coverage information, improvements could be made.

On the terrestrial side, we have the issues that arise from the one-served/all-served nature of the data. With respect to mobility, my firm independently assessed the ground realities of availability and speeds in areas of South Carolina as compared

to the 477 data. The map on the screen shows the results of the drive test in southeast South Carolina. The light blue shows the 477 coverage; the black dots show the locations where service was not available, and the red dots show locations where speed was under 4 megabits per second. As evident, this drive test does not comport with the reported coverage. In part, the conflict is driven by the lack of uniform standards for carriers to submit 477 data.

As a final topic, a number of cities and states are looking to programs to expand broadband. New York, for example, established a broadband investment program to utilize $500 million to bring service to nonserved areas across the state. The size of the fund, along with the goal of achieving 100 megabits per second statewide by the end of 2018, make this program one of the largest and most ambitious of its kind in the country. By the end of 2018, they will move their served percentage from 70 percent to well over 98 percent.

In conclusion, my testimony focused on coverage, data, and estimates potential cost. While efforts to collect data, model, and understand these complex areas may be time-, labor-, and data-intensive, as with all my client work, we need to strive to collect and develop the best information to make informed decisions.

Thank you.

[The prepared statement of James W. Stegeman follows:]

**********INSERT 10**********

Mrs. Blackburn. I thank the gentleman.

Mr. Darr, you are recognized for 5 minutes.

STATEMENT OF BRYAN DARR

Mr. Darr. Thank you.

Good morning. My name is Bryan Darr, and I am the president and CEO of Mosaik Solutions, previously known as American Roamer.

I want to thank Chairman Blackburn, Ranking Member Doyle, and the fellow members of the Subcommittee on Communications and Technology, for the opportunity to speak with you today.

Expanding and accelerating broadband deployment requires reliable information. Without trusted data about coverage gaps, we will not stimulate private sector investment, advance toward the goal of universal service, expand broadband into more rural areas, or maintain the competitive broadband market we see today.

Since I founded Mosaik in 1988, our sole mission has been to produce reliable data about wireless network coverage and performance. Almost 30 years later, we are still a small business. We have less than 50 employees and we are still based on Memphis, Tennessee. But we offer some of the most accurate insight into network coverage and performance available in the market.

More simply put, we tell our clients where they can reasonably expect to have access to a variety of mobile networks and how reliable wireless networks are at any given point in the United States and much of the rest of the world.

Mosaik has supported part of the FCC's recurring informational needs for many years. The FCC uses our CoverageRight datasets in its annual competition reports and other policy and regulatory decisions.

Mosaik and its competitors stake our reputations on supporting the products and services we provide to our clients. Despite healthy competition and increasingly sophisticated data analysis among private sector network analysis companies, the FCC has sought to displace this industry by mandating use of its own data analytic tools.

In 2013, the FCC elected to expand its Form 477 to mandate that carriers provide information directly to the Commission. In some cases, the FCC uses its in-house data to the exclusion of all other sources.

The Wireless Telecommunications Bureau recently stated that its Form 477 coverage data is, quote, "the best available data we have today," unquote. It is not. The Form 477 mobile broadband coverage data is flawed.

First, there are no defined specifications for what radio-frequency conditions or methodologies are required. Second, the FCC's data is out-of-date almost as soon as it is filed. Form 477 data is too infrequently updated and has too large of a time gap between reporting date and release date.

For example, mobile network coverage data as of December 2015

was released in September 2016, a lifetime in this fast-moving industry. During this 9-month period alone, a national operator radically expanded the population served with its LTE network while another more established operator added thousands of square miles of rural LTE coverage. That is precisely why Mosaik's LTE network coverage datasets are updated monthly.

Relying exclusively on antiquated or inferior government-mandated data threatens to frustrate mobile broadband deployment and harm American consumers. And the FCC's decision to exclude other types of data threatens to crowd out private investment from U.S. companies, including Mosaik, that compete to provide similar, and we believe far superior, products about network coverage and performance.

These private companies, responsible for much of the innovation, have provided gains in predicting and understanding network availability. Our measurement capabilities must keep pace with changing developments. Operators are testing innovative strategies to improve coverage in urban areas. As the number of households with landline telephone service continues to decline, improving indoor network availability and performance will prove a priority for municipalities and public safety organizations.

New technologies offer promising solutions to these issues. We commend the FCC for recognizing the importance of data-driven

decisionmaking. When measuring the availability of broadband to consumers, the FCC should take into account all sources, especially as providers embrace newer technologies to improves network quality.

That holistic approach is consistent with longstanding executive branch policy which directs agencies to rely on the private sector when feasible. Here, policymakers can greatly augment the quality and depth of their data and at a cost equivalent to a handful of cell sites. When government agencies embrace the capabilities of private companies, instead of competing with them, taxpayers can spend less money and benefit from sound policymaking, based on more accurate and timely data about network coverage and performance.

Thank you, and I look forward to answering your questions.

[The prepared statement of Bryan Darr follows:]

**********INSERT 11**********

Mrs. Blackburn. I thank the gentleman for the testimony.

And I will begin the question-and-answer and will give myself 3 minutes to begin those questions.

Mr. Stegeman, let's talk about the 2009 Recovery Act. RUS approved 297 broadband infrastructure projects funded by stimulus dollars, totaling $3.5 billion. Yet, they had no data tracking where the funding went and did not have accurate maps of areas to target in advance of awarding those grants. As a result, instead of benefitting the expected 7 million Americans as was promised, the program has served approximately 213,000 households and 15,000 businesses.

So, as we talk about broadband expansion, how do we avoid this kind of misdirection of funds from happening in the future and moving forward?

Mr. Stegeman. It is a great question because, as you look at those funds that were deployed, I think, in part, they were -- I don't want to say rushed out -- but they were pushed out quickly without an examination of all the available data. There was a lack of data at that time to understand really what was needed in those areas, and there was a lack of information on the followup from that deployment, so that you really didn't know what was deployed, so that competing carriers, other interested parties, may know what is available and what is not available.

So, I think a big driver to make things successful is to make,

one, information available to all parties. So, where is broadband infrastructure available? If public funds are used to help deploy those, that information and location of that should be made available.

We should also have information about where demand is and where unserved portions of the country are. In part, that is why I provided those maps, so you get a sense of what is available at the FCC, so that we can understand how to improve the data to make better and more informed decisions.

Mrs. Blackburn. Mr. Darr, do you have a thought on that?

Mr. Darr. Well, for starters, the vintage dates on what was being collected on a state-by-state level were not the same. Ultimately, as the data was collected up and assembled at a national level, what we ended up with was inconsistency in time that the data was captured.

There was also a lack of direction in terms of what standards should have been used. As we heard the earlier panel talk today, talk earlier today, about defining standards so that what is being reported is apples to apples --

Mrs. Blackburn. Right.

Mr. Darr. -- is rather critical.

Mrs. Blackburn. Let me come to you with one other question, and I am almost out of time on this. You talked a little bit about overlaying the traditional coverage with wireless. How can that

be beneficial to infrastructure development and what are the type problems to expect when you start that overlay of a wireless with the traditional?

Mr. Darr. So, we think a layered approach is critically important to understanding really what is going on. All networks, as they are being engineered, start with a predictive model, an RF model, that says we think this is the area that is going to be served by putting up this cell site at this height, at this spectrum.

But, as you encounter real-world situations, interference from buildings, trees, whatever it may be, you have issues with some of that. And the traditional method of going out and testing those networks has been drive testing, and that is still an extraordinarily important part of how the operators judge the performance of their networks.

But we now have millions upon millions of devices in the field that are capable of collecting more information and trending over time. But you only get this type of information -- and we will call this crowdsourcing, although it can be a larger explanation --

Mrs. Blackburn. Right.

Mr. Darr. -- you will only get this where there is a crowd. And so, you get very good information, lots of information from Brooklyn, but you don't get very good information from rural Iowa,

as Mr. Loebsack was suggesting earlier.

So, you do need this layering effect in order to be able to capture that. Where you have specific issues that need more directed testing -- and drive testing provides an excellent way of doing that -- but you have to see it holistically.

Mrs. Blackburn. Thank you, and my time has expired.

Mr. McNerney, for 3 minutes.

Mr. NcNerney. Well, I thank the Chair.

Mr. Darr, in your written testimony, you mention that the Form 477 mobile broadband is flawed. Is there one change that would improve it? For example, improving the frequency that the reporting is required?

Mr. Darr. I think there are two, actually. And the frequency would be one, but how to capture that data, how to process that data, normalize it, and put it into a system that it can be utilized and analyzed is part of what takes that time. And that expertise does exist in the private sector today.

Mr. NcNerney. Would you say that the Form 477 fixed broadband data is also flawed?

Mr. Darr. We concentrate primarily on the wireless data. I would be happy to have some of our other experts answer that as a followup.

Mr. NcNerney. Thank you.

Mr. Stegeman, you mentioned that there are categories

unserved, underserved, and served. Why do you believe that that distinction is important?

Mr. Stegeman. There are a number of reasons. Part of that category came from our work with the state of New York in which they were looking at deploying and making sure all consumers had access to 100-megabit service.

If you look at the FCC's current definition of broadband service, it is 25 megabits or less. If you look at the National Broadband Plan, the No. 1 goal of the National Broadband Plan was to make sure all citizens had access to 100-megabit service. So, there are kind of the two points on the extreme. That in-between is what we kind of think of as an underserved potential that may be less expensive to exploit and get up to the 100-megabit service.

Mr. NcNerney. Okay. Very good.

You also mentioned that Form 477 has an assumption that you call "one-served/all-served" assumption, and that it has a flaw in it that could overestimate the number of homes served by high-speed internet access. Could you explain how the one-served/all-served assumption works and how we might address the problem?

Mr. Stegeman. Yes. First, the FCC collects information at the census block level. There are about 11 million census blocks in the U.S. They are non-standard shapes. They can be as small as a city block, but they can be, also, as big as multiple miles.

When a carrier reports their 477 data, they can identify a census block as served. So, you assume the whole thing is served if just a single customer in that census block is served. So, when you get out into rural areas with these bigger census blocks, it may be the edge of a census block is served, one customer, but the rest of the area is under- or unserved.

So, it makes an issue from the aspect of, one, you can't recognize that these customers don't have access to service and, two, you can't institute programs to address them because you have no knowledge. So, to address that concern, what you could either do is require providers to supply additional information as to potentially what percentage is served or, also, potentially providing street segments that are served. So that you can understand kind of the dimensionality of that service within that census block.

Mr. NcNerney. Very good. Well, respecting my time limitations, I will yield back.

Mrs. Blackburn. The gentleman yields back.

Mr. Shimkus, for 3 minutes.

Mr. Shimkus. Thank you. I will be very short. But you had no time left, Mr. McNerney; you ran out.

Having said that, mapping as a key. I like the map if you were here for the opening statements. We have to have a national standard. Obviously, you highlight three different speeds, I

think, and then, we use the map to focus on unserved and underserved areas. That is what my goal would be, is to direct resources, whether it is hard-line data, fiberoptics, or cellular. It depends and every area is going to be different.

I looked at this closely, and I wish I would have grabbed you beforehand because this data is 2016. When you have got these colors, what year is that?

Mr. Stegeman. That is the latest available data from the FCC. It is June of 2016.

Mr. Shimkus. Okay. I would just highlight that the way -- and I am not trying to put you on the spot -- but it is just the district that you have for my district is from the 2002 district lines. So, I would update the congressional district lines to current to help us figure. Because about one-third of, well, actually, about two-thirds of this isn't in my district. So, we have got to have confidence in our maps, whichever ones we are using.

Mr. Stegeman. No, I understand. My staff informed me before I got here --

Mr. Shimkus. Oh.

Mr. Stegeman. -- today that we used an older version.

Mr. Shimkus. Right. That is okay. I mean, I --

Mr. Stegeman. But we can file a new version.

Mr. Shimkus. Okay. That would be helpful. And I yield

back.

Mrs. Blackburn. The gentleman yields back.

Ms. Clarke, 3 minutes.

Ms. Clarke. Thank you, Madam Chair.

This question is for Mr. Stegeman. As you may know, I represent the 9th Congressional District of New York, and broadband deployment is key to creating jobs and attracting businesses to my district in the state of New York.

Ms. Stegeman, one of the programs you cited in your written testimony as being particularly instructive is New York's $500 million program being carried out by the Empire State Development Corporation. Can you explain what, in your view, makes that program so innovative and successful? And are there lessons that we can learn from the New York program that could be applied at the federal level?

Mr. Stegeman. Yes, I would be happy to. It has been an honor for me to work on the program. It is an innovative approach in which federal or state funds have been identified to help build out unserved areas.

The way it is approached is it is a reverse auction. So, actually, it is a competitive bidding on unserved areas across the state, and multiple providers can come in and bid on those areas, and the lowest bid wins. So, it is an efficient use of state funds and it is a way for incumbent carriers to bid on

expanding out services in their footprint at a lower cost than maybe a competitor. So, it protects the incumbent if they want to bid and potentially have a cost advantage of billing out. And it is statewide in that it is addressing the issues.

So, it is one of the few states that I have seen that has made a vast expansion of broadband deployment. As I said, by 2018, there will be well above 98 percent of customers or homes in New York that will have access to 100 megabits or more. So, it is a pretty expansive program.

Ms. Clarke. And that cuts across the rural, suburban --

Mr. Stegeman. Across the full state, yes.

Mrs. Blackburn. All right. Mr. Johnson, 3 minutes.

Mr. Johnson. Thank you, Madam Chairman.

I am going to continue to beat a little dead horse today, I fear, a little bit.

Mrs. Blackburn. Okay.

Mr. Johnson. In Appalachia, let me just give you some statistics to kind of set the stage for my question. Broadband coverage, 25 megabits per second or more, in my district, 60.5 percent. That is 34 percent below the U.S. median district and over 5 percentage points less than geographically-similar districts. Looking at high-tech sector workers, half of the U.S. median district, almost half of economically-similar districts -- and there is no wonder because we don't have access out there

and it is really hard.

So, one of the problems we have got is data collection. Mr. Darr, you know, we have got limited funding to do this kind of work. Data accuracy is so critical. Today there are parts of my district, for example, that barely register on GPS. God knows, I have tried to travel it and get to places.

Can you talk about the unique challenges of data collection in rural America and why Form 477 data is inadequate to collect this information?

Mr. Darr. Well, certainly. Thank you for the question.

Form 477 data is collected from the operator's predicted RF patterns. And this has been the accepted way of doing things all along. But in the early days all we were worried about was voice. Can you make a phone call or not? And now, what we are worried about as much as voice, if not more, is data. What is an acceptable signal out on the edges of the network to, say, push through a text message or notify someone that they have an email? It is very different from being able to download a video. It is very different, indeed. It takes a great deal more throughput to do that.

And so, when the operators define an area as being covered, and you go out there and find that it is not covered to your satisfaction, it doesn't mean that they are not telling you the truth, but it does mean that you can't necessarily do what you

want to do with the service.

Being able to better define what areas have a certain level of service I think is extraordinarily important in determining ultimately that. And we think being able to capture that information from devices in the field is the only affordable way to be able to reach all of the country.

Mr. Johnson. Okay. Madam Chairman, I will yield back.

Mrs. Blackburn. Mr. Flores, 3 minutes.

Mr. Flores. Thank you, Madam Chair, and I appreciate this discussion.

Mr. Stegeman and Mr. Darr, how long do you think it would take to compile a comprehensive map, an accurate map, of broadband coverage, given that the data has already been collected and given the capabilities of companies such as yours?

Let me go a different direction first before you do that. It seems to me like you have talked about one of the challenges of creating accurate maps and you point out the lack of standards related to what constitutes coverage. What is the right standard to use? Because I think that is how we get to our map question really.

Mr. Stegeman. That was primarily addressed at the mobility coverage. So, when mobility providers provide their coverage, as Mr. Darr talked about, they provide potentially what their either (a) marketing maps look like or (b) they are just projective

of what that coverage is. There are no standards on decibel loss, on the quality of the signal. There is no stated standard on what the minimum megabits are in that coverage. It is, basically, please provide us a map of your 4G coverage.

Mr. Flores. Okay.

Mr. Stegeman. And that is what you do.

Mr. Flores. Okay. But, in order to get to the right standard, what should we do to develop that standard?

Mr. Darr. Defining -- and I would leave the ultimate number up to RF engineers --

Mr. Flores. Okay.

Mr. Darr. But neg 85 was mentioned earlier; I will say that.

Mr. Flores. Okay.

Mr. Darr. It is a good way of putting everybody on more of a level playing field. But seeing where that extended coverage is is also important as well. It should not be dismissed.

Mr. Flores. Okay.

Mr. Darr. But it should be recognized that, in order to have a specific minimum anticipated quality of service, that a standard should be put in place.

Mr. Flores. So, assuming that we get this standard in place, how long do you think it would take to create the map based on your capabilities, the data we have to describe those areas, to describe the quality of our broadband coverage nationwide?

Mr. Darr. The majority of operators have this data internally. They use it for their own planning purposes, for their own technical support requirements. So, a lot of this data is already there. It may need to be reconfigured a bit to specifically meet the needs of the requirements at hand, but it could be done, I think, in a relatively short period of time. Again, that is the predicted coverage.

When you are talking about taking measurements out in the field, planning and executing drive testing, the four areas of specific interest are going to take some time. And I would leave that question up to Mr. Stegeman.

As far as collecting information from devices, you could, by encouraging the public to share information about what is happening on their device and getting a better idea of what the actual consumer and device experience is, can give you a large trending information set.

Mr. Flores. We have gone past my time. Mr. Stegeman, if you get a chance, can you supplementally answer that question to the committee?

Mr. Stegeman. Yes.

Mr. Flores. I mean after this. I have run past my time. Thank you, Madam Chair.

Mrs. Blackburn. I thank the gentleman.

As you all can see, this is an issue that our members care

about tremendously. And I would ask that you remain open to answer questions by writing in -- Mr. Stegeman, you just had the one from Mr. Flores -- as we complete our record on this today.

This does conclude our Q&A portion. And before we conclude, I do ask unanimous consent to enter the following letters into the record: a letter from the Satellite Industry Association, a letter from Rocket Fiber, from American Cable Association, a letter from the CTIA, and a letter from Century Link. Without objection, that letter will be entered into the record.

[The information follows:]

**********COMMITTEE INSERT 12**********

Mrs. Blackburn. And pursuant to committee rules, I remind members that they have 10 business days to submit additional questions for the record. And I ask that witnesses submit their responses within 10 business days of receipt of those questions. Seeing no further business before the committee today, without objection, the subcommittee is adjourned.

[Whereupon, at 1:23 p.m., the subcommittee was adjourned.]