

NWX-DOC-NTIA-OTIA

Moderator: Jean Rice/Karen Perry
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Coordinator: Thank you for standing by. At this time, all participants are in listen only mode for the duration of today's call. Today's conference is being recorded. If you have any objections you may disconnect at this time. I would now like to turn the meeting over to Jean Rice. You may begin.

Jean Rice: Hello and thank you so much for joining us today at the BroadbandUSA's monthly webinar. I'm Jean Rice, Senior Program Specialist with NTIA's BroadbandUSA and I'm going to be co-moderating this webinar with my colleague here, Karen Archer Perry, who's the Senior Policy Analyst.

Today, our webinar is going to focus on smart agriculture and its potential for farmers and ranchers who use smart technologies to improve yields, reduce costs, increase efficiencies, and improve decision making. You know for crops smart technologies and analytics can help determine which plants need fertilizer, water, and insecticides, and can improve the efficiency of farm machinery. By using data analytics, farmers can make the real time decisions that can improve crop selection and growth and minimize the number of chemicals use, as well as reducing costs. You know for ranchers, wearables or audio analytics can assess the health of animals for early intervention and

smart technologies can assist in making sure each animal gets feed, specifically tuned to what it needs.

In the webinar, we'll also be diving into how smart agriculture can impact and potentially largely impacts the economics of farming. And we're finding that innovation and collaboration are the keys to the continued development of smart agriculture. And so we'll focus on the bit on the Global City Team Challenge Smart Agriculture and Rural Supercluster, which we'll talk about shortly.

And we'll be covering the challenges for smart agriculture like broadband coverage, and the FCC/USDA, Rural Taskforce working on the issue. Next slide. We have just a terrific, terrific lineup of speakers and I'm very happy they were able to join us today. We're going to have Dr. Dennis Buckmaster, who's the Dean's Fellow for Digital Agriculture. He is a professor of Agriculture and Bioengineering at Purdue University, and he co-chairs the GCTC Smart Agriculture and Rural Supercluster and is a member of the FCC World Task Force.

We also have Megan Nelson who's an Economic Analyst for the American Farm Bureau Federation, and a member of the GCTC Smart Agriculture and Rural Supercluster leadership team. We also have Chad Rupe, who is an Administrator for the Rural Utility Service for the US Department of Agriculture. So with that, it's a terrific lineup.

Karen Archer Perry: Hi, this is Karen and before we begin, I'd like to review some of the logistics for today's webinar. First of all, we'll open up the webinar for questions after the completion of all of the presentations. As you hear from each presenter, if you do have questions, please use the question box on the right-hand side of your screen to submit your questions or your comments.

Second, the presentation along with the transcript, and an audio recording of today's presentation will be available on the BroadbandUSA website within seven days of this webinar under the events, past events tab. And finally, please visit our BroadbandUSA website.

For information about our technical assistance programs our useful guides, products, publications, and other tools that can assist you in planning, funding, and implementing your BroadbandUSA project.

As a context for today's program, my colleague, Jean Rice will provide a short introduction to a program that NTIA co-leads with the National Institute of Standards and Technology. It's called the Global Cities Team Challenge Smart Ag and Rural Supercluster.

This forum brings together thought leaders from across industry and academia to develop scalable models, to promote growth and enhance the quality of life in tomorrow's smart ag communities. Jean.

Jean Rice: Oh, thanks so much. Well, I have to say that NTIA is very pleased to work with the sister agency of the Department of Commerce here at NIST, on the Global Cities Team Challenge. You know, overall, we promote multi-sector collaboration, innovative, replicable, and sustainable models for Smart City solutions.

GCTC learns from the ground up and develops blueprints for local, tribal, and state governments, so that we can learn from each other's best practices and lessons learned. Next slide. NTIA is delighted to have started the Smart Ag and Rural Supercluster with NIST to focus on the needs and challenges and

innovations related to smart agriculture and smart rural communities regarding connectivity, education, and telehealth.

This group has developed a blueprint and holds conferences and webinars on these topics and you can see on the slide he has the link for the blueprint, I highly recommend you read it. Next slide, please.

The base of the superclusters on the ground project. Typically these are based on a community or region and have teams that includes stakeholders, cities, and universities. Some projects are based on technology like the work we've done in wireless telecom with universities.

We have telehealth project was the one sponsored by Cobank. Smart ag innovation like the Grand Farm in North Carolina, and food safety, but very practically dependent on just a few of your projects, but they give you a sense of kind of their overall kind of approach. Next slide.

I'll just to give you one example here and I know that Dennis will be talking about further is a food shed project that came about by the state of Pennsylvania leading the way. You see how it might be a food shed, smart food shed to help Pittsburgh and it turns out to encompass now three states, cities, counties, nonprofits, and universities.

So, we do hope that if you are interested in this you could join the effort and work on projects and certainly let us know through any of us, Dennis, Megan, or myself as well as BroadbandUSA know. Next slide, please.

Well, as we begin, our first speaker is Dennis Buckmaster and he is a professor of Agriculture and Biological Engineering at Purdue University, and Dean's Fellow of Digital Architecture, Agriculture. He has degrees in

Agricultural Engineering from Purdue and Michigan State with a PhD. He also joined to the Purdue ADD statuses in 2006.

His current focus is on digital agriculture with work in the data pipeline from phenomena sensing, including communication, computation, and decision support. Open Source efforts through the Open Ag Technology and Systems Center which he co-founded integrates with his research education outreach efforts.

Dr. Buckmaster leads the Agricultural Systems Management Program and currently teaches computer technology with applications ag tech and innovation. Let me just turn it over to you, Dennis.

Dennis Buckmaster: Thank you very much and I very much to appreciate the opportunity to share with all of you today. Coming from West Central Indiana, it's a beautiful weather day where I am. My charge here is to talk with you this afternoon about smart data driven agriculture. Next slide.

But first I just want to follow up on what Jean Rice is already mentioned about the Global Cities Team Challenge Supercluster on Ag and Rural Broadband Connectivity. In that group, you can see the leadership there, Mo, Josh and myself and a larger team than that, with the four categories of smart agriculture farm to mapping improving rural outcomes, broadband access as well as telehealth.

In our role in the GCTC supercluster is to share good practices from one organization or one company, one community to another, to showcase some exemplary approaches to solving real broadband problems that we face, to tell the stories of successes that are out there, and then also in part of all of that to compare and demonstrate some of the alternatives.

So, just to give you one example, here in our region, there is a project called the Wabash Heartland Innovation Networks. And as part of their work, they're going to deploy an aerostat, that think of it as a tethered blimp that will provide connectivity with a very long reach tens of miles from one, what they call very tall vertical assets.

So, what we learned from those types of deployments, we will save abundantly through this supercluster and we encourage you to check us out and get on board. Next slide.

So, I thought I would talk first about the data pipeline, in sort of first blank all the way to the right What we really trying to do is improve the decision that we would make both tactical and strategic. In order to do that, we go all the way to the left and first identify for that decision that we want to make, what is the need for data? What types of data? How often what resolution, etc., must we have in order to make those decisions better?

In between then, there is a lot of data science wrangling during the cleaning, data, integration, visualization, etc. Next slide. But in the case of agriculture, it's not just data. There are also these things that we might call biophysical models or simulation models that really capture the essence of science that's been accumulated over the decades.

We already know a lot about chemistry, physiology, biology, physics, water flowing through soil, etc. and so, we don't always need tremendous amounts of data, but we do need some data so that we make sure those models are tracking correctly.

And then of course, in almost any business, agriculture included, there are logistical considerations, practical limitations, either because of the number of workers or the number of machines or simply time, that sort of thing. Next slide.

So this image here is sort of a representation of an augmented reality or a digital twin sort of a situation where there is the real world that we live in. It's the real world that has crops and irrigation and has tractors and implements etc. But we will try to monitor that via sensors, do some computing in the cloud and, and hopefully make better decisions.

So I've included in that graphic four really special words to me. So, now, what, and if. And if we ponder all of the questions that could come out of various combinations of those four words, we realize the dilemma that many agriculturalists face and I'll just mention a couple of examples.

The first one is this, I had a plan, Plan A. So it rains for a week, now what. So, you know, what would you do different? What determines when you switch to plan B? What is the best plan B and occasionally Plan C and D and you know what I mean about that?

How about now? Since the markets have shifted should we change the cropping plan? Maybe shift what land resources you're going to put into which crops, etc. Another one, since a lot of people think about water as an extremely valuable resource that we ought to be careful with. How about if field 18 is droughty? So what?

Well, if I have irrigation, I might consider turning the irrigation on, or but I still need to decide how much and what if I don't have irrigation. So, field number 18 is droughty, until it's a so what until it's so droughty that it may be

has been weeks or it was a very critical time in the crop production cycle. In that case, the so what becomes I've got to really consider changing the marketing plan because of the drought. All right. So these are logistical generally but sometimes strategic decisions. Next slide.

So one of the tools that we released here from Purdue is the simple app called CONTxT. And I'll let you read the definition of the word context, but the purpose of this very simple app is to collect the data that's often missing in agricultural systems.

It's the kind of information that would have been written in the dashboard notebook that's always in the wrong vehicle, it's in assorted formats, occasionally it gets lost, but it contains really important information that you would want to know if you really want to mine the data that you have.

So you think of this is really the metadata is data about the data. It's one thing to have the yield map, but the yield map is really only useful in the big picture if you fully know everything that happened in that field and that's the purpose of this app. Next slide.

Another simple one is this app that we call GROW. It's really a growing degree day's tool. There have been implementations of something like this before on the Internet, but the advantage of this particular one is it's yours. It's a progressive web app that you run on your phone, your mobile pad, tablet, and it stores the data locally and could also store it in your own private Google Sheet.

So the advantage of this is that it doesn't make a decision, but it gives you insight so that you can make a better decision. And this is one app that is a

good example of combining public data with your own private data that you know in an operable way. Next slide.

So I've got just two slides of several commercial examples of smarter agriculture and if I mentioned one and forgotten your favorite or your company, I apologize. Of course in limited time, I can only cover a sampling index of simply what this is. So, I'm not endorsing one over another, but I'm trying to give you as the audience today, an understanding of how data is used in agriculture. So we're going to go through these pretty quickly.

The first one being on Farm Mobile. They have a thing that they would call a puck that plugs into the Controller Area Network on agricultural machines and so you get the machine data to provide yourself your farm with real time harvest insights. You get a timeline of exactly what happened, where. You can play that back and then most importantly, you get data that relates to the agronomics of your operation.

Climate FieldView has been around and in sort of different versions. What it allows is also the streaming of real time data, and the integration of several different data layers such as imagery that might come from the UAV or a satellite, of course yield maps, but then there are also as applied maps of chemicals of fertilizer.

And then the platform also allows you to create an applied prescriptions of exactly what to do in various parts of your fields. Advanced Agrilytics is a firm that enables sub-acre management with some data integration and what they offer that's a little different than some of the other platforms, it's a research oriented process to help you mitigate the risk within the year and among years. And so they have tools that facilitate on farm experimentation and data analysis.

Of course, the original equipment manufacturers and AGCO Connect is one sample of that. They have systems for monitoring machines, the logistics, the operations, maintenance, and tracking where those vehicles are. And then the last one on this slide is ARVA Intelligence, a relatively small new start-up firm that includes some artificial intelligence to do some farm plan modeling to project some, what if scenarios to help you identify the best choice of input selection and the placement of those inputs on your land base. Next slide.

Of course, smarter agriculture is not just cropping systems in wide acres, it's also livestock and it's also available in small holder installations. And the first one here, iYOTAH is a company -- they offer some solutions that integrate data from disparate systems, those systems that are, by default, sort of totally disconnected, but in in practical agriculture, they really are connected.

And so in the livestock realm, for example, in dairy, the feeding system may have its own data architecture and platform, the milking system is yet a different one totally unrelated probably by a different company.

Maybe you would have some of these Fit Bits for cows activity monitors of sorts on your livestock that might be in yet another system. And then, if you're also tracking the weather conditions, what is the environment that my livestock are experiencing? That's also in a different system. And so companies like iYOTAH help pull those things together to draw insights and help you manage these particular aspects of the operation.

ROGO is a robotic soil sampling unit company, and what they do is really improve the precision by which you can get your soil samples and soil analysis. So this is something that you can do manually. But the advantage of the robotic system increase the precision.

Intelinair uses crop and generates crop intelligence from fixed wing aircraft that fly over the region very frequently, and also at high resolution. And so with some artificial intelligence, they're able to do those things classify, collect, analyze, and probably most important visualize and then alert operators or fire managers as to what areas need particular attention.

IDA is a company back in the livestock realm and they have systems to monitor dairy cattle with regard to their health so the heat detection insights with regard to calving and productivity of your animals.

And then the last one, there is smart and variable rate irrigation control companies like CropMetrics or Irrrometer, some others, where you not only monitor is the soil dry but you monitor the soil moisture and assorted depths of the profile. And that's very important because at different stages ranges of crop growth, of course, the depth of the roots is really different.

And in the status of crop growth also influences the need for water. So these things do need to be integrated. So, next slide.

As we think about all of the data that those systems would use, some of it is sort of a bits and status like moisture is that the gate is closed, this gate is open. So many cows have one pass this point didn't drink water today. Some of it is very high rate data, like a controller area network data stream, a canned data stream.

Of course, increasingly, we're also using audio and video as data. And so with all of that data interoperability is a challenge you might face because I showed what several commercial products that are very successful and used every day by many people around the world, you would think maybe we've solved this.

We have it because interoperability requires cooperation and it's the competition that exists in the industry. There are many stakeholders when you think about the producing of take your favorite crop corn, wheat, soybeans, oats, rice doesn't matter. There are many stakeholders in that whole process on the input and the output side and they each-- many of them have a different platform and they have to work together and be interoperable.

So as we work on the right-side of that slide from the low end to the high end, as we move toward more artificial intelligence really being making smart agriculture even smarter than we must have improved interoperability. At some point, the feeding system does need to know exactly what was the temperature that those cows experienced.

And so that requires system to work together, we're working on it, but I want to at least leave the thought today that this is a problem not yet fully solved. So that's all I have time to cover today, but I really do appreciate the opportunity to share with you some of the approaches in smarter agriculture.

Jean Rice: Thanks so much, Dennis. It's a great overview and of agriculture, smart agricultural innovation and, and I have to say, you know, you've done such great work there. It's impressive to see. I had a question for you.

You know, you were talking about how artificial intelligence is kind of growing in smart ag, you know, just to kind of bring it home. How would a farmer who -- how would a farmer have an example of how he would use AI?

Dennis Buckmaster: Okay. I really view AI sort of in two different categories of use. One is simply doing what I can do as a human already, but doing it either more consistently, faster, or more extensively. So in that case it would be working toward automation. So for example, state of the art combine harvesters and

pea harvesters and green bean harvesters as examples would automatically adjust themselves based on the losses coming out the back of the machine.

Of course, the human could do that, but where the human does that it frankly gets very tiring because you're continually watching so many things at one time. And so by automating that, now, the human can actually do the other things, but they're doing better.

The other use of AI would be to take someone who might be relatively a novice or at least not a guru and expert status, and with AI sort of tap into the knowledge base and the expertise of other individuals. Long ago, we called it something like expert systems, but now we can just sort of crunch numbers essentially, like wrangle the data and out of that data, get some good recommendations and insights.

Jean Rice: Okay, great. Thanks so much. Oh, and just as a reminder for everybody, we're going to have time for questions at the end of the session. So use your chat question box on the right-hand side and submit questions. Do it at any time that comes to mind. We'll get to them at the end. Okay, next slide, please.

I'm really happy to introduce our next speaker. Megan Nelson, who was an Economic Analyst at the American Farm Bureau Federation's Public Affairs Department. Megan issues areas of focus on analysis for rural and global development, transportation, infrastructure, and taxes.

She joined the Farm Bureau in 2018 and has contributed to the economic research and analysis on a whole broad range of factors related to agricultural policy issues. She also is currently the co-representative for the American Farm Bureau on the GCTC and Rural Supercluster and she comes to the board

through the U.S. Senate Agricultural Committee, where she is currently the committee intern working on the farm bill.

And she got her Master's degree from American University. So Megan, I'm really interested in your economic analysis. And let me turn it over to you.

Megan Nelson: Thank you and thank you for having me. I hope everyone's having a great, sunny and some parts afternoon here. So, I'm just going to be kind of talking about a larger picture kind of the 50,000 foot view, but view of broadband and the benefits of precision agriculture. Next slide, please.

So just to paint that very broad picture, where we're at today is it's nearly 60 million people or one in five Americans living in rural areas. And this can have a broad range of people working in agriculture or people living in communities that have a lot of agriculture and a high reliance on agriculture. Next slide.

So at the American Farm Bureau, a lot of what we're working on is trying to highlight that broadband is no longer a luxury is not just for Netflix. It's not just for streaming music. It's for the necessity of living in a digital world. There's agricultural needs, looking at infrastructure, precision AG, connecting buyers and sellers. And then it's also quality of life.

The COVID pandemic has really highlighted the need and we've all been hearing this for distance learning and working remotely and how important this is to not only the economy but to be able to have a high quality of life in rural areas and for those who use agriculture, a part of their daily life. Next slide, please.

Another aspect that we look at is that precision agriculture and getting adoption rates where people are using these all the time and broadband access are two sides of the same coin. And so this graph is showing based off the most recent FCC progress report, which has been incredibly helpful. But it's really showing that the number of Americans lacking fixed broadband access, it continues to decline, which is incredible.

There's been a lot of pressure on the Congressional level and a lot of attention paid to these issues. However, we're still seeing that the digital divide the divide between rural areas and urban areas, with wired broadband access is still massive, relatively speaking.

And so while it's great to see these improvements year over a year we're needing granularity, when we're looking into where this digital divide really is and how we can finally get rural areas, all the access that's required. Next slide, please.

And so what we're looking at too is we talked about broadband a lot. This is one of our strategic issue areas at American Farm Bureau. And so why is this so important? Well, the USDA estimates that the potential benefits for broadband technology and the infrastructure that goes along with it, so it would bring to rural areas, is nearly \$65 billion annually. And this is massive.

This really highlights that these that there's so much room for growth and the ability to really hone in on the practices that we're seeing in precision technology. Next slide, please.

So this first table, it's -- I'm not going to go through the entire table, but it's really highlighting the annual gross economic benefits from precision

agriculture. And it kind of pieces it out and shows, by sector by sector and then also showing the different technologies and the reliance on broadband.

But what I wanted to highlight specifically, is that second to last light blue row, looking at the gross economic benefits as a percentage of total U.S. production, and it's estimating a total of 18%. And so those estimations are based off of precision agriculture being met at demand levels.

That is a huge chunk of potential benefits and things that we're not quite there on but could be with the adoption of these technologies. And this can also range from input use transportation, and all the way down to sales to the consumer. And so it really spirals through the entire supply chain, which is a really important thing to highlight here. So going forward. Next slide, please.

I just wanted to highlight a couple of those sector specifics. So in this first graph here, it's highlighting the potential benefits for row crops and production and planning technology compared to the potential attributable benefit to broadband, with the percent of technology dependent on broadband. And so that person dependent on broadband does the light green dotted line to kind of show you how that fits in per technology.

And so what I would like to highlight here is that the potential benefits to row crops is tremendous. The sector is already highly mechanized, which is really kind of sets it up to being able to adopt these new precision ag technologies more easily, because it's already in that same vein.

And the majority of these benefits and technologies currently in place, as Dr. Buckmaster was highlighting, are used for improved yields, and reducing overall costs. USDA estimates that connected technologies and row crops could result in \$13.1 billion in gross benefits annually. And so a lot of this is

technology for improved planning such as microclimate modeling, yield monitoring and precision seeding, which is estimated to have a potential annual gross benefit of \$4.2 billion with \$1.1 billion attributed to access to broadband services.

And that's something that this report highlighted and I'd also like to reiterate in this presentation, is that a lot of this is dependent on that broadband. And so that is why they're kind of two sides of the same coin, like I said. And then on the production side, for row crops, these, the potential is greater than \$6.7 billion and possible benefits derived from precision agriculture with \$2.5 billion attributed to broadband. Next slide, please.

So then going forward, looking at specialty crops, it's the same sort of graphs, you can follow that same line. But what we're seeing here is what grow crop, specialty crop farmers could see a major gains with the adoption of new production and planning technology with a possible increase of \$8.5 billion for market coordination efforts.

And so this is saying this is mainly highlighting the adoption of digital technologies to coordinate markets, from direct to consumer sales for some of those more niche markets and getting consumers aware of the products that they're growing and being able to connect those.

Specialty crop producers can also shorten that supply chain utilizing these platforms and really can see a lot of potential gains. Total annual benefits for next generation precision ag for specialty crops is estimated at \$13.1 billion, which is also a tremendous gain for specialty crops. Next slide please.

Livestock fall in the same grass profile here. The outlined potential benefits for livestock and dairy compared to the attributes of broadband also

estimating one of the largest potential gross benefits totally \$20.6 billion. And the majority of these estimated benefits come from the production side and are focused on increased efficiency of animal care.

So it's like utilizing Bluetooth technology, and animal wearables that transmit general health data directly to the producer, resulting in a 15% reduction in medication per animal is what is estimated, as well as shortening the cattle finishing process by four to six weeks.

This technology also can be advancing general health monitoring alone, just that technology is estimated to generate \$8.8 billion in annual gross benefits. And so it's unsurprisingly, as poised as producers in the livestock and dairy sector are to reap enormous benefits from next generation ag, they're also the most dependent on high functioning, high speed broadband to enable these new technologies. Next slide, please.

So here, we're just looking at a general example of the food supply chain system. So thinking back on some of those technologies that I highlighted, you can really see how these technologies have trickled down into the entire ag industry bringing much needed efficiency improvements and healthy food to consumers.

And the next thing I would like to highlight is, while all these technologies that I've kind of highlighted here and Dr. Buckmaster has also highlighted are incredible, and they're currently hard at work in the field., but there's a lot of challenges as mentioned to, that we're facing on the farm level to reach full utilization of these technologies. Next slide please.

I just want to just share this excerpt from Blake Hurst. He is the President of Missouri Farm Bureau, his testimony to the House Agriculture Subcommittee

on rural broadband. I'm not going to read through the entire example he gave here, but I think it's a really important thing to highlight. As you know, farming has changed. So much of the technology that we're using has come on so quickly and it's incredible but being able to fully recognize the impacts of these technologies and how to fully use them is going to be a hurdle.

Dr. or Mr. Hurst also highlighted in his testimony, that this data, not only it allows their farms to apply more fertilizer on the most productive land, they cut rates for deals that control less, and very few populations in real time. And so we're using the technology in our real basis but being able to fully utilize that technology and understand that technology is a hurdle we're going to have to work on to see full adoption rates. Next slide.

And so, as American Farm Bureau, some of our largest things that we're focusing on right now is looking into what how do we get to get full adoption rates and full utilization of these amazing technologies? What do we need? We need broadband access, we need accurate broadband maps, we need to highlight that the greatest granularity needed to get broadband not only at people's homes, in rural communities, but also all over the field.

Thinking back to some of the other slides that we've seen, in order to use these technologies, we can't have spotty service because it was a rainy day. We need these technologies to be functioning and working for farmers and ranchers at all times. So, like I said, the main thing we're focusing on right now is getting accurate broadband maps to be able to highlight where funds need to go to get broadband everywhere.

And then also that precision agriculture connectivity, making sure that the end user, the farmer, the person sitting in the combine is aware of the technologies and able to utilize them to their full extent. So we're going to continue to work

on these things and advocates for continued funding and assisting to connect rural areas and bridging that digital divide. Next slide.

And so like Jean mentioned, I'm happy to take any questions at the end of this and thank you again for having me.

Karen Perry: Thank you, Megan. I have one question for you right now. And that is, can you just give us a really quick example of something that a state farm bureau is doing right now to foster the development and use of smart ag at the local level?

Megan Nelson: Yeah, definitely. How the American Farm Bureau is structured is we have a lot of states and like you mentioned, there's a lot of effort on the state level. The FCC challenge is an example I'd like to highlight because it was so important to have state farm bureaus be able to utilize their grassroots to go out and actually put FCC challenge together to try and work on and assist the FCC in getting more accurate maps. So that's one thing, many state farm bureaus -- and then like the excerpt I highlighted from Blake Hurst. It's also in communicating to government and communicating up through all of our possible channels, what is needed and being able to get on those task force and highlight what's they're seeing at the farm level and highlighting what their members are seeing at the farm level. So it's really about utilizing the grassroots and amplifying the farmer voice.

Karen Perry: Thank you very much. I have the pleasure of introducing one of our excellent partners, Chad Rupe, next as our last speaker. NTIA has worked with a number of partners across our federal agencies and USDA is one of our closer partners, particularly in the area of broadband and Chad is an excellent partner in that particular area.

He is -- has served as the Administrator of the Rural Utility Service since June of 2019. Previously, he served as USDA Rural Development state director for the state of Wyoming, where he also held state and national leadership roles in broadband. Before joining USDA, Chad spent more than 13 years in the banking industry specializing in commercial lending in Wyoming.

He began his service to our country in the United States Army. He's a graduate of the United States Military Academy at West Point where he earned an MBA and he also earned an MBA from the University of Phoenix. Please welcome Chad.

Chad Rupe: Thanks, Jean. I appreciate the introduction. Just for clarification, just a bachelor's degree from the Academy. But anyways, I'd like to talk to you a little bit about what we have going on within USDA, specifically within rural utility service and then talk to you today about the precision ag taskforce at the FCC.

First of all, I think it's important to take note of a few things. Our agency under the leadership and division of the President, as well as Secretary Perdue, has been very active even during this time of COVID. It's truly been phenomenal to work with this team that we've got here.

In fact, Rural Utilities Service obligated more loan and grant funds for electric telecom and water projects to rural America under the first term of President Trump than in any previous first term administration. So I hope that sinks in for a second because that's a very significant point.

The second piece of this is that we've also worked very hard to implement many improvements in our process as defined by Congress, including the

2018 farm bill that has been mentioned here earlier, and that is no small task. If you saw what was in Title VI of the 2018 Farm Bill, I can tell you it is no small effort, no, no small lifts that we've had to conduct to be able to move forward. If we could, let's move to the next slide. Let's talk a little bit about our mission.

Even in these uncertain times, we've been working hard to continue to carrying out our mission, which is to assist rural communities in creating prosperity so that they are self-sustaining and economically thriving through investments that create ladders of opportunity, build regional resilience and support the growth of emerging markets.

So we have a vast array of products and offerings that we provide throughout rural America to be able to enable those offerings. Most of those are loans, grants, and technical assistance. If we could, let's go to the next slide.

Within USDA Rural Utility Service, we're going to talk a little bit about what we are doing for broadband programs as well as some of the other programs that we're bringing on board, and then we'll talk about our integration with the FCC and the American Broadband Initiative, and then give you access to a few more resources. So let's skip to slide five.

If we could. I first want to highlight, let's go to the next slide, highlight a little bit of what we've done in 2018. It's important to understand that in Rural Utility Service, we focus on electric and telecom programs in specific rural areas. And that's really defined by population centers of 20,000 or less.

There's a lot of need throughout the United States, but our sole mission is to serve rural America and within the electric and telecom programs that is defined as the 20,000 or less population. In 2018, we created the Reconnect

program which was given to us in appropriations by Congress as a pilot program, and we opened up that first round in December of that year, and then in 2019, we concluded our first round. And we'll talk not just about reconnect, but we're also going to talk about the expansion of our all of our programs to solve the E connectivity in rural America. Some of these actions were just this last week.

In fact, yesterday, we published a new regulation that we'll talk about here in a moment. Let's go to the next slide if we could. In the last few months, we've been working extremely hard. First of all, distance learning and telemedicine is something that we've focused on in a very significant way based off the not just the needs of COVID. But we've been focusing on this for quite a while, but we've really ramped up our efforts to be able to deliver on services.

We've received more funding, and we're working diligently to improve upon that. But beyond that, what we've done is yesterday, it went public in the Federal Register, we published a new smart utility regulation that's going to open up the purpose of all of our programs in rural business and cooperatives service, rural housing service, and then in rural utility service for the ability to use 10% of any programs, construction funds for retail broadband purposes.

And that has a pretty big scope and broad depth when you start thinking about all those things that Megan addressed as far as the supply chain, and everything that's associated with delivering broadband and productivity out into the ag sector has a significant impact. So when you combine that in with our existing telecom program, and you add the middle mile fiber that we talked about with the electric program, being able to deliver that service, it's really a game changer in how we do business.

So when we talk about all the process improvements, it not only opens up the funding for the capacity of what had been a very small program within USDA, but it also really expands the process and opportunities for people to engage this need. If we can let's move on and let's talk a little bit about where we are specifically within broadband on some of our recent programs.

For DLT, as we call it will very soon be announcing round one awards and I obviously don't want to step in front of the Secretary and his announcements. So I will leave you waiting in the wings for that one for a few days here as we work to finalize those award announcements. But we're also working diligently to underwrite the DLT Cares Act application that we received earlier this year as well, as you can tell we've received a significant interest in there.

So we had about \$71 million that was available in round one and then we had \$25 million dollars that was available in round two. So when we start talking about serving the needs of rural America, we really want to make sure that we use all the existing funding and all of our capacity to help solve this need. Because obviously, if someone can't go to work and do their job, it's going to have a direct impact on our ag productivity.

All right. We'll look to finalize all those announcements here, the remainder of this calendar year. In Reconnect, obviously, we talked a little bit about round one, but in round two, we've determined our awards and we're working through the offers the obligations, the announcements. Of those over the next few months, the Secretary has been out and about in rural America and we'll continue to do so announcing those awards.

If you go to reconnect.usda.gov, you'll be able to see the latest news on those awards. And they change on a daily basis as we roll out new announcements.

So I'm not going to go into details on each of these slides, but I'm going to show you a little bit about what we did in round one on the next slide here, it really talks about the impact of where we're trying to reach.

We have different performance measures or key metrics that we look at and it really is much more about productivity than it is about convenience. All of these things are there to support the ag producer and the supply chain as we look to increase productivity. So we expect to see similar results is what you see on this slide round one for round two. So I think that's something to take note of. If we go to the next slide.

I think one of the very important things to understand is, if we can't ever get the middle mile fiber needs built, we will never get to last mile and will never realize what all been talked about today. So under our electric program, in 2019, we have worked with our electric coops throughout the United States to provide middle mile fiber for smart utility and smart grid purposes.

There's a lot of dark fiber capacity on those lines that can be offered as an option for last mile retail providers to deliver that connectivity out to the communities. If you look at the 1930s, most of the farms didn't get electricity until rural electrification came to them with low interest fixed rate loans.

Now, we've been spoiled a little bit in the modern age, and we have a lot more grants, but the same premise exists is that if we can get out and service those middle mile needs to the communities, a lot of last mile provisions will develop and economic growth will result from that.

So regardless of whether or not as a generation and transmission or distribution cooperatives, if we can get them to partner with the retail providers as a last mile, then we'll start to realize a lot of these needs, but until

we do that, we're not going to see a movement of the needle. The good news is we're doing it we have done it and we're continuing to do it as we move forward.

Like I said in the beginning, we're putting more money into rural America now than we ever have before from Rural Utility Service perspective based off a four-year timeframe. So let's talk what we're really here to discuss today, though is interagency coordination on the next slide.

And what you see here is how we integrate not just with the FCC, but with the rest of our federal partners through the American Broadband Initiative. I'm going to dive into details on the Precision Ag Task Force. And forgive me if I don't get into too many details at this point, because I think it's important to note that that task force that Advisory Council, if you will, has not submitted their final report formally to the FCC and so I don't want to jump ahead of them.

But I am going to talk a little bit about the details of what's being discussed within those working groups realizing that there is finalization reports that need to go on and things of that nature. So, for a little bit of background, Congress, directed the FCC in consultation with the Secretary of the Department of Ag to establish the task force as part of the 2018 Farm Bill, and the Precision Ag Task Force is specifically designated to provide recommendations to the FCC this year under seven goals or purposes.

And those goals are first identify and measure current gaps in the availability of the broad of broadband Internet access on ag land. Second, to develop policy recommendations to promote the rapid expanded deployment of broadband Internet access service on unserved ag lands with a goal of achieving reliable capabilities on 95% of ag land in the U.S. by 2025.

So that's what I would call a big hairy audacious goal that is a very strong statement and big commitment. And like I said, we're going to have to bring a lot of assets to the table to be able to realize that and so we started that process. Third, is promote effective policy and regulatory solutions that encouraged the adoption have broadband Internet access service on farms and ranches and promote precision agriculture.

That is a very key item because of the fact that the FCC is a regulatory body, so given that life that the Taskforce recommendations, which is made up of a whole bunch of people from private industry across the United States with a cross section of geography and companies, I think is very important. It's all a manner of the actual sectors involved in this, so that is very difficult to get people to come to a consensus when you have that diversity of opinion.

And then next, their mission is to recommend specific new rules or amendments to existing rules of the Commission, that the Commission's should issue to achieve the goals and purposes of the policy recommendations from the above goal with the 95% measure.

And then, next is to recommend specific steps to the Commission that they should take to obtain reliable and standardized data measurements of the availability of broadband Internet access services may be necessary to target funding support, not only from the FCC, USDA, NTIA, but also from a host of other federal agencies as well as local and state level resources.

As you might be aware, HUD has offered a lot of CDBG money sorry for the acronym, the Community Development Block Grant money in some states that they have used to help build out infrastructure to unserved areas which is a pretty significant footprint when you start thinking about the all the different

federal agencies bringing something to the table and the vast needs that are out there. So this really is an all hands-on deck effort.

And then, lastly is recommend specific steps that the Commission should consider to ensure that the expertise of the Secretary and available farmed out are reflected in future programs of the Commission dedicated to the infrastructure deployment of broadband Internet access service and direct available funding to unserved lands are needed.

It's really wanting to be effective and efficient in the deployment of federal funding that we've done to ensure that we are maximizing and leveraging every federal dollar we can with private dollars to maximize impact. So what we did is we formed different working groups and those working groups will deliver that recommendation or those sets of recommendations to the Taskforce actually next month. So we're not very far away from that.

Those teams they formed into the groups. So the first group was discussing connectivity needs based off geography and regional economies, but they're discussing such topics as real time versus delayed aggregation of data as it's collected on the farm. And how do you handle wireless versus wireline capacity versus small acreage dispersed acreage and the type of production that goes on, as well as integrating fixed and mobile wireless?

We have fixed wireline and wireless funding capacity of USDA, but really, it's the FCC that that helps with the mobile funding provision of what is being developed. So, you know, you've seen a lot of them develop a lot of the FCC develop auctions, in different areas and so all of these things are really servicing the same goal with a variety of function.

And then talking about on farm equipment and fixtures with their proprietary technology, the emerging technology, and then the interoperability of the platforms and the interfacing technology used so that we can increase traceability and sustainability of ag production, which really can be a powerful effect when you start looking back at how we've had to sometimes destroy entire crops, or livestock production for a year based off of different things that have come through the system.

So this can really isolate a lot of problems and increase our productivity and effectiveness and do things such as water conservation, reduce our environmental footprint has a significant impact. Then next working group that is focused is on adoption and that is really determining who is using precision agriculture and for what purpose and what areas.

We have a unique capacity in partnering with the American Farm Bureau, as well as with how we collect data through such things as our national ag statistics, service or Farm Service Agency, or our Natural Resource Conservation Service.

There's such a strong local presence out throughout the United States in our offices, that we have a lot of capacity to be able to quite good quality information, aggregate that up and then be able to offer that in a transparent form, but with protected information being undisclosed so that we can be able to use that information to really leverage something that has been overlooked by the FCC for many years.

And most other federal agencies and the fact that they have not incorporated ag data into how they deploy funding. And this is something that obviously now with this focus, we can gather all of this information with all the things that everyone is doing and make it mean something when it comes to

delivering federal dollars, and creating a regulatory environment that supports what people are trying to deploy, whether it's the last mile or the last acre.

And then they're also discussing how to improve education in STEM in those rural areas to take advantage of all this equipment, so there's not used like a 1950s equivalent but it's used like a 2020 piece of equipment.

And then also the use of automation and telemetry to offset farm leader, labor shortages is another piece of this. The third group is working on accelerating deployment in using artificial intelligence and big data, like I discussed just a few minutes ago to efficiently deploy those federal funds.

And then lastly, the last group is working on the mapping issue and incorporating that cropland data like I discussed, so that we can maximize its impact and make sure that we're delivering USDA funds as well, some of the FCC funds in those right areas. FCC has specifically designated a pot of money towards rural ag production and so I think it's important that we incorporate this map into that so that they understand where to invest those funds, and we will obviously have a focus on that as well.

So that's really a background on the Taskforce and I would encourage people to stay tuned and login when the Taskforce provides that recommendation to the commission, here in the near future, because I think that we'll all learn a lot from that and that's not just a one- time report.

I think the other piece of this is that people understand this is an ongoing effort. That is an annual report that is required to be submitted to the FCC so that we continue to engage and improve and learn from what we've done, and we will continue to do so. Those are the main things that I wanted to discuss today.

Lastly, what I'd like to do is offer you the access to our website and my contact information here at the very end slide. So feel free to reach out and if I can't answer the question, I'll be happy to get the right expert to be able to answer the question but with that, Jean, I'll hand it back to you. Appreciate it. Thank you.

Jean Rice: Karen, handing it to you. Anyway, Chad, we want to thank you so much for a terrific presentation and we're all looking forward to--

Karen Perry: This is Karen and thank you very much. We are very close to the hour, but I'm going to ask you one very quick question. You mentioned that this is an annual report. And if you haven't turned it over, it hasn't been finally issued, but I know you're already thinking about next steps.

So can you give us just a little bit of a preview as to what your expectation or your hope is for what the next steps are, after the report is turned in and what you hope will happen next?

Chad Rupe: Sure, I think it's important that everyone take that report and digest it because there's so many things that can happen from it, but most importantly, is that we increase our food and ag production, whether that be a food or the fiber, or even the fuel, quite frankly, to continue to provide economic growth.

Really, the impact is what matters and it's not going to be a single source solution. It's going to take everyone to bring it to the table, including Congress, as well as federal agencies, state and local officials and private industry. So continuing to engage, and like I said, learn from what we've done and what we will continue to do, because nobody has a single answer. Nobody has the right answer.

It's going to take a continuous learning process. So that's really what I hope to gain out of this first one. Obviously, we're going to gain some action items out of this first round and I think that's going to be important that we make use of those recommendations and deliver impact based on those recommendations so that this becomes not just a report that sits on the shelf, but something somebody actually uses and we truly do grow with it.

Karen Perry: Well, thank you, Chad. And it's also very promising that it is an annual process because it's certainly going to continue to change annually and I think that's one thing we all know. I'm sorry, that we didn't get to people's questions today, but I wanted to remind to thank all of our speakers as well as our attendees.

And I wanted to remind you all that the presentations, the transcripts, and the audio recordings will be available on our BroadbandUSA website within seven days, so you will be able to refer to them and all of our speakers do welcome your comments or your questions.

Finally, BroadbandUSA is available for technical assistance to help expand broadband connectivity and promote digital inclusion and broadband adoption in your community. For more information, please email us at broadbandusa@ntia.gov or visit our BroadbandUSA website which we have been updating and enhancing quite a bit lately.

So if you've been to our website before, come and check it out again. There's new pages and a lot of new updates for you to look at there. There are toolkits and publications, but also quite a few small enhancements that are worth taking a look at. Thanks very much for joining us today.

Please come and visit us next month for our whips for our next webinar, which is the lance, the Changing Landscape of Remote Learning, definitely a web, a webinar that's going to be interesting for all of us. Thank you very much.

Jean Rice: And I want...

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