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NEXT STEPS FOR SPECTRUM POLICY

THURSDAY, MARCH 26, 2015

House of Representatives,

Subcommittee on Communications and Technology

Committee on Energy and Commerce

Washington, D.C.

The Subcommittee met, pursuant to call, at 10:16 a.m., in Room 2322 of the Rayburn House Office Building, Hon. Greg Walden [Chairman of the Subcommittee] presiding.

Members present: Representatives Walden, Latta, Shimkus, Lance, Guthrie, Olson, Pompeo, Bilirakis, Johnson, Long, Collins, Cramer, Eshoo, Yarmuth, Clarke, Loebsack, Rush, Butterfield, Matsui, and McNerney.

Staff present: Ray Baum, Senior Policy Advisor for Communications and Technology; Andy Duberstein, Deputy Press

Secretary; Gene Fullano, Detailee, Telecom; Kelsey Guyselman, Counsel, Telecom; Grace Koh, Counsel, Telecom; David Redl, Counsel, Telecom; Charlotte Savercool, Legislative Clerk; David Goldman, Democratic Chief Counsel, Communications and Technology; Margaret McCarthy, Democratic Senior Professional Staff Member; and Ryan Skukowski, Democratic Policy Analyst.

Mr. {Walden.} We are going to go ahead and call to order the Subcommittee on Communications and Technology, and welcome our Members and our witnesses here today. Since this is a go-away day and we have votes coming up in about an hour or so, we are going to go ahead and get started.

There is no question that mobile technology is one of the key components of the economy of both today and of the future. Americans have wholeheartedly embraced the role of mobile in their lives. In fact, there are more wireless devices in the country than there are people in the country. Mobile is even more critical in developing nations for whom mobile is the first national network for connectivity. Time and again, as the country that pioneered spectrum auctions once, and is the process of doing it again, the world looks to the United States to lead spectrum policy and answer the challenge of meeting spectrum demand. We must continue to rise to that challenge.

Demand for connectivity will only continue to grow as the Internet of Things becomes a ubiquitous part of our daily lives. People rely on spectrum to stay connected to friends and family, conduct business, engage with the government, and access resources for things like healthcare and education.

This committee has long been a leader in freeing up

spectrum for commercial and unlicensed use to meet demand and feed the innovation that has been the hallmark of U.S. spectrum policy. In just the past few Congresses we have brought forth bipartisan legislation to authorize a first-of-its-kind broadcast television incentive auction, formed working groups that Ms. Matsui and Mr. Guthrie co-chaired that we organized to look at how do we modernize the federal spectrum, how do we work together to ensure that this vital national resource is put the most efficient and effective use. By the way, going into that legislation, the Congressional Budget Office said it would never happen, and they gave us a zero score, or something like that. And after the fine work of you all at the FCC and the people who actually arrived with checkbooks, I think the net is somewhere around $41 billion, paying fully for the interoperable broadband spectrum, or a system for public safety, as well as 911 enhanced process, and paying down debt. And that is just the first part of the auction with AWS-3.

Now, as we go forward, we need to make sure that there continues to be good cooperation and understanding about all the parties as we go into the broadcast incentive auction. I know our broadcasters were involved in this auction with some of the spectrum they had with the Defense Department and

other federal agencies, so it was more than just the Federal Government, and I commend the broadcasters for their involvement. But the model can hopefully be recreated in other spectrum bands through the Federal Spectrum Incentive Act. This was introduced, by the way, by Congressman Guthrie and Congresswoman Matsui, as the broadcast incentive auction is doing for broadcasters, this legislation would allow participating government agencies to receive a portion of the proceeds from the auction of spectrum assigned to it. That makes sense. It incentivizes agencies to take a hard look at the modern spectrum needs and consider alternatives, free up even more spectrum for commercial or unlicensed use.

Now, in the past, there has been a great deal of focus on so-called beachfront spectrum, the spectrum with the best propagation characteristics for commercial mobile use. Some of this will be auctioned off in the upcoming incentive auction of the 600 megahertz band currently used for UHF broadcasting. But these types of opportunities are going to be even more scarce in the future and it means we are--we have to start looking outside of the traditionally desirable spectrum bands. There is only so much spectrum out there, so we need to work together with what we have and that means expanding use into the spectrum frontiers.

The FCC began a proceeding last fall to examine the use

of frequencies above 24 gigahertz. To put that in perspective, most commercial use happens below 6 gigahertz, and most mobile use is in the 3 gigahertz level. Development of technologies that can utilize higher frequencies to meet current and future needs could be a real game-changer. I look forward to hearing more about the FCC's work in the space from our witnesses.

So how do we achieve these goals and ensure that America remains a leader in wireless technology, and development and deployment of mobile innovations? It will require a great deal of working together to leverage industry and engineering know-how, government authority, and agency implementation. To achieve this, both Congress and the FCC must be flexible and forward-looking stewards of our public spectrum asset.

So I look forward to hearing from our witnesses today. And with that, I will turn over the remaining time to my vice chair, Mr. Latta.

[The prepared statement of Mr. Walden follows:]

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Mr. {Latta.} Well, thanks, Mr. Chairman, for yielding. And thank you for our witnesses for being here with us today.

The demand for wireless spectrum capacity is growing daily, as technologically advanced devices and products are increasingly using unlicensed spectrum instead of cellular networks to connect to the Internet. There is no doubt that spectrum has become an integral part of our everyday lives, and contributes greatly to economic growth and innovation. It is vital that the capacity of our Nation's airways is able to accommodate advanced mobile innovation, therefore, we must examine all ways to expand access to spectrum. That is why I introduced H.R. 821, the Wi-Fi Innovation Act, which would examine ways to maximize the use of spectrum in the upper 5 gigahertz band, without creating harmful interference with incumbent users. My bill also recognizes that unlicensed spectrum is a critical component promoting continued economic development, increased connectivity, and greater productivity.

Mr. Chairman, I look forward to today--hearing from today's witnesses, and I thank you for yielding. And I yield back.

[The prepared statement of Mr. Latta follows:]

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Mr. {Walden.} Mr. Latta, we appreciate your participation and your comments.

We will turn now to Ms. Eshoo from California for an opening statement.

Ms. {Eshoo.} Thank you, Mr. Chairman. And good morning to all of our witnesses. It is wonderful to see you. Roger, is this the first time you have ever testified? It is.

Mr. {Walden.} Oh, boy.

Ms. {Eshoo.} Isn't that great? Yeah. Well, we miss you, but we are proud of you.

$41.3 billion. How would you like to have that in your checking account? That is a lot of money. It is really unprecedented in terms--that it was raised from the AWS-3 auction. It is a huge win, and I think that it is instructive to all of us in the value of spectrum. Spectrum is gold. Some is 18 karat, some is 24 karat, there are different levels of gold, but it is still gold. And we know that these funds are going to be used to reduce the deficit by some $20 billion. I don't know what other committee is producing that, but everyone here should pat themselves on the back. It is going to pay for the build-out of the first ever nationwide interoperable public safety network. That was the only recommendation of the 9/11 Commission that the

Congress had not made good on, and it is going to upgrade our 911 call centers across the country to support next-generation technology. So this is, I think by all--anyone that takes a look at this would say this is a success story.

Now, less than 2 years ago, Chairman Walden and I began regular meetings with NTIA, with the FCC, with the DoD, to ensure that our efforts to relocate or share spectrum held by federal agencies really stayed on track. And those were important informal meetings as well as hearings, but it really paid off. Many thought that the DoD wouldn't cooperate, but thanks in part, I think, to this bipartisan process and their cooperation we--that we established in June of 2013, 65 megahertz of spectrum will be brought to market to support America's insatiable appetite for wireless broadband. But our work is far from complete, because our goal is to free-up 500 megahertz of spectrum, and ensure that every American has access to 4G high-speed wireless broadband.

According to Sisco's latest forecast, global mobile data traffic will increase nearly tenfold over the next 4 years. That is a lot; increasing tenfold over the next 4 years, reaching an estimated 24.3 X-bits per month by 2019. So as a finite resource, we have to think big in our approach to spectrum management.

I think a 21st century spectrum policy should recognize the following. The complimentary benefits of both licensed and unlicensed spectrum. The need for competitive safeguards to prevent excessive concentration of spectrum, particularly within the prime beachfront bands below 1 gigahertz. And the need to utilize new sharing technologies to enhance efficiency and better manage spectrum.

The upcoming incentive auction can achieve, I think, each of these policy goals, while generously compensating broadcasters who voluntarily chose to participate. And I salute the broadcasters for cooperating. I want this to work very well for them because when it does, it is going to compliment the rest of the system. Similarly, freeing up additional unlicensed spectrum in the 5 gigahertz band will unlock immense economic value in our country, promote access to broadband, and expand the digital sandbox used by innovators and entrepreneurs.

So it is a pleasure for me to welcome all of you here, the experts, and as I said before I began my opening statement, to see our former Chief Democratic Counsel, Roger Sherman, you are a great source of pride to us, Roger. So I look forward to your testimony and the conversation that we are going to have, and the input that you will give to us.

And with that, I yield back.

[The prepared statement of Ms. Eshoo follows:]

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Mr. {Walden.} Gentlelady yields back.

Anyone on the Republican side want to make an opening comment, or should we move on to our witnesses? Okay.

We will go to Ms. Matsui now, using Mr. Pallone's time as the senior Member on their side.

Ms. {Matsui.} Thank you, Mr. Chairman, for yielding me time. And I also would like to welcome Roger Sherman. It is great to see you.

The future of American innovation would be fueled by spectrum, and more and more spectrum. Never has this been more evident than the record-breaking AWS-3 auction which generated nearly $42 billion. That is more than four times the reserve price that the FCC put on the sale, and more than double the previous record of $18.9 billion set in the 2008 wireless auction.

The planning for the AWS-3 auction did not happen overnight. There were many skeptics who doubted this auction would ever occur. But as a result of years of bipartisan congressional collaboration with the Department of Defense, the FCC and the NTIA, along with our Nation's broadcasters, the final product of the AWS-3 auction was truly historic for the wireless market and for consumers. The major investments put forth all provides us with fresh evidence of the

increasing consumer demand for Internet access by smartphones, tablets and devices. Spectrum has become one of the lynchpins in our economy. 4G speeds will soon become 5G speeds. New cars rely on spectrum to improve driver safety. Wi-Fi hotspots are popping up across the country. Innovative healthcare devices are being introduced utilizing spectrum to monitor blood pressure, oxygen levels, and activity levels. Technologies that allow consumers to control home energy consumption from mobile devices also rely on spectrum.

To more efficiently utilize our Nation's airwaves, America needs a national spectrum plan, one that would require a healthy mix of licensed and unlicensed spectrum bands. To that end, Congress must look for creative ways to produce more spectrum and create a pipeline for spectrum reallocation or sharing. That is why today I join Congressman Guthrie in introducing legislation that would create the first ever incentive auction for federal agencies, and for once, offer revenue to federal spectrum users in exchange for federal spectrum. It is a game-changer.

I thank Chairman Walden and Ranking Member Eshoo for cosponsoring this bill. I also welcome the Senate Companion Bill also introduced today by Senators Ed Markey and Deb Fischer.

Moving forward, I also believe that unlicensed spectrum

should be part of our spectrum plan. It is important for the FCC to develop a testing process on the upper 5 gigahertz band this year. It is time for the FCC to bring together in one room engineers from both the auto and technology sectors to see if they can coexist without interference in the 5 gigahertz band. That was the underlying principle of the bipartisan law passed in 2012.

I look forward to continuing to work in a bipartisan manner on spectrum issues. It is one of the key issues for our economy.

I would now like to yield the balance of my time to the gentlelady from New York, Ms. Clarke.

[The prepared statement of Ms. Matsui follows:]

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Ms. {Clarke.} I thank the gentlelady from California.

Chairman Walden and Ranking Member Eshoo, thanks for convening this hearing. Thank you once again to Congresswoman Matsui for yielding time.

For years, we have been discussing the Nation's spectrum crunch, and it is good to see the progress in this area, particularly as consumers are increasingly becoming dependent on their mobile devices. The world is going wireless, needless to say. Most of us couldn't even imagine going through the day without our mobile devices. But it is more than having our phones in our pockets. Our kids are using connected textbooks, our cars are equipped with fourth-generation wireless technology, our doctors treat us faster, at lower cost, by using wireless equipment, and everybody expects that--excuse me, and everyone expects to watch what they want, when they want to, where they want it, and whatever wireless devices they have handy.

Americans are clearly more engaged in the wireless ecosystem, and we need to ensure that our Nation has the capacity to accommodate current and future wireless needs. But all of this innovation does not happen alone. Our hunger for all things mobile is driving our insatiable demand for the airwaves that feed our devices. These airwaves are the

invisible infrastructure that is all around us. It powers the devices and services we use every day. That is why Congress charged the FCC with managing this scarce public resource on our behalf, and that is why we directed the FCC to conduct spectrum auctions that make more spectrum available for wireless carriers, and to supercharge the Nation's supply of spectrum for--of Wi-Fi.

The FCC has taken the ball and ran with it. Earlier this year, the agency completed the most successful auction in history. It raised over $41 billion for public safety and wireless, and made a significant slice of the airwaves available for mobile broadband. The FCC also gearing--is also gearing up for the broadcast incentive auction next year, but if we want the United States to continue to lead the world in wireless, there is a lot more to be done.

I look forward to the hearing from--to hearing from our expert panelists today about what is next in the spectrum pipeline, and I yield back.

[The prepared statement of Ms. Clarke follows:]

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Mr. {Walden.} Gentlelady yields back. We appreciate her comments.

And now we will go to our witnesses. We want to thank each of you for being here, not only before our committee but also the work you do not far away at the FCC. So thanks for being here.

And we will start out with Mr. Roger Sherman, he is the Chief of the Wireless Telecommunications Bureau of the Federal Communications Commission. Mr. Sherman, we are delighted to have you back here. I have 23 yes-or-no questions Mr. Dingell submitted, and--but go ahead with your testimony.

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^STATEMENT OF ROGER SHERMAN, CHIEF, WIRELESS TELECOMMUNICATIONS BUREAU, FEDERAL COMMUNICATIONS COMMISSION; ACCOMPANIED BY GARY EPSTEIN, CHAIR, INCENTIVE AUCTION TASK FORCE, FEDERAL COMMUNICATIONS COMMISSION; JULIUS KNAPP, CHIEF, OFFICE OF ENGINEERING AND TECHNOLOGY, FEDERAL COMMUNICATIONS COMMISSION; AND JOHN LIEBOVITZ, DEPUTY BUREAU CHIEF, WIRELESS TELECOMMUNICATIONS BUREAU, FEDERAL COMMUNICATIONS COMMISSION

} Mr. {Sherman.} Thank you. Good morning, Chairman Walden, Ranking Member Eshoo, and members of the subcommittee. We appreciate the opportunity to discuss next steps for spectrum policy, and welcome your interest in this topic.

At the table with me today are 3 experts well known to this committee; Juli Knapp, the Chief of the Office of Engineering and Technology; Gary Epstein, the Chair of the Incentive Auction Task Force; and John Liebovitz, the Deputy Chief of the Wireless Bureau, and Special Advisor to the Chairman for Spectrum Policy.

We know that time is limited and you are probably anxious to ask questions, so I won't reiterate our testimony, but instead briefly highlight three basic points. First, the

demand for spectrum continues to grow exponentially, and as a nation, we need to maintain our collective focus on this resource to continue to be the world leader in wireless. There is no debate that wireless is an engine of economic growth and progress in the United States, and there is no debate that spectrum fuels this engine.

As Chairman Walden and Chairman Wheeler pointed out in a recent op-ed upon the close of Auction 97, there is direct linkage between spectrum, jobs and economic growth, not to mention innovation, competition and consumer choice. You can be sure FCC staff is focused on making licensed and unlicensed spectrum available for mobile broadband to meet consumer and business demands. This has certainly been a key area of focus for Chairman Wheeler and all of the commissioners.

Second, we are actively bringing more spectrum online. Since Chairman Wheeler's arrival at the FCC, we have auctioned the 10 megahertz H block, and 65 megahertz of AWS-3 spectrum. We have also made other spectrum newly available and useable for wireless broadband and unlicensed uses. Of course, we are working towards the incentive auction early next year.

A couple of quick observations about AWS-3, many points that you have already raised in your statements. AWS-3 was a

team effort, and it is well known that it was a success in large part due to the important work of NTIA, DoD, and other Federal agencies. What is less well known, at least outside the Rayburn Building, is that full engagement of the Energy and Commerce Committee was a critical element of this success. Members of this subcommittee in particular took a personal interest in the success of this effort, and did everything possible to bring along other stakeholders with interest in this spectrum. These collective efforts yielded a great result. More spectrum is available for wireless broadband, federal agency transitions are paid for, and a number of congressional priorities have received critical funding, including the nationwide broadband public safety network, public safety research, next generation 911 implementation, and more than $20 billion for federal deficit reduction. As you are well aware, these priorities came directly from legislation authored by this subcommittee.

Third, and finally, the FCC is continuing to think hard and creatively about how to ensure a continuing supply of spectrum is in the pipeline. We all know how long it takes to ready spectrum for auction, or otherwise make it available for commercial use. The agency intends to use the tools Congress has provided towards this end. We will also continue to working closely with this committee and our

federal partners going forward. Along these lines, I am pleased to report that tomorrow Chairman Wheeler plans to circulate with the commissioners draft final rules to create a new service in the 3.5 gigahertz band, the Citizens Broadband Radio Service. This is an exciting opportunity to use new innovative technologies and policies to leverage 150 megahertz for wireless broadband. We have also initiated a proceeding aptly titled Spectrum Frontiers. This notice of inquiry examines spectrum high up on the spectrum chart, the bands above 24 gigahertz. This proceeding will help us understand better the future of wireless services, and hopefully create a regulatory environment in which new innovative technologies can flourish for the benefit of consumers.

On behalf of my colleagues here today and at the FCC, we thank the subcommittee for the opportunity to testify, and stand ready to answer your questions. Thank you.

[The prepared statement of Mr. Sherman follows:]

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Mr. {Walden.} Mr. Sherman, thank you for your testimony. We thank the other witnesses for being here today for the committee.

Mr. Sherman is the only one presenting testimony today, so we will go right into our questions and then he will--he told me he is more like the point guard, he will hand it off to the other experts on the panel as well, but feel free to ask him questions too.

So we will start with--please, lots of questions, Mr. Sherman. We will start with Mr. Epstein.

The FCC's budget requests include $2.4 million to engage an administrator to manage the broadband relocation fund. Is that engagement going to be awarded through competitive bidding, and if not, why, and is this a one-time request or do you think additional funding will be necessary? I have a couple of other follow-up questions, but--

Mr. {Epstein.} Well, thank you, Mr. Chairman.

Mr. {Walden.} And, yeah, turn on that mike. There you go.

Mr. {Epstein.} Yeah. Thank you very much, Mr. Chairman, for the opportunity to testify today. The broadcast administrator is going to be a crucial part of the transition post-auction, and yes, we do anticipate it as

being a fair and open compete, and we do anticipate that it will be a one-time-only request.

Mr. {Walden.} All right. And where will those funds come from, the $2.4 million estimated cost?

Mr. {Epstein.} I am not an expert in the budget aspects of things. My anticipation is it will come out of auction proceeds, but I will confirm that with our Office of Managing Director.

Mr. {Walden.} Okay. And the commission has engaged clearinghouses before to manage cost sharing in the clearing of spectrum bands. How much--do you know how much those cost to manage--those--how much it costs those entities to manage a clearinghouse?

Mr. {Epstein.} Mr. Chairman, I don't have those numbers. As--does any--do any of the other experts--

Mr. {Walden.} Yeah, if other members on the panel have answers to any of these questions our Members have, please feel free to speak up.

{Voice.} We will get that back to you.

Mr. {Walden.} All right.

Mr. {Epstein.} We will get that information back to you.

Mr. {Walden.} Perfect. Okay. And, Mr. Knapp, welcome, by the way. We are always delighted to have you in the room,

and helping us on the technical side of these issues. And so I want to talk about performance requirements for receivers. Do you think that a sort of one-size-fits-all rule setting performance requirements for receivers or defining the interference environment will solve the problems across many different types of radio devices, and if not, how would you tailor an appropriate framework?

Mr. {Knapp.} Thanks, Mr. Chairman. We have had our technological advisory council look at this issue. One of the things that came out of that is a proposed new approach for dealing with receivers. It is based on something called interference harms fresh roles.

Mr. {Walden.} Um-hum.

Mr. {Knapp.} Rather than setting standards for receivers, which we--as we got into it, found that a one-size-fits-all would be really difficult--

Mr. {Walden.} Right.

Mr. {Knapp.} --to come up with. In fact, I was at a conference earlier this week where I heard another idea that is coming out of a multi-stakeholder group that is a variation on that, which talks about more of a generic mask. So the receiver issue continues to come up. We are still working with the industry on approaches that we can take to this without moving quickly to mandatory standards.

Mr. {Walden.} All right. Yeah, let me--I will go to this next question. Mr. Knapp and Mr. Sherman, the proposed use of heightened receiver performance standards as a solution to interference problems has long been of interest to our subcommittee, as you all know. However, we recognize requiring more stringent standards for receivers can result in over-engineering and higher consumer prices, which I think is what you are alluding to there. So how do we balance this? Is there a way to improve receive performance without concurrent increase in price or device size? And then I still have people asking me about, you know, spectrum is limited, are there ways to maximize use, and that leads to a discussion about FM chips in cell phones and all of that. So, Mr. Knapp, do you want to address that?

Mr. {Knapp.} So the problem is a lot easier to deal with when you are introducing new services. So in the spectrum that Roger referred to, the proceeding on Citizens Broadband Radio Service, the--one of the things that we are looking to a multi-stakeholder group to do is to try to address the receive issues at the start. And so that is how we are trying to approach this. It is difficult to do something about receivers that are already out there, but we think--

Mr. {Walden.} I think we learned that with LightSquared

and GPS and all of that, right?

Mr. {Knapp.} Right. Absolutely.

Mr. {Walden.} Mr. Sherman?

Mr. {Sherman.} On the question about FM chips that you--

Mr. {Walden.} Right.

Mr. {Sherman.} --asked earlier, I think Chairman Wheeler spoke about that last week at one of his hearings.

Mr. {Walden.} I heard he was on the Hill.

Mr. {Sherman.} Yeah. And I think he indicated that he thinks the market seems to be working, and if consumers want their FM chips, they can let their carriers know, and that their--the market should solve that problem. And I think that--I probably don't have anything to add to that.

Mr. {Walden.} All right. Those are the only questions I have, so I will yield back the balance of my time.

And I will turn now to my friend from California, Ms. Eshoo.

Ms. {Eshoo.} Thank you, Mr. Chairman.

I am going to go as quickly as I can because I have a lot of questions, and I doubt I will get them all in, but the ones that I don't, we will submit them to you in writing for a response.

To Roger, you know, I think, very well that it has been

a long-held belief of mine that the upcoming incentive auction rules really have to be sufficient to prevent excessive concentration of spectrum amongst the Nation's largest wireless providers. Now, today, approximately 73 percent of the highly desirable spectrum below 1 gigahertz is held by two companies in the country. Is it the commission's view that wireless carriers who lack substantial low frequency spectrum are at a competitive disadvantage?

Mr. {Sherman.} Thanks for the question, Ms. Eshoo. I think the commission has been wrestling with this issue for the last several years in various competition reports.

Ms. {Eshoo.} Yeah. It is a sticky wicket, um-hum.

Mr. {Sherman.} And last year--

Ms. {Eshoo.} Um-hum.

Mr. {Sherman.} --in--about a year ago, when it adopted the incentive auction order, it also adopted a companion order of mobile spectrum holdings in which it recognized that a complimentary mix of spectrum, including low band spectrum, because of its special properties, was critical to competition. And it took steps in that order to recognize the unique characteristics of low band, which as you know, is better for rural coverage because it propagates over further distances--

Ms. {Eshoo.} Um-hum.

Mr. {Sherman.} --and it also is great for urban areas where it can go through buildings and walls. So the commission took action in that item to recognize the special qualities of low band, and in transactions it gives special deference to the amount of low band spectrum being transferred. And then importantly, in the incentive auction, it established what we call a market-based reserve, which is a real balancing act to try to make sure that nobody can get all of it--

Ms. {Eshoo.} Um-hum.

Mr. {Sherman.} --and make sure it is available to the smaller providers, because as you mentioned, it is disproportionately held by a couple of large carriers. Not suggesting those carriers did anything wrong, it is just a historic fact.

Ms. {Eshoo.} No, they didn't, but the whole issue is that we have competition in our country.

Mr. {Sherman.} Right. Right.

Ms. {Eshoo.} I mean that is--we have free markets, we have--but competition is one of the essential ingredients in our national economy. Thank you.

Mr. Knapp, it is great to see you. I have fought very hard for unlicensed in the TV white spaces, which is why I was concerned to hear that the FCC recently received a

petition to suspend the TV white spaces database. Can you explain to the committee exactly what is going on with this, and if you are aware of any instances of interference as a result of the database problems raised by the NAB?

Mr. {Knapp.} Sure. These are databases that were set up through private providers where only fixed users, the people who do things like wireless broadband and provide service to businesses, can register their locations and some related information into the databases. We are aware there are some anomalies in the databases, and we have been working with the database providers and the other stakeholders to take care of any housekeeping that needs to be done, as well as continuing to work with the broadcasters to correct any problems that we find. But we have not--

Ms. {Eshoo.} So what is--this is really loud. What is the--yeah. We have some at the table. What is the upshot of it though? I mean will--is this going to be settled, is it going to be left hanging in limbo, what is going to happen to the TV white spaces?

Mr. {Knapp.} So I am confident that this can be easily corrected.

Ms. {Eshoo.} That is great.

Mr. {Knapp.} It is things like missing phone numbers.

Ms. {Eshoo.} I like the word easily. Okay, good.

Moving on.

Both to Mr. Liebovitz and to Mr. Knapp, the prospect of 5G technology is very exciting. It is very exciting for consumers. I think for everyone on the committee, we understand what superfast speeds will bring about for people in our country, and that is the cause of excitement. It is my understanding that the commission is currently examining which bands of spectrum would best be suited for 5G services. When can consumers expect to see 5G deployed in our country?

Mr. {Liebovitz.} Thank you, Congresswoman, and thanks for the invitation to speak today.

Ms. {Eshoo.} Uh-huh.

Mr. {Liebovitz.} So 5G is a topic of growing interest in the wireless industry.

Ms. {Eshoo.} Um-hum.

Mr. {Liebovitz.} As I think Members know here, in the U.S. our policy is not to earmark spectrum for certain technologies. We have a strong policy of technology neutrality and we intend to continue that.

Ms. {Eshoo.} And I think that is a sound policy.

Mr. {Liebovitz.} At the same time, we recognize that some of the new technologies that are coming down the pipe have the potential to use very wide channels, and use spectrum that otherwise is previously thought unusable for

terrestrial service. So we put out the NOI last fall on spectrum frontiers which teed-up a number of different bands above 24 gigahertz for both licensed and unlicensed 5G-type service. We have--there are also incumbents in those bands. Some of those bands that we have to think about protecting their users, satellite users and others, but the technology itself is not really ready yet, it is still in the lab. I think most people anticipate that these technologies would happen in the 2020-plus time frame, and I think if you look at the history of wireless, this technology, they tend to--the schedules sometimes tend to slip a little bit, but it is a--it is looking at the next decade I think, more than, you know, tomorrow or the next year, but it is coming and we want to be the first--we want America to be the first country to have it, and the place where the technology gets developed and thrives.

Ms. {Eshoo.} Speed it up.

Mr. {Liebovitz.} Is that my testimony, or are you--

Ms. {Eshoo.} No, your testimony is over. My time is up.

Mr. {Walden.} Gentlelady's time has expired. We have to move now to the gentleman from Ohio, Mr. Latta.

Mr. {Latta.} Thank you very much, Mr. Chairman. Again, gentlemen, thanks very much for being here today to testify.

Mr. Knapp, if I could just start questioning with you. The FCC has done very good work in facilitating compromise solutions so that the 5.1 gigahertz band can be shared to the benefit of Wi-Fi consumers. We now need more such compromise solutions to enable efficient use of the 5.9 gigahertz band to keep up with consumer Wi-Fi demand. Wi-Fi can share the band with future intelligent transportation systems if those systems are every deployed. What is your timeline do you think for allowing Wi-Fi operations in this band?

Mr. {Knapp.} So the--we brought together the stakeholders for the two bands that are in play. One is a band of 120 megahertz that is used primarily by the Department of Defense. So we have set up a working group with Department of Defense, NTIA, there are also some NASA operations in there, along with the industry stakeholders. There have been studies done on the required protections. We are not quite there on the ability of the equipment to meet what the requirements would be. So we are still working on that. Once we get to a point where we have a solution, there will need to be prototype devices from industry to be tested to make sure it works.

So it is a little bit hard to give you a firm timeline. I can tell you that we are trying to accelerate this as fast as we can.

Mr. {Latta.} Let me ask, when did the working groups first form--

Mr. {Knapp.} So most of the work had been going on internationally. So that has been going on actually probably a year and a half, 2 years. We reached a point where it was clear we were not going to be able to have everything that--necessarily in place to succeed internationally, so we created the work group, I think we started late last summer, and then we picked up the pace with meetings once a month earlier this year.

Mr. {Latta.} So you are meeting with the working groups about every month that you are working--

Mr. {Knapp.} Every month.

Mr. {Latta.} Okay.

Mr. {Knapp.} We created a technical subgroup that is meeting in between. So we have all the players there trying to find an answer here.

Mr. {Latta.} Okay. Let me ask also, given the tremendous advance in the wireless technology over the last decade, should the commission review its DSRC spectrum designation to determine in the public interest if there are other more advanced vehicle or to--vehicle safety technologies using services like the LTE advance 5G or Wi-Fi?

Mr. {Knapp.} So this is the other portion of the

spectrum, 75 megahertz, that we have been looking at. There, the technology is very similar to Wi-Fi, and so the IEEE, which is basically the developer of both the Wi-Fi standard and the DSRC standard, put together a tiger team to try to find a solution. They are nearing the completion of a report. There are a couple of proposals on the table to be looked at, plus we have been meeting separately with the NTIA and Department of Transportation, and one of the things I think that we have agreed we need to look at is the broader scope of communications for vehicles beyond just the DSRC.

Mr. {Latta.} Thank you.

Mr. Liebovitz, if I could ask you quickly, how can we move forward and ensure shared use of the upper 5 gigahertz band, and would it be beneficial for the FCC to hold routine meetings with the committee in order to accomplish the goal?

Mr. {Liebovitz.} So I would like to yield to Mr. Knapp on that question.

Mr. {Latta.} Okay, that is fine, if you want to do that. He is on the hot seat then.

Mr. {Knapp.} You know, we would be more than happy to meet if you would like and keep you apprised of the progress.

Mr. {Latta.} Yeah, we would appreciate that.

Mr. Sherman, as stated in the--your joint testimony, in 2010, the FCC analyzed spectrum demands and determined that

the 300 megahertz would be needed by 2015. It is now 2015, and as you have outlined, the FCC has released 145 megahertz of spectrum for wireless broadband use.

What is the plan for our Nation to meet the skyrocketing consumer demand for wireless services?

Mr. {Sherman.} Thanks for the question, Mr. Latta. I think--

Mr. {Latta.} Yeah, is your mike--

Mr. {Walden.} Yeah, turn your mike--yeah.

Mr. {Sherman.} The announcement about the 3.5 gigahertz item that is being circulated will make progress, but I would defer to my colleague, John Liebovitz, because he has been working on this plan for several years, and he probably can give you more up-to-date information.

Mr. {Latta.} Thank you.

Mr. {Liebovitz.} Yes, so the national broadband plan, which of course, was authorized and directed by Congress, which came out in 2010, talked about 2 goals. One was 300 megahertz for mobile use in 5 years, and then 500 megahertz within 10 years. Towards the first goal, as you mentioned, we have succeeded in getting close to 150 megahertz out already, which if you look at the history of spectrum release, is very fast actually. The 3.5 gigahertz item, which is--which looks to be voted in the April meeting, would

add another 100 megahertz of new spectrum. And then, of course, we have the incentive auction coming in early 2016. So it might not exactly be in the 5-year time frame, but it is pretty close, that we actually have a roadmap to get to the 300 megahertz.

Beyond that, we would be looking at other bands. We have talked about some of them today for both unlicensed and licensed broadband use, which would take the Nation to 500 megahertz.

Mr. {Latta.} Thank you.

Mr. Chairman, my time has expired, and I yield back.

Mr. {Walden.} And we will now turn to the gentleman from Kentucky, Mr. Yarmuth, for 5 minutes.

Mr. {Yarmuth.} Thank you very much, Mr. Chairman. Thanks to the witnesses for being here today.

I know there are some stakeholders who think the FCC should focus exclusively on allowing opportunities for licensed spectrum. And, Mr. Sherman, I think in your testimony you referenced the agency's commitment to--the commission's commitment to both licensed and unlicensed. Could you explain--which I think is a good idea. Could you explain why it is important to allow the opportunities for unlicensed spectrum?

Mr. {Sherman.} Sure, I would be happy to. And I would

ask if my colleagues, Juli Knapp or John Liebovitz, have anything to add, but I think the agency recognizes that in this environment, licensed spectrum and unlicensed spectrum are complimentary and mutually--and very critical and support each other in a lot of ways. Consumers use both and consumers want both, and there are benefits to licensed users and licensees by having unlicensed, and vice-versa. Congress recognized this in the middle tax--the Middleclass Tax Relief and Job Creation Act by allowing for unlicensed uses in the 600 megahertz. So I think everybody is very comfortable with the symbiotic relationship between licensed and unlicensed.

I would ask if Juli or John have anything to add.

Mr. {Knapp.} No, I completely agree with what Roger said, and we are working hard on both fronts to provide spectrum and opportunities for growth of both licenses and unlicensed services.

Mr. {Yarmuth.} I know that unlicensed spectrum is really important for innovation and for small business and so forth. How do some of the larger carriers--wireless carriers use unlicensed?

Mr. {Sherman.} Well, I think the most obvious way is unlicensed--a lot of people in their everyday use of their smartphones will be on a licensed network, so to speak, as they travel from their office to their house. When they get

into their house, a lot of times their phone will transfer onto a Wi-Fi network within the residence, and they will be using data on an unlicensed Wi-Fi network.

Mr. {Yarmuth.} Okay.

Mr. {Knapp.} Yeah, I would just add that certainly, Wi-Fi gets all the attention, but in those same devices are Bluetooth to connect to your headphones and the Near Field Communications for the automatic payment that is emerging. All that is unlicensed.

Mr. {Yarmuth.} Okay. Thank you for that.

And one of my kind of personal obsessions now is how we make policy in real time with as fast as the world is changing, and certainly, in this area, that kind of dilemma is certainly relevant. Is there any--you talked about research on 5G and so forth, is there anything going on out there, research and so forth, that actually scares you, and might be so disruptive that your world--the world as you know it, and we know it, is--will change?

Mr. {Sherman.} Well, if you are talking about research, I should probably defer to the engineer.

Mr. {Yarmuth.} I mean the reason I--for instance, I read something a few weeks ago where somebody had--has invented a way to transmit electricity through sound waves to appliances, and if that is--I am--I think that, if it is

scalable and if it actually works, that is a disruptive technology because then we have to say, well, should we really be investing trillions of dollars in the grid if we are going to be--have another way to transmit electricity. I was just curious whether in your specific area there are things that promise that kind of disruption. I mean it is fine if you say no.

{Voice.} No. No. Go ahead.

Mr. {Liebovitz.} I would just add, I would just say that the--I think this is a big policy challenge that we always face about how do you prepare for the next disruptive technology. I think it is instructive and reinforces the policy of technology neutrality, of flexibility, as much as possible so that we don't, you know, as much as possible that we don't lock certain types of uses categorically into the rules, we allow lots of different applications to thrive. Our 3.5 gigahertz proceeding actually is an attempt to try to push the boundary of flexibility even farther. So in some ways it is a hybrid between licensed and unlicensed uses, and I think there is a lot more we can do looking forward to 5G and so forth.

Mr. {Yarmuth.} Um-hum. I have no other questions. I yield back, Mr. Chairman. Thank you.

Mr. {Walden.} Gentleman yields back.

And we now turn to the gentleman from New Jersey--yeah, gentleman from New Jersey, Mr. Lance.

Mr. {Lance.} Thank you very much. Good morning to you all.

The incentive auction will be the first time the FCC auctions a band plan that is not set in advance of the auction, using a new auction mechanism, ascending clock, that includes a separate round to assign licenses after the main auction is over. It will also include a spectrum reserve triggered when bidding reaches a certain level, impaired licenses and something called intra-round bidding. As I understand it, all of this new, even for those wireless carriers who have participated in traditional auctions.

To the panel in general, and perhaps to Mr. Epstein and Mr. Liebovitz, what steps will you take to help prepare carriers for bidding in this first of its kind auction? For example, will there be multiple mock auctions and seminars?

Mr. {Epstein.} Thank you much--thank you very much, Congressman. You are absolutely right. Outreach is extremely important in this auction on both sides of it; both the reverse auction side and on the forward auction side.

On the reverse auction side, you know, broadcasters are really not used to bidding in an auction, and especially in a new auction, a voluntary auction like this. And so I can go

into detail later, but we have taken many new steps to encourage and to inform broadcasters.

On the forward auction side are--wireless providers are more familiar with auctions, they are expert, but you are exactly right, there are several new features of this auction. We have been working with them on a daily and on a weekly basis to help formulate the appropriate policy, and we will have outreach and we will have mock auctions as part of the planning to go forward before the auction.

Mr. {Lance.} Thank you. Would others like to address the issue?

{Voice.} No, thank you.

Mr. {Lance.} Thank you. The FCC's incentive auction public notice proposes to sell both impaired and unimpaired licenses. As I understand it, a license is impaired when a carrier cannot serve the entire geographic market due to interference from television broadcasts. Before bidding on a license, carriers will need to know the extent to which licenses are impaired, meaning which parts of their license area they may not serve or may be subject to interference.

What kind of information will carriers have prior to bidding regarding the geographic areas that may be impaired?

Mr. {Epstein.} This concept of impairment, Congressman, comes from the fact that the commission made the policy

decision that it really doesn't want to go to what is called the least common denominator. And, you know, if we can't get a reasonable amount of spectrum in certain congested areas, we don't want the whole country to have that limited amount of spectrum. And what that means is, as you said, you are exactly right, we may have broadcasters in that particular band which will mean that hopefully in some limited areas, bordering congested areas, that the--they--the--certain blocks in the auction will be subject to interference.

What we have said in the public notice that you have talked about, and what the commission will decide in the summer when it resolves that, is the amount of detail, what we have talked to the carriers about, is very specific detail so that they will know exactly what they are bidding on in the forward auction, almost on a 2 by 2 sale level.

Mr. {Lance.} Thank you. Anyone else on the panel like to comment?

Thank you very much, Mr. Chairman. I yield back the balance of my time.

Mr. {Walden.} Gentleman yields back the balance of his time.

Now turn to the gentleman from Iowa for 5 minutes.

Mr. {Loebsack.} I was not expecting to speak this soon. Thank you, Mr. Chair.

I want to be pretty brief just because some of the things that I wanted to ask about have already been covered, but I would like to just--and I may be repeating, and that is fine, but refer to the unlicensed issue, and this is to any of the witnesses. Some stakeholders argue that the FCC should focus exclusively on maximizing opportunities for licensed spectrum. I believe, however, that the FCC should pursue a balanced spectrum policy that includes more spectrum for both licensed and unlicensed. I know unlicensed spectrum has lower barriers to entry which can help startups, I think that was mentioned already, and small businesses get access to the--this platform for innovation. How do larger wireless carriers use unlicensed spectrum? And that is really for anybody here.

Mr. {Sherman.} Well, I think we would agree that there is a symbiotic relationship between licensed and unlicensed spectrum, and they are not mutually exclusive; you can have both. And I think the Congress has recognized that, and the FCC strives to implement a policy that recognizes that.

I mentioned earlier the example of offloading usage--data usage onto an unlicensed network to ease capacity, and there are other new innovations that are coming down that use both licensed and unlicensed technology, and seamlessly between unlicensed and licensed services.

I don't know if John or Juli have anything to add.

Mr. {Knapp.} Yeah, I mentioned some before, and I think most people have--appreciate where we had the arguments years ago about should be one or the other or more, that the 2 win when there is spectrum for both.

I mentioned a couple of things before, even on the medical front, we have got glucose monitors that can--use unlicensed spectrum, or lightly licensed spectrum, to collect data. They feed it to the wireless device, and then the information can go back to the doctor or--so there are things that are being accomplished and innovations that are occurring because we have both, and we need to continue to provide for both.

Mr. {Loebsack.} Thank you. Anyone else? Okay. Just one--go ahead.

Mr. {Sherman.} I just wanted to add one other thing. We often look at it also, consumers don't really care if it is licensed or unlicensed--

Mr. {Loebsack.} Right.

Mr. {Sherman.} --they just want their device to work and the services--

Mr. {Loebsack.} Right.

Mr. {Sherman.} --to perform. So I think at the end of the day, consumers are going to want services in both the

required to make things robust.

Mr. {Loebsack.} And I think that is the bottom line for us here in Congress too. We have to make sure that that access is there.

Mr. Sherman, paying for a broadband connection, including wireless broadband, you know, can be a major challenge obviously for many of my constituents, many of the constituents here--of the folks here on the dais today, and competition in the wireless industry is critical, no doubt, if we are going to help low-income Americans get connected. And I have a particular concern about rural America, I have to say, not just because I represent a lot of rural areas, but a lot of folks on this committee now who have that particular concern as well.

How does access to spectrum impact the level of competition in the wireless industry, because competition, hopefully, would lead to, you know, lower prices or at least more competitive prices, and providing the same kind of access as well. And so if you could speak specifically to the rural areas, I think that would be important for a lot of us here.

Mr. {Sherman.} Thanks for that question. It is also very important to the commission on a bipartisan basis. And there are a number of policies that the commission has

adopted over time to incent rural deployment and build out. We need to do more but there are a lot of things already in place.

One thing that is critical is low band spectrum, which we talked briefly about before.

Mr. {Loebsack.} You mentioned that earlier. Can you elaborate on that a little bit?

Mr. {Sherman.} The more--low band spectrum, because of its propagation characteristics--

Mr. {Loebsack.} Um-hum.

Mr. {Sherman.} --is really well suited for rural areas. It goes farther with less infrastructure--

Mr. {Loebsack.} Um-hum.

Mr. {Sherman.} --so that it costs less and can serve those areas where people live, you know, longer distances apart. And--or in congested cities oftentimes, you can have multiple sites attached to buildings and serve lots of densely populated areas, but rural areas you have bigger distances, so low band spectrum is particularly well suited. We want to make sure that there is lots of low band spectrum in rural areas with lots of providers having options, so rural consumers have the same benefit of competition that--

Mr. {Loebsack.} Right.

Mr. {Sherman.} --that urban consumers have. We also

have incentives for building out--we have build-out requirements. There are, right now in looking at small business preferences and incentives in open NPRM, you know, the question of rural build-out incentives is also, you know, keyed up and the commission is very sensitive to those issues.

But I think in everything we do with competition policy, rural is a big part of it.

Mr. {Loebsack.} It is. And, you know, again, I mean I cited a lot of examples where it is just really hard for folks in a rural area to--because there isn't that much competition. And, you know, in the end, they end up paying a lot of money and they are not getting as good a service often as the--is the case in the urban areas. So how we can incentivize that is the question.

Mr. {Sherman.} Well, one other thing I should mention in the incentive option, one thing the commission did is it changed the standard license size to what is called a PEA--

Mr. {Loebsack.} Um-hum.

Mr. {Sherman.} --and it was a compromise amongst various stakeholders, but it allows smaller providers to have access to a smaller license area, which might not be as expensive as a large, nationwide or regional license--

Mr. {Loebsack.} Okay.

Mr. {Sherman.} --and a lot of the small rural providers that we talked with and engaged in that proceeding were really pleased that the commission came up with a way that they can get into the auction--

Mr. {Loebsack.} Thank you.

Mr. {Sherman.} --at a reasonable basis.

Mr. {Loebsack.} Thank you.

Mr. Chair, I see my time has expired. I yield back.

Mr. {Walden.} The gentleman yields back. And I just concur with what he said about the rural areas. I have a town, Mitchell, Oregon, 130 people in 2010, now to 129. The local city had to pay to put in a payphone because there is no cell coverage, and you have a highway going by, and people are just--have a problem, breakdown, knock on somebody's door. I mean it is just--we still have these areas that--like Mitchell, Oregon, that need coverage.

Ms. {Eshoo.} Would you just yield for a moment--

Mr. {Walden.} Yeah, sure.

Ms. {Eshoo.} --Mr. Chairman?

Mr. {Walden.} I am on--I don't know whose time I am on.

Ms. {Eshoo.} Yeah, I--sure. You have the best time. It is the chairman's time. But it is great spectrum, yeah.

Mr. {Walden.} Yeah.

Ms. {Eshoo.} On this issue of rural, in the last

Congress, I had counted how many members of the Energy and Commerce Committee represented rural areas, and a combined from both sides of the aisle there were 18 members. So, you know, the rural representation could take over this entire committee, you know. I don't know how many--

Mr. {Walden.} We just haven't told you we have them.

Ms. {Eshoo.} --I haven't counted. I haven't counted for this Congress, but this issue is sweeping in terms of--and it has excellent representation here. So it is very important to highlight it.

Mr. {Walden.} Yeah.

Ms. {Eshoo.} Thank you.

Mr. {Walden.} Yeah, actually in this county, there is one person for every 9 miles of power line. So I mean these are not--you know, but--so it is hard to find the economic--anyway.

We will go now to Mr. Guthrie, who helped lead our task force--the bipartisan task force on this issue. Thanks for your leadership, you and the rest of the Members did a terrific job. So please go ahead.

Mr. {Guthrie.} Thank you, and I appreciate that, and I think people who have heard this will get tired of hearing me say this but it is true that now that we are having these spectrum meetings, it is interesting when you get into public

service, things you get involved in you never thought about. I used to--I have said I didn't walk around Kentucky going send me to Washington and I will deliver you spectrum, but that is something that people want and expect, and so it is really good that we are here doing this. And so I would just kind of make a statement of--for a few minutes and then ask a couple of questions. But I would like to thank all you guys for testifying. It is very important. And I also want to mention my appreciation for working with Doris Matsui and for all of her efforts working with me on the spectrum issues, as co-chairs of the Congressional Spectrum Caucus, it was bipartisan effort and very--worked well together. And, in fact, today we have reintroduced together the Federal Spectrum Incentives Act, a bill that would provide financial incentives to encourage government agencies to relocate from their existing spectrum bands in order to free-up additional spectrum for other uses. And I look forward to hearing from--I mean working with all of you to move this forward.

As we have already discussed at length today, spectrum is an important limited resource, and by incurring--encouraging federal agencies to make additional spectrum available, we can invest in innovation and ensure spectrum is available to meet the demands of our critical emergency needs and commercial uses. And this bill received strong

bipartisan support last Congress, and I look forward to working at the same again this time.

And just what Mr.--my friend from Iowa, Mr. Loebsack, just said, I was going to mention that we also want to recognize the commission's work to create rules for the upcoming incentive auction that does use the partial economic areas for geographic support in Kentucky. I am one of those 18. I have some good-sized--couple of good-sized cities, but I do have a lot of rural area, and it will aid my constituents and it will aid better participation in the auction, so we appreciate that.

I just have a couple of questions with the couple of minutes I have left. Mr. Epstein, for you, you know, we have heard--I have heard concerns that the $1.7 million relocation fund for broadcaster expenses may be inadequate for the true cost of relocating stations. What is your opinion on this, and assuming that it could be inadequate, what are potential solutions?

Mr. {Epstein.} We are very concerned about both the--

Mr. {Walden.} Can you turn on your microphone, sir?

Mr. {Epstein.} --amount and the--I am sorry.

Mr. {Walden.} Thank you.

Mr. {Epstein.} I think it is on. Is it?

Mr. {Walden.} Yes.

Mr. {Epstein.} I will move it closer.

Mr. {Guthrie.} Move it closer, yeah. Thanks.

Mr. {Epstein.} Yes, we too, Congressman, are concerned about both the amount and the process, so we commissioned an expert report called the Waddelli Report, that was out there, and they came back with the conclusion that it was challenging but feasible to do so if we were careful and took certain steps. So we have no reason to believe that it--the $1.75 billion which Congress set forth, will be insufficient to be able to do the relocation, but we are working with the NAB, with broadcasters, with the industry generally, and we are also taking certain other steps such as building into the software ways to minimize relocation costs. And that includes, you know, minimizing the number of stations that have to change channels, or taking special account of those stations which have really expensive relocations new--and minimizing those. So we look forward to working with the industry and with everybody else, but at this point we have no reason to believe the $1.75 billion won't be sufficient.

Mr. {Guthrie.} Yeah, it was just pointed out to me, I said $1.75 million. We couldn't do it for that, could we?

Mr. {Epstein.} Billion.

Mr. {Guthrie.} If we could do it for that, we could use the money for the deficit--

Mr. {Epstein.} Yes, sir.

Mr. {Guthrie.} --couldn't we? And I will ask Mr. Sherman, we are talking about, you know, referring spectrum through broadcasting, trying to free the bill to free spectrum through government spectrum, but outside of the crunch for procurement of more spectrum, is FCC doing to encourage more spectrum, and I--don't create spectrum, better use of spectrum, maybe sharing, efficiencies, those types of things? I have about a minute left, if you could elaborate on what you guys are doing to create more spectrum than what we have--

Mr. {Sherman.} I--

Mr. {Guthrie.} --or more availability.

Mr. {Sherman.} I can initially respond, but then will ask John to elaborate. But I think all of the above is what the FCC is doing. You know, unlicensed, licensed, sharing, exclusive use, we are exploring everything because we have to be as efficient as possible. And I know John has spent a lot of time working on that.

Mr. {Liebovitz.} Yes, I will come back to the theme of flexibility. We have--obviously, the unlicensed spectrum is the ultimate in flexibility, and shared--and sharing and, you know, unlicensed spectrum today is where most of the spectrum sharing happens, and people don't even realize it, Wi-Fi is

intensive sharing with Bluetooth and other technologies. We have secondary market rules which allow people to transfer spectrum to other--others. They can sell--essentially sell the rights so the market can work, which is really important. And then we are looking at ways to kind of push the rules to even be more flexible. I mentioned the 3.5 gigahertz item in some ways will encourage not only sharing between commercial and federal users, but also among different types of commercial users so that, for example, maybe some--in the future some very large industries, including some that are well known by the committee, energy, and so forth, will have access to a 150 megahertz band that they can use for LTE to do lots of smart grid, deployments, other types of things.

Mr. {Guthrie.} Thank you. My time has expired. Thank you, Mr. Chairman.

Mr. {Walden.} Thank the gentleman for his good work and good questions.

We will now turn to the gentleman from California, Mr. McNerney, for 5 minutes.

Mr. {McNerney.} Thank you, Mr. Chairman. And I thank the witnesses.

Mr. Liebovitz, is there any language in the current regulations that discuss how new technologies in the unlicensed spectrum should interact so that existing

technologies are not unfairly hampered?

Mr. {Liebovitz.} I think Mr. Knapp is probably the--

Mr. {McNerney.} Okay, sure.

Mr. {Liebovitz.} --best person to answer that.

Mr. {Knapp.} So the way unlicensed works is the devices, they all have a little label on them that says they are not protected against interference, but obviously they are serving a wide public grid. So when new technologies--the beauty of it is it allows flexibility for cutting-edge technologies to be introduced, but we also try to keep an eye on that there is not something that disrupts all of the good applications--

Mr. {McNerney.} Yeah.

Mr. {Knapp.} --that are out there now.

Mr. {McNerney.} So that was kind of vague. I mean--

Mr. {Knapp.} Yeah.

Mr. {McNerney.} --when we expect some new technologies to come in, can't they be disruptive to existing technology like Wi-Fi?

Mr. {Knapp.} What we try to do, because there is freedom there, is just keep an eye on what is going on. There is not a specific benchmark for--like in the licensed service where there is protection. And most of those technologies are built to be robust and operate in a shared

environment.

Mr. {McNerney.} Yeah, I am little worried though that some of the new technology can come in and be very dominant, like the LightSquared problem.

Mr. {Knapp.} Yeah, I think we are always keeping an eye on what is coming in the way of new technologies and those bands, and we have been encouraging the industries, because they normally sort out the details of the sharing, to work those things out before a new technology is introduced that is disruptive.

Mr. {McNerney.} Okay. I am not sure who to ask this question, but is there any portion of the spectrum that will be reserved for small bidders in future auctions? Mr. Sherman?

Mr. {Sherman.} Well, I think the question is about the ability of small bidders in future auctions?

Mr. {McNerney.} Right.

Mr. {Sherman.} The way the FCC has approached that in the last few years is through something called our competitive bidding rules where we have small business discounts, and that is an issue that is currently open before the commission, evaluating whether the current rules make sense or we should update them. And there are some proposals in the record to update the rules to allow small bidders to

get a more realistic opportunity to bid for a spectrum which is, you know, is pretty expensive. So that is an active proceeding that the commissioners are all engaged in.

Mr. {McNerney.} Okay. I don't understand exactly what is going on with the incentive auction. What are the current holders of the 600 megahertz band and how are they going to be treated in the--in an auction?

Mr. {Epstein.} Well, the--most generally, the current holders of the 600 megahertz band are UHF broadcast television stations, and the act that Congress passed was an innovative act, a way to look at spectrum in a different way, and what we are charged with by this subcommittee and the Congress and the commission with doing is having a workable back-to-back auction, and by that I mean is a reverse auction where the broadcasters will voluntarily submit their spectrum for compensation for a share of the proceeds that we will get in the forward auction from the wireless providers. And that is the challenge that Congress has put before us.

There are other present users of the 600 megahertz band such as wireless microphones and unlicensed, and as part of our overall planning, we have to make transition and other plans for them. So it is a complex of items which is part of the Spectrum Act which we are charged with implementing.

Mr. {McNerney.} Okay, thank you.

Mr. Chairman, I yield back.

Mr. {Walden.} Gentleman yields back.

Chair now recognizes, let us see, Mr. Pompeo has left, the gentleman from Ohio, Mr. Johnson, for 5 minutes.

Mr. {Johnson.} Well, thank you very much, Mr. Chairman.

Mr. Epstein, given the success of AWS-3 and the feedback that you have received, do you feel that you have a better idea of how much spectrum might be reallocated as a result of the incentive auction?

Mr. {Epstein.} Congressman, I think we are more optimistic, we are comfortable. The success of the AWS-3 auction may not be directly transferrable or relatable, but it is an optimistic and good thing, and we are noticing it not by any kind of administrative decision that the commission makes, but by the increased interest of the broadcasters in participating.

Mr. {Johnson.} Sure.

Mr. {Epstein.} You know, we have a very strong broadcaster outreach program, and we are seeing a lot of interest.

Mr. {Johnson.} Can--and maybe this has already been asked, and if it has just say so and we will move on. Do you have any--how did you come up, or how are you coming up with the calculations on how much spectrum is to be auctioned?

Mr. {Epstein.} It is really a market-based decision that Congress put before us. We don't have a predetermination. We have put out a bunch of sample band plans, but the challenge of this auction and the new innovative thing that Congress put before the commission is it is market-based. So we will know how much spectrum when the broadcasters show up.

Mr. {Johnson.} Okay. Can you be specific about maybe some of the lessons learned from AWS-3 that can be applied to this upcoming incentive auction? Mr. Epstein, that is for you.

Mr. {Epstein.} Okay. There are--one of the lessons is that, as Roger noted, we have an ongoing proceeding about play--entities that are considered small businesses, and we are looking at that issue. We have to see whether there are any lessons learned, and the Wireless Bureau and the commission has said that that will be resolved prior to the start of the incentive auction. We are looking at some of the financial results, and seeing whether any of the metrics we have in the incentive auction should be tweaked and modified. And I am sure there are other lessons that we will look at and we will learn from that very successful auction.

Mr. {Johnson.} So is it safe to say that your experience with AWS-3 informs the agency's actions as you

move forward with this major undertaking?

Mr. {Epstein.} Yes, sir, to some extent, yes, it does.

Mr. {Johnson.} Okay. Mr. Sherman and Mr. Knapp, what industry initiatives have you encountered that effectively attempt to use spectrum more efficiently and with less impact on adjacent users? And you--Mr. Sherman, you can go first.

Mr. {Sherman.} I am not aware of specific industry initiatives. I know that industry is always working to be more efficient and do more with less, and are constantly changing out equip and building more facilities to be more efficient with their spectrum use, but I would defer to Juli's expertise on how it happens technically.

Mr. {Johnson.} Mr. Knapp?

Mr. {Knapp.} Thanks, Roger. As I sit here thinking about it, we are seeing innovation in--as a result of flexible rules on multiple fronts. The--on the unlicensed front, one of the things that doesn't get much attention is there is spectrum that we have opened up, way up, at 60 gigahertz. You are going to see what I think is a result of an industry developed standard, new unlicensed equipment that will be called Y-gig. So it is trying to use spectrum more efficiently. In the existing unlicensed bands, all of the development in the standards that have gone from the slower standards to the more faster and improved products you are

seeing on the shelf has been a progression of industry initiatives. And on the license front, as we are sitting here just talking about the success of an auction that has occurred, you know, we are just moving through 4G, we are already talking about 5G. And so in--you know, I think across industry and on all fronts you are seeing lots of innovation and trying to use spectrum more efficiently for new services and products.

Mr. {Johnson.} Yeah, you know, as a 30-year IT professional myself, one of the questions that continue to go--goes around in my head, you know, with current technology there is only so much spectrum. I am wondering what industry is doing to explore the unknown. You know, how do we create more spectrum? What is the next big advance in technology that will get us there? Anybody?

Mr. {Liebovitz.} I will take that. So, you know, I think there are two big trends to keep an eye on. One is the densification of the network. So using a spectrum with smaller and smaller cells, both on the license and unlicensed size--sides of the equation, so that the spectrum gets reused more effectively. And the other is, as Juli mentioned, looking at higher spectrum bands and using new technologies which I think are mainly have to do with antennas--smart antennas to focus energy in--using those higher-up bands in

ways that was not practical beforehand. And that--you know, we are looking at, you know, technologies that can use--that can produce 10 gigabit speeds in the lab by using very wide channels, of course, shorter distance. So there are some really exciting things happening, and that is really the subject of the 5G--

Mr. {Johnson.} We could have some great conversations over dinner but I have run out of time.

Mr. Chairman, I yield back.

Mr. {Walden.} Thank the gentleman for his questions and comments.

We will now go to the gentlelady from New York, Ms. Clarke. Thank you for being here and for your participation.

Ms. {Clarke.} Thank you very much, Mr. Chairman. And I thank the ranking member and our panelists as well.

Mr. Sherman, I wanted to ask, what is the plan to ensure that broadcasters adequately participate in the auction, and what incentives are the FCC offering to increase their engagement? Much of the incentive auction's success is based on broadcaster participation so that they will in turn provide the demand for the auction's next stage.

Can you give us some insights there?

Mr. {Sherman.} Sure, I can tell you that we do have a plan, and we are in the process of implementing it. And Gary

Epstein is leading that effort and I think he can walk you through a number of the steps the commission is taking.

Mr. {Epstein.} Yes. Thank you very much, Congresswoman. Your point is absolutely the most crucial one. We won't have an auction unless we have broadcaster participation. And so we have done what we usually do which is meet with broadcasters and have Webinars and seminars, but we have taken two special extra steps, and we intend to take more.

One of those steps is we, in response to requests from broadcasters, we have released 2 broadcaster information packages, made them available to every licensee in the country, and they contain both business information and estimated pricing information. And that, combined with the AWS-3 auction figures, has piqued a lot of interest by broadcasters.

And the second major effort we have undertaken is we are going around the country on broadcaster information trips, okay, and visiting, both in general sessions and in private sessions, we are getting out of Washington, we are visiting 50 cities, we are going around the country and meeting with broadcasters in order to inform them so that they can make decisions on whether to participate.

Ms. {Clarke.} Have you begun receiving any feedback as

of yet? I am concerned about averting any unintended consequences to smaller, perhaps rural broadcasters, and maintaining an inclusive and diverse broadcast ownership and offerings that perhaps repackaging and channel shifting that is being proposed may inadvertently create some consternation out there. What kind of feedback are you getting?

Mr. {Epstein.} Congresswoman, an excellent point. We have gotten a lot of positive feedback from a lot of stations who are interested in participating in the auction and in allowing the commission to reclaim their spectrum, and that is from small broadcasters and large broadcasters alike, but with some other broadcasters like the broadcasters you are talking about, there are other options to participate in the auction, such as channel sharing and going from U to V, which Congress has as an option in the statute. So what we have done is we have emphasized those alternatives with these other broadcasters. They can get proceeds from the auction, but continue the broadcast even after the action is over.

Ms. {Clarke.} That is good news. Can you share with us how the FCC proposes to engage in repacking and channel shifting, and ensure that consumers are adequately informed about the impacts?

Mr. {Epstein.} We have learned lessons from the digital transition, and if you look at the report and order that the

commission adopted in May, there is a whole section on consumer outreach. And so we have delegated to part of the commission, the CGB part, the consumer governmental part, with the responsibility to come up with an overall comprehensive plan to engage with consumers and make sure that people do not lose service.

Ms. {Clarke.} Well, on that very point of consumer outreach, will--that will be necessary to minimize confusion and disruption of the stations after they are repacked. Is there any discussion currently at the FCC about how to work that out logistically?

Mr. {Epstein.} Yes, there is. Okay, there is planning going on. There was--there is an obligation--a specific obligation in the commission's report and order for--at the appropriate time for the commission to come up with a specific plan. And we are at the beginning stages of that because the auction is a year away. I don't want to go beyond that, but it is an important part of our outreach efforts.

Ms. {Clarke.} Very well. Thank you very much, Mr. Chairman, and I yield back.

Mr. {Walden.} Good questions. I thank the gentlelady.

We will now go to the gentleman from Missouri, Mr. Long, for 5 minutes.

Mr. {Long.} Thank you, Mr. Chairman. I thank you all for being here today.

Mr. Knapp, I have a story here that appeared in the publication recode on March the 17th, and I would like to have that added to the record. And--

Mr. {Walden.} Without objection.

[The information follows:]

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Mr. {Long.} The first couple of--thank you, Mr. Chairman. The first couple of paragraphs, he is among dozens--let us see, John Doe of 123 Jump Street, has some explaining to do. He is among dozens of questionable characters in a Federal Government database that is supposed to keep unlicensed Wi-Fi devices from knocking broadcast TV signals off the air. There are actually four John Does in the system, along with six entries for Sue Q. Public of Any Town, USA, and two from John Q. Public of the ever-population location None/None. Even a quick look at the database suggests there is something not quite right. Is there really a company called Acme at 1600 Amphitheater Parkway, an address more generally associated with Google, and does Lin Su really own 59 unregistered--or, excuse me, registered, unlicensed Wi-Fi devices, or have actual owners simply copied that name from the installer's guide of the devices that they bought? The--for instance--well, I gave you those, but is this--is it possible to go under the--to the white space databases and enter fake addresses?

Mr. {Knapp.} So I think what we did is we went through the databases. We did find the four John Does. It appears to us that these may have been for testing purposes when this was rolled out. There are some things, you know, these

databases are cutting-edge, and I think from anything, there are some things that you can improve upon, and one of them maybe is the authentication of the individuals that we can work on with the database providers. But out of roughly 550 records, we only found four John Does and one John Q. Public, and they are easily taken out.

Mr. {Long.} Okay, so Lin Su--

Mr. {Knapp.} Lin Su is with Acme Company.

Mr. {Long.} Or Sun--excuse me, Lin Sun.

Mr. {Knapp.} Yeah, he is an employee of a company that makes these products, and so it would not be unreasonable for them to be testing them at their location.

Mr. {Long.} What is the effect of entering a fake address?

Mr. {Knapp.} So bear in mind that the way the database works, the device can't operate because it has to get the available channels from the database. The database was a tool to just help us locate it--a source of interference if it occurred. Even if the information wasn't right, we could still find the interference and take enforcement action if we needed to.

Mr. {Long.} Well, is requiring GPSs for fixed white space devices, would that fix it?

Mr. {Knapp.} So the things that were referred to were

things like a phone number wasn't right, or the--there was an incomplete email address. So it--these weren't incorrect locations, so just having the GPS location alone is not going to address some of these other issues. But we are working with the database providers to make sure that you can't enter in something that is just erroneous.

Mr. {Walden.} Would the gentleman yield?

Mr. {Knapp.} Yeah.

Mr. {Walden.} Mr.--

Mr. {Long.} Yes.

Mr. {Walden.} How will closing so many field offices help deal with interference issues in a timely manner?

Mr. {Knapp.} So the restructuring of the field offices that is being contemplated, at the same time we would be looking at alternative ways that we could more effectively get out and locate and diagnose the interference cases. There are tools that are available now to actually have sensors in place and do the outreach, and I think we are also looking at things like tiger teams that we could sent out when we had an interference case. So we are mindful of that in that exercise as well. And, of course, it is pending with the commissioners.

Mr. {Walden.} Thank you. I yield back the chair--Mr. Long.

Mr. {Long.} And I yield back also, Mr. Chairman.

Mr. {Walden.} Gentleman yields back.

We will now go to Mr. Rush, it appears is next. We are glad you are here and--

Mr. {Rush.} Good morning.

Mr. {Walden.} --please go ahead.

Mr. {Rush.} Thank you, Mr. Chairman. And I certainly want to welcome the witnesses.

I must be quite frank, I sit here as an angry, black American male. We are all aware of the scarcity of spectrum, and we just witnessed a successful AWS-3 auction where again the millionaires were able to buy up valuable so-called beachfront property. And soon we will be witnessing another auction, the broadcast incentive auction where it seems as though, unless something drastically changes, we will have a--the same outcome.

I have been on this subcommittee--on this committee for 22 years, and 20 years I have sat on this subcommittee. I was a part of the subcommittee that worked on legislation to grant the FCC its competitive bidding authority back in 1993. I was here, I was present, sitting in these very same seats. And all the major auctions, going all the way back to the C block auction, H block auction, the AWS-3, and seem to be ill-designed to enable small and minority businesses to bid

and to win.

The question still looms large for the FCC. In light of the abysmal failures of these last three auctions, to be fair and equitable to minority and small businesses, what can you say to us this very morning that can assure us that this next auction will give us an opportunity for small and minority bidders to fair better and to have different and better outcomes? Again, in my opinion, where some might say these auctions have been successful, success is in the eye of the beholder, and from my vantage point, my eyes, my constituents, they are an abysmal failure. Reassure me please if you can.

Mr. Chairman, with that, I think that we ought to really have some hearing in the future on the status of these auctions as it relates to the minority and small business bidding process isn't fair and equitable, some time in the near future.

With that, I will ask the--Mr. Epstein, maybe you can answer the question that I have.

Mr. {Sherman.} Thanks for that question, Mr. Rush. This is a priority for the commission, and last year the commission issued a notice of proposed rulemaking to focus on the issue of empowering small businesses, including businesses owned by women and minority groups. It is--the

notice of proposed rulemaking recognizes that the wireless industry has changed dramatically since the rules were last updated, and that our current rules may not work anymore to get people into the business. And so what it proposed, through a number of specific proposals, was allowing more flexibility and maybe looking at business models to--updating business models to reflect the reality that 95 percent of wireless consumers are served by four carriers. How do you allow--in such a capital-intensive business, how do you allow small entities to get into the market, and how do you allow them to acquire spectrum? That has been teed-up.

In the interim, we had AWS-3 which also raised a number of questions about the designated entity program and bidding practices. So just this week, Chairman Wheeler circulated with the other commissioners a public notice asking a number of additional questions about this issue; how do we promote and empower small businesses while preserving the integrity of the auction process. And it is open, and once that is voted on by the commissioners, there will be an additional comment period. And it is something that we are going to wrap up before the incentive auctions start. So there are proposals on the table. There is a vigorous debate in the record by various stakeholders.

One of the things that was in the notice of proposed

rulemaking was a proposal that has been put forth by a number of groups that have been active in the designated entity space. I think it was MMTC that had a proposal about the attributable material relationship rule, and one of the proposals was to change the way we apply that so that a small company that might have a business relationship with a big company isn't automatically excluded.

These are complicated issues, and we need to make sure we do them in a way that doesn't allow for gaming of the system, but these--all of these topics are on the table.

Mr. {Walden.} Gentleman's time has expired.

Mr. {Rush.} Thank you, Mr. Chairman.

Mr. {Walden.} Thank the gentleman.

We will go now to the gentleman from North Dakota, Mr. Cramer.

Mr. {Cramer.} Thank you, Mr. Chairman. I thank the witnesses.

And I just--I am just going to throw it out for discussion because I have to admit, you might have to bring it down a level or two for me to really grasp this. But one of the things--I come from one of these rural places, yeah. You can make it 19 now if you--I don't know we lost, but anyway it is--North Dakota is very rural, right, and so my small market, you know, broadcasters have expressed, of

course, this concern about, you know, the repacking cost. And we have talked about whether $1.7 million is inadequate and whether you need more, and where it would come from, and that has been fascinating, but my question more is a step even further back, and that is if a small market TV broadcaster, for example, in Fargo declines to participate, how--can we be assured that they then won't have to also then participate later in the repacking? I mean in other words, hear conflicting messages about that, so somebody really smart explain to me how either we avoid that, or secondly, what do we do to mitigate it?

Mr. {Epstein.} Well, I won't claim to be real smart, I will defer to Juli on that.

Mr. {Cramer.} I have set the bar very low, just so you know.

Mr. {Epstein.} But let me start and Juli can pick up.

Mr. {Cramer.} Sure.

Mr. {Epstein.} What we are seeking to do in the--in this auction is to have a near nationwide contiguous band of spectrum, and that is the key, so that when you have your cellphone and you move from Fargo to New York, to New Jersey, or anywhere else, it works.

Mr. {Cramer.} Yeah.

Mr. {Epstein.} And so if we--so two things have to

happen. One, we have to get volunteers, stations to participate in the auction, especially in crowded areas, but in some smaller markets too. And then everywhere, if we cleared down from channel 51, and a station even in a rural market is at channel 47 or channel 46, we won't get that contiguous band of spectrum unless we repack them--

Mr. {Cramer.} Um-hum.

Mr. {Epstein.} --even though we may have room to do that. And what that--Congress did--what you did in the act is you said, yes, we have the authority to repack it, but we have to repay your expenses.

Mr. {Cramer.} Um-hum.

Mr. {Epstein.} And that is just from an overview standpoint why somebody in a smaller market would have to move. So we have this contiguous band of spectrum for the wireless providers in the forward auction.

Mr. {Cramer.} Thank you for that very nice clarification.

Then that does bring up the rest of the questions that we have already tried to sort of ask, and that is how much is enough, and if it is not enough, how do we do it differently, but I suspect we are going to continue discover that through this process. But thank you for that 101 for the guy from North Dakota.

With that, I yield back, Mr. Chairman.

Mr. {Walden.} Thank the gentleman.

And we will now go to Mr. Butterfield for questions.

Mr. {Butterfield.} Thank you very much, Mr. Chairman. Looks like we are getting very close to votes and so I am going to forego some of the formalities that I normally would go through in the early part of my remarks, and get right to the meat of the point that I want to make.

Let me just begin by associating myself with the remarks made by my good friend, Mr. Rush, from Illinois. I agree with him completely. I am the chairman of the Congressional Black Caucus, and the CBC takes the position that Mr. Rush just articulated a few moments ago.

One of our top priorities in the CBC is to increase a representation of African-Americans at all levels of corporate America. That includes the Boards of Directors, that includes executive leadership, the workforce, vendors, contractors, and even community reimbursement. And so the CBC will not only be focused on increasing diversity in general, but we are focused on African-American representation in particular. So this is not only about spectrum, this is about corporate diversity as well.

And so it is in this context that I want to ask, I guess Mr. Epstein, the following question about diversity and

specifically how it relates to the companies who come before the commission for a variety of matters, including those who seek to acquire spectrum. As chair of the CBC, and as a member of this committee now for 22 years, one of my priorities is to encourage companies to have both leadership and rank and file employees who better represent the makeup of their communities and their customers and our country. However, when you look closer at many of the entities that come before your commission, they do not have a very good diversity profile. That is just a fact, they do not have a good diversity profile in either the internal or external operations. And so I am wondering, how do you and other members of the panel today think we can better address the lack of diversity in the companies that are competing for spectrum?

Mr. {Epstein.} Okay. Well, let me start. My specialty and what I do 24/7 is the incentive auction, and to focus on the--your questions and Congressman Rush's questions, it is the proceeding--the general proceeding that Roger Sherman talked about, okay, where we are looking very seriously about any--generally, in auctions throughout the commission, and specifically, with respect to the incentive auction, how do we do exactly what you are talking about. How do we increase diversity? We have done things like have smaller geographic

areas, and we are looking at the bidding issues which Roger talked about, but specifically with the incentive auction, those are some of the initiatives that we are undertaking.

Mr. {Butterfield.} But you do acknowledge the lack of diversity.

Mr. {Epstein.} We acknowledge the need for small business and diversity. This commission does, yes.

Mr. {Butterfield.} Yes, all right. All right.

In the interest of time, Mr. Chairman, I am going to ask unanimous consent to enter into the record a letter regarding the FCC's designated entity program, and the letter was written to you and Ranking Member Eshoo--

Mr. {Walden.} Yes.

Mr. {Butterfield.} --on March 25 by the National Association of Black Owned Broadcasters. I ask--

Mr. {Walden.} I--

Mr. {Butterfield.} --to put it in the record.

Mr. {Walden.} I have read the letter. Without objection, it will be entered into the record, sir.

[The information follows:]

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Mr. {Butterfield.} Thank you. I yield back.

Mr. {Walden.} And I appreciate the gentleman.

And will now move on to Mr. Shimkus of the great State of Illinois.

Mr. {Shimkus.} Yeah, thank you, Mr. Chairman. It is great to have you all here, and we are getting--as you know, getting close to getting out of town. So, Roger, welcome back. It is good to see you.

And the points raised by my two colleagues, Mr. Butterfield and Mr. Rush, you know, just brings me to, you know, we have--a lot of us extolled the success of the AW-3 auction, everybody being pleased. Obviously, we find out not everyone is pleased, and that there are bidding rules in this process. Have--has the FCC done an after-action review on to do a lessons learned, and can you say everyone is pleased? You know, in an auction, I think there are disappointed people, right, if they don't win the auction, but are there--does anyone storm away angry, that they felt that the bidding rules may not have been adequately exercised?

Mr. {Sherman.} Well, the way the process works, after the auction we always do an after-auction review of things, and in fact, as the auction was ongoing I mentioned this proceeding that we were asking for comments on updating the

competitive bidding rules. We were watching the auction develop, and we thought there might be some lessons learned, so we, on our own motion, delayed the comment period 3 times to make sure people had a chance to bring in lessons that is all public from bidding activity, that they may want to enter into the record. And I mentioned Chairman Wheeler circulated something earlier this week asking additional questions about that specific issue. There are 2 tracks. That is 1 track, the sort of forward-looking rulemaking, and what changes or tweaks we might consider in response to what happened in the auction to empower small business and make sure nobody is getting an unfair advantage through the rules through technicalities. I am not saying that occurred, but those were the questions.

The other track is to evaluate the applications from the winning bidders. And a number of the winning bidders applied for a designated entity credit, and the commission has a longstanding process whereby we evaluate those requests. We put them out basically for comment and for people who might object to weigh-in and file a petition to deny. We haven't-- I am not aware of any petitions to deny being filed yet, although we have not completed our review where we put them out for public comment. We are doing that, but it is a very time-intensive process because these applications are

complicated, and we want to make sure we are being very thorough.

Mr. {Shimkus.} Yeah, because this broad--the whole--now moving into the broadcast debate with the next round, it is kind of different. It is almost regional, the old UHF, now the 600 megahertz, and then how do you cobble that together, which raises issues of package bidding and other ways to try to put together something that makes sense to different entities. So I think an after action review on the success or that issue will help us as we move forward. I just find it very interesting. A lot of new members on the committee. I have always said, you know, you have heard me say--you all have heard me say, you know, the great thing about this subcommittee is really technology moves faster than we can regulate. And then you all have to be involved in trying to mitigate the interference issues or some of the complexities, but it--that--this is probably the greatest example of free and open market competition, and the ability for great minds to do great things, and--that I have, you know, experienced I think in any other area. So I enjoyed that.

And final question, really directed to Roger again, is these, you know, the fragmented management process between the FCC and the NTIA on spectrum. Is there any--ever talk about how we get that all cobbled together where, when we

have hearings, we are dealing with 1 and maybe not 2, and the different processes?

Mr. {Sherman.} Well, I will make an observation, and then I would defer to John ad Juli who spend a lot of time with the agencies and NTIA, but in my experience since I have been at the commission, the relationship with NTIA is great, and there is a lot of collaboration and coordination going on, everybody moving towards the same goal. I know John and Juli have been engaged for years, and everybody sort of has their responsibilities under the respective statutes, but I think it is all working towards getting more spectrum out there.

I don't know if John or Juli have anything to add to that.

Mr. {Knapp.} No, just ditto to everything that Roger said. We know that there is--our responsibilities overlap, and that we have to work together for the good of the country, and that is what we try to do.

Mr. {Shimkus.} There is no--or issues that--duplication that--in this process?

Mr. {Knapp.} I don't think so much duplication because they got different systems that they are overseeing, military, justice, et cetera. What we try to do through a lot of good work, both formally and informally, is break down

the barriers.

Mr. {Walden.} All right.

Mr. {Shimkus.} Great.

Mr. {Walden.} Gentleman's time has expired.

Apparently, we have had votes on, I am sorry, I didn't realize we were to that point. There are 6 minutes left, but we will--I will be happy to go to--

Mr. {Collins.} Yeah.

Mr. {Walden.} --the--Mr. Collins.

Mr. {Collins.} Mr. Chairman, I appreciate that. Mine may only take 30 seconds. It is for Mr. Epstein.

I represent Buffalo and then the Rochester area. Our broadcasters, many of the Canadians, are getting our signal. And in spending 24/7 on the spectrum, I hope that includes some time on border coordination. And I just wondered where do we stand on border coordination specifically between the U.S. and Canada, and when do we anticipate an agreement being reached?

Mr. {Epstein.} We have been working on this for a couple of years. It is really important that we do this. We have been working with Industry Canada, we have had meetings almost weekly with them. We were most pleased by about 4 months ago they put out a ban plan which was analogous to our ban plan, and we are hopefully getting reasonably close.

They have just got comments in what they call a consultation, which is like our rulemaking, where it is to our mutual benefit to reach agreement--

Ms. {Eshoo.} Um-hum.

Mr. {Epstein.} --because it gets--we will get spectrum on both sides of the border and coordination. And we are hoping well before the auction, within a matter of months, we will be able to reach--that is our goal.

Ms. {Eshoo.} Yeah.

Mr. {Epstein.} Can't promise it will happen because it is a sovereign country--

Ms. {Eshoo.} Right.

Mr. {Epstein.} --but that is our goal.

Ms. {Eshoo.} Would the gentleman yield just for a moment?

Mr. {Collins.} Yeah, certainly.

Ms. {Eshoo.} One of the questions that I didn't get to ask was what you just raised, and it was an issue that Mr. Dingle raised over and over again. So we will get a written response and I will share that with you--

Mr. {Collins.} We--yeah, we appreciate that.

Ms. {Eshoo.} --when we get it. Thank you.

Mr. {Collins.} I mean as bad as the Buffalo Bills are, the Canadians still watch our team play.

Mr. {Walden.} Wow. You may want to revise and extend those remarks.

We will go now to Mrs. Ellmers for final questions.

Mrs. {Ellmers.} Thank you, Mr. Chairman. Thank you to our panel. And I apologize for coming in late, so if the questions I ask have already been answered, if you can just indulge me.

Mr. Knapp, the commission looks at the 3.5 gigahertz and the 600 megahertz unlicensed bands. With the commission--will the commission be placing any new restrictions on unlicensed users?

Mr. {Knapp.} I don't think it in terms of placing new restrictions, it is just we will develop a framework that will include the technical standards to make sure that everything works together without interfering.

Mrs. {Ellmers.} Okay. Thank you, Mr. Knapp.

Mr. Liebovitz, the subcommittee has heard time and time again about the value of innovation and experimentation within the unlicensed technologies. We have had--we have all been concerned that the mantra innovation without permission be applied to improve all aspects of connectivity. Is the commission planning to prohibit the use of LTEU in any unlicensed bands?

Mr. {Liebovitz.} The answer is no at this time. We are

working with the parties and trying to ensure that people talk to each other so that the technical--

Ms. {Ellmers.} Um-hum.

Mr. {Liebovitz.} --issues don't become something that needs any involvement from the Government.

Mrs. {Ellmers.} Great. Well, thank you. My work is done, and I yield back the remainder of my time.

Mr. {Walden.} Appreciate that.

I recognize the gentlelady from California.

Ms. {Eshoo.} Thank you, Mr. Chairman. Thank you to the panel. Mr. Chairman, I would like unanimous consent to place this in the record. It is--I asked the question about competition, and this is--are the results of who did what AWS-3 auction. Thank you.

Mr. {Walden.} Is this--without objection.

[The information follows:]

********** COMMITTEE INSERT **********

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Mr. {Walden.} That will be entered into the record.

And with that, I thank the witnesses for being here today, and the good work you do at the FCC. We appreciate it.

And we are adjourned.

[Whereupon, at 11:54 a.m., the Subcommittee was adjourned.]