MEETING OF THE TASK FORCE FOR REVIEWING THE CONNECTIVITY AND TECHNOLOGY NEEDS OF PRECISION AGRICULTURE IN THE UNITED STATES

JULY 11, 2023

HYBRID MEETING: VIRTUAL; COMMISSION MEETING ROOM, FCC HEADQUARTERS, 45 L STREET NE, WASHINGTON, DC 20554

10:00 AM EDT	**CALL TO ORDER AND WELCOME, ROLL CALL**	Lauren Garry, Designated Federal Officer Teddy Bekele, Task Force Chair

Roll Call : [highlighted in yellow if present]

Teddy Bekele, Senior Vice President and Chief Technology Officer; Land O'Lakes

Vice Chair:

Dr. Michael Adelaine, Ph.D., CIO & Special Advisor to the President; South Dakota State University

Members:

Dale Artho, Dale & Kathy Artho Farms

Dr. Sreekala Bajwa, Ph.D., Vice President, Dean & Director; Montana State University College of Agriculture & Montana Agricultural Experiment Station

Andy Bater, Farmer; Fifth Estate Growers LLC

Julie Bushell, President, Paige Wireless; Irrigation Association

Anthony Dillard, Tribal Councilman; Choctaw Nation of Oklahoma [present online, but did not announce during roll call]

Michael Gomes, Vice President, Strategic Business Development; Topcon Agriculture

Heather Hampton+Knodle, Vice President & Secretary; Knodle Ltd. Farms [joined online just after roll call ended]

Robert Hance, President & CEO; Midwest Energy & Communications

Ryan Krogh, Manager, Production System Program Management; John Deere

Jennifer Manner, Senior Vice President, Regulatory Affairs; Hughes Network Systems, LLC

Joy Sterling, Chief Executive Officer; Iron Horse Vineyards

Jimmy Todd, Chief Executive Officer & General Manager; Nex-Tech

Dan Watermeier, Commissioner, Nebraska Public Service Commission

Andy Burke, USDA

Teddy Bekele: announced the agenda

FCC Mapping Update: FCC Broadband Data Task Force – Kirk Burgee; Khoa Nguyen

Introduced and discussed Broadband Data Collection and Broadband Funding Map history and how it was stood up by the FCC (presentation from Kirk Burgee)

- Regarding the fabric and broadband availability: what is it; who creates it; the challenge process and how often they are updated; what's on map

The second iteration of the national broadband map was released May 30, 2023 and is substantially improved version of the map. It includes more than 1 million more serviceable broadband locations than the first iteration. The availability data also shows continued improvement.
Improving the data is largely done through validating provider reported data through the challenge process. Over 4 million challenges were sent for provider response. The Map is updated on a rolling basis and FCC has contacted over 800 challenge filers.
Latest developments:

- Version three of the Fabric was made available to fabric licensees on July 3, 2023
    - Incorporates successful challenges made to version two
    - Challenges to version three are most likely to be accounted for in version four (will be available in December 2023)

Broadband Funding Map (presentation from Khoa Nguyen)

- Provides overview of national broadband funding map. Allows users to explore national broadband funding data and see what federal funding is available for areas and use filters to see more granular data, like which agency the funding is coming from, by project, and availability at a particular address, amongst others.
- Continually improving the map as data comes in from other agencies.

<u>The GA Office of Broadband Deployment Structure: Georgia State Broadband Office, Deputy CIO Jessica Simmons</u>
Introduction: Enabling legislation gave some responsibilities to GA technology authority and others to Department of Community Affairs. The Broadband Office is a partnership between the two agencies to make sure they are strategically deploying federal funding and planning for the BEAD program.
Presentation: Overview of GA Broadband Office

- GA has location level broadband map that is mapped down to location level and indicates unserved location. It also has census block shading.
- Overview of broadband funding programs in GA: American Rescue Plan Act; Capital Projects Fund; working on getting funding information to the FCC to be reflected in Broadband Funding Map
- Recent broadband awards: they show that while there are unserved locations in GA, there have been significant monetary commitments to get those locations served. They also showed federal funding commitments in GA in 2022 and prior. GA can be strategic in the future to target unserved locations with BEAD funds and other funding programs.
- Current funding programs:
    - GA will receive just over $1.3B from BEAD funds.
    - GA will also have middle mile infrastructure planning from DoveTel and Zayo Group.
    - Digital Equity: Digital Equity Act provides $2.75B and ~$1.5B from Digital Equity Act other funds from Digital Equity Grants.

HHK: 100/100 standard, as they go into unserved areas, does setting a standard become a hurdle for providers? If so, how do you work through that?

- JS: thus far, have not seen a standard to be a problem. All programs so far have been 100/100 or greater. If it isn't feasible to hit that standard (e.g. they can only achieve 100/20) they would have to provide a lot of information to show why 100/100 couldn't be hit. All applications approved thus far are either fiber (most are fiber) or fiber co-ax.

HHK: do you expect this to be similar (100/100) for all unserved locations in GA?

- JS: she thinks so, but it may be different as they reach extreme high-cost locations. Thus far have not seen an issue meeting the speed standard.

Dr. Bajwa: collecting lots of data through 3rd parties and in the field. Is this going to the FCC somehow?

- JS: have actively participated in the mapping effort; submitted fabric and availability challenges. Treasury has updated its reporting requirements and will submit information on funding that will get back to the FCC

Dr. Bajwa: what has the office done to address connectivity in frontier communities/sparsely populated areas?

- JS: In 2021 created a strategy to address the digital divide. Of unserved areas, 90% were in rural areas. The focus has largely been on rural areas. As they implement BEAD, the focus is on unserved areas though, whether they be urban or rural. Regarding rural areas, they targeted counties with the Capital Projects Fund that had more than 20 unserved locations or 20% of county unserved/tried to target areas with the highest need. With BEAD, they are focusing on getting everyone connected, even if it is 1 unserved location.

Dr. Adelaine: How do we deal with folks who can't afford service even if they have availability?

- JS: Have done a lot of work to promote ACP, mostly through Department of Human services and Department of Education, and the work with the Digital Equity plans to promote knowledge of ACP and participation in the program. Have done work through the library system to get out hotspots and chromebooks, as well as get out information on the 1 time device credit in ACP. The state has also been working on helping people sign up for ACP.

Dr. Adelaine: Is there a consistent matching requirement for funding?

- JS: have not had a match requirement. Even so, had a 50% match average in 1 program and the other is 40%. For Capital Projects Fund saw a slightly lower match, which was to be expected since the providers were not drawing the area (the state was) so it may not be as financially advantageous. Also did not see as much matching in very rural areas, where there were only 1-2 strong applicants.

Andy Bater: Is there overbuilding to promote redundancy?

- JS: Some. Try to follow federal guidance, which is to avoid areas that already have 100/20. Try to focus on areas with most need. Try to avoid overbuilding, but it can be nice for consumers to have more than one choice.

Julie Bushell: does the state strategy concern connecting cropland or just to home and business?

- JS: thus far the focus has been to the home. In the 5 year plan, has tried to take a broader view of connectivity and note how helpful broadband can be to healthcare, education, and other arenas and seek to provide as much connectivity as possible. As they implement BEAD though, they must follow those program rules and legislation and focus on unserved and underserved areas.

<u>The MN Office of Broadband Deployment Structure: Minnesota State Broadband Office, Bree Maki</u>

About the Minnesota Office Broadband Deployment Structure:

- The Office was created in 2013, first grant round was in 2014.
- The purpose of the Office was to improve broadband in the state and improve accessibility for underserved communities and populations.
- The staff members of the Office are spread across the state, which is helpful as they work with partners.
- MN Broadband Policy Framework: statutory goals; broadband office/task force; data (the office's mapping program); tools the office can use (infrastructure grants; digital equity)
- Provides overview of MN unmet needs regarding broadband access, both with 25/3 access (2022 goal) and 100/25 access (2026 goal)
- Existing grants programs:
    - Over last 8 grant rounds they have issued over $206M in grant programs.
    - Acknowledges that the 50% match is not always feasible to get providers to go to most unserved areas, so they have a lower population density program to address this issue.

This is a relatively new program, so trying to collect data to get information and understand where those lower population densities are and what that area should be from a definitional standpoint.
    - Provides overview of Border-to-Border Grant program, Line Extension program.
    - Explains that grant programs have a challenge process.
- Overview of 2023 legislative funding

IIJA and Digital Equity is integrated into the office's existing work:

- Digital Equity Act—MN received around $800M for digital equity work.
- Provides explanation for their definition of Digital Inclusion.
- Gives overview of required plan components to address digital equity.

MN Strategy regarding Digital Equity Planning:

- Each state implements digital equity a little differently. MN has self-selected work groups formed on a voluntary basis. the scope of what these working groups work do is to receive and share information; gather local information on digital inclusion assets, needs, and goals; and serve as a network of partners for the Office of Broadband Deployment.

Gives overview of its broadband data collection timeline as well as other timelines for the Office's work.
Gives overview of Minnesota Broadband Map.
The Office doing advocacy work to ensure that people know about ACP and can access these funds.

<u>Discussion of the Smart Climate Initiative: USDA, Bidisha Bhattacharyya</u>

Agriculture is unique because it is a source of emissions but also can be a large part of climate solutions.
USDA has gotten a positive reception from a variety of stakeholders and have been able to leverage a variety of resources, including in the legislature.
While she is only going to speak to agriculture, she notes that there is a lot of work happening in forestry as well. She is also happy to follow up with information on USDA's work regarding broadband investment.
Partnerships for climate-smart commodities:

- USDA has launched partnerships for climate smart commodities and has invested over $3.1B in 141 selected partnership projects.
- All projects are voluntary and incentive based.
- Focus is on creating new opportunities and markets for agriculture and forestry.
- Defines climate smart commodity as anything that reduces greenhouse gas emissions or sequesters carbon.
- Incentives for producers:
    - There need to be sufficient incentives to encourage producer participation. All plans need to have a plan to include smaller producers.
- Projects are approved on a rolling basis, but 141 tentatively selected project with an average of 50% federal funds match.
- There are diverse partnership participants: tribes, private companies, non-profits, and others
- Sharing information publicly: USDA is collecting lots of data from these projects and will summarize and publish information from these gatherings, as well as consolidated data. USDA is cognizant of not sharing private data or proprietary information as they publish this information.
- Climate smart agriculture and the Inflation Reduction Act:
    - IRA provides NRCS with $19.5B in additional funds to existing programs
    - IRA funds went live this fiscal year
    - IRA focuses on climate change mitigation to reduce greenhouse gas emissions and carbon storage
    - NRCS is continually evaluating mitigation strategies
    - IRA funding can also be used to facilitate a mitigation practice
    - Measuring, monitoring, reporting, and verification: the IRA gives the NRCS to quantify sequestration and emission trends over time. This involves collecting field-based data

and assessing outcomes associated with certain activities. The goal is to understand the climate impact and footprint of agriculture.

- Provides overview of other climate efforts and other conservation issues, such as water conservation in the West and nutrient management strategies.

Andy Bater: the research grants. is there a framework for farmers to address connectivity problems and issues as they conduct these grants?

- BB: Yes, there is a lot of qualitative data collection and she is sure they will hear about connectivity challenges and appreciates the flag on that that is data they should collect in these efforts

Dr: Bajwa: Is there any coordinated effort in USDA to offer support for the farming communities to undersatnd connectivity challenges on farmland?

- BB: There is some of that happening in broadband programs and some research agencies

HHK: Who decides what carbon benefits make sense and what models we will use?

- BB: This is a big question and one that USDA has been seeking an answer for. Put out questions on this in 2021 and additionally has 141 pilot programs to learn from and help figure this out. Congress also set up a certification process in the IRA as a way for people to figure out which processes/standards are some of the good ones. USDA is also having conversations right now on what the standards should be to reduce the noise. USDA will also be investing money in carbon testing and understanding the climate impact at scale of methane and nitrous oxide reduction so they can build a better data set over time to make these efforts more efficient.

Teddy Bekele: would better connectivity on farmlands yield better data?

- BB: Yes, this connectivity is needed to get the information needed on conservation practice.

<u>NAPDC, NIFA and Data Sharing Conference Discussion Debrief: Dr. Michael Adelaine and Mike Gomes</u>

Takeaways:

1) Data obtains its highest value when it is shared or aggregated. The creations of "data lakes" or repositories is creating additional or incremental value for both owners and the trusted advisers they share it with. Examples given of value created: farmer is getting data for a service provider, such as a nutritionist. The farmer is then sharing data with university, government entity, or other trusted party.
    - Farmer control: Connecting the data dots, i.e. aggregating data, has lots of positive effects, such as creating greater profitability, but farmers having control of their data will be key to getting farmers to participate in data sharing
2) Land grant universities and specifically the NIFA based efforts among 8 different geographic regions can be key to data sharing.
    - Land grant universities serve as regional and national knowledge repositories. They can be a structure that allows data to be easily shared.
3) Following the example of medical data and aspects of the strategic advisory group on smart farming.

The conference was a collaboration between USDA, NIFA, and University of Nebraska Lincoln.

Dr. Bajwa: who is hosting the data?

- Mike Gomes: most people don't dispute who owns the data (the collector), the issue is when they put it in this repositories do users have the ability to get the raw data out of it. Also, when work product is created from collected data, it's unclear who owns that work product because it's a derivative product.
- Dr. Adelaine: Universities would not be hosting the data, but the issue is how researchers could access the data for their purposes. A part of the conference was coming up with models with how

the data could be shared with the community and researchers and how that would work. In the end, the more we can share these data lakes the more insights we will be able get from the collected data.

Teddy Bekele: Why was the country broken into 8 regions?

- Dr. Adelaine: that was because there would be a working environment between researchers and extensions in the region.
- Mike Gomes: In some areas, land grant universities are collaborating between regions, such as Purdue and UC Merced.

Andy Bater: We are at the end of the Farm Bill. Who is working on the Hill to make these collaborations happen?

- Mike Gomes: The Hill wasn't specifically discussed, but there is action happening in the state house in Nebraska.

Andy Bater: Some think data sharing should be centered at the USDA as a neutral repository. Thoughts?

- Mike Gomes: There was some thoughts on non-profit organizations that could be a neutral repository. The main thing is that these data lakes are being made and that there is a neutral repository.

Working Group Update: Mapping and Analyzing Connectivity on Agricultural Lands: Sreekala Bajwa

Provides overview of charges to the working group.

Provided overview of working group activities.

- Assessed charges and report from last working to determine what the working group should address.
- Brought in 19 guest speakers who are experts in industry, academia and government.
- Created four subgroups to look into critical areas that the group identified.
- Provided interim recommendations based on the new BDC map.

Recommendation 1: BDC usability enhancements for precision agriculture

- The FCC should add information to increase the usability of BDC map for precision agriculture. Should include alternative descriptors in addition to being able to look up a location by address, since not all places have a physical address. For example, County, municipality, zip code, geocoordinates
- Wireless coverage mapping: the existing coverage hexagon sizes used in the FCC map should be extended.
- Add agricultural structures (e.g., irrigation systems, grain bins, sheds) to the BDC map

Recommendation 2: BDC verification data layer

- The FCC should include verification data layer(s) into existing BDC interface showing where the existence and performance of connectivity has been independently verified, augmenting the existing data layers that show where connectivity is expected.
- 3rd party data sources should be included in this layer and should adhere to required key performance indicators (KPI), providing a list of recommended KPIs.

Recommendation 3: The framework to define served, unserved, underserved, and unverified land

- Describes a framework the USDA and FCC should adopt to determine and map unserved agriculture lands and underserved agricultural lands, and develop a visual platform hosted by the Agricultural Research Service to support the broadband mapping needs of the agricultural community.

- Provides recommendations for how the FCC and USDA should define unserved, unverified, underserved, and verified broadband availability

Recommendation 4: Interagency coordination

- Many people are collecting broadband connectivity data. The USDA should create a council that would coordinate this data and involve USDA, NTIA, BIA, US Census Bureau, and the FCC.
- Provides overview of recommended activities the council should undertake and its coordination efforts, both inter-agency and with other agencies and outside parties.

Recommendation 5: Adopt connectivity use case driven standards for data and mapping purposes

- Precision ag connectivity profiles (i.e., use cases) should be integrated into the BDC map on a geographical basis of less than 25 acres. Use cases could include real-time heavy data processing, such as AI; real-time telematics data communications needed for farm machinery and other functions; and asynchronous bulk data transfer needs, such as filed mapping with drones or field robots.

Mike Gomes: Did you consider common land use units in recommendation 1?

- Dr. Bajwa: there is no common standard used across the country, from our understanding. Is this wrong?
- Mike Gomes: This is not a national standard, but is widely used and should consider CO use as a unit.

Jennifer Manner: Thinks having a common framework like recommendation 2 is critical

Joy Sterling: The significance of a map that becomes all green is the need for farmers to be able to verify they have connectivity before they even adopt precision ag. You need to know the tractor won't "drop off" when you reach a certain point in your fields.

- Dr. Bajwa: Agrees. Believes farmers will be using this map for verification of service.

Heather Hampton + Knodle: Likes recommendation 5 and that it has multiple technologies listed

Jimmy Todd: without having tighter specs on the map, especially for mobile service, the maps will be wildly inaccurate. Suggests revising recommendation 1 to reflect this.

- Heather Hampton + Knodle: Agrees this is critical.

Ryan Krogh: Starlink has recently rolled out mobility solutions. Have you guys considered the impact of satellite and recommendations going forward?

- Dr. Bajwa: their discussions were focused on the wireless network that would be used for farmlands. You can't pull the broadband through mountainous, vast areas because it's not feasible. Have not specifically addressed satellite as they consider the mobility picture.
- Jennifer Manner: over time we are going to see greater speeds in satellite. Agrees that it is good to consider, perhaps for the next report, how satellite will affect what we look at maybe in this report or in the next report.
- Jimmy Todd: it's still very early stages and needs to be tested right now. There is definitely going to be latency, jitter, other quality issues right now.

Mike Gomes: A few things the working group could consider. First, in rural areas, the time when usage is highest is when kids get out of school because they turn on their phones. Second, recognizing that crops are growing so that they might increase in height and effect connectivity, I.e., just because you have connectivity in December doesn't mean you'll have it in July.

<u>Working Group Update: Accelerating Broadband Deployment on Unserved Agricultural Lands: Jennifer</u>

Manner

Overview of charges to the working group from the Task Force
Overview of working group responsibilities
Three key recommendation areas: funding requirements, private network development; spectrum efficiency and network deployment
Provides 14 agreed upon recommendations

- Federal agencies should use the same broadband definition standards and update them biannually.
- USDA should develop funding programs to support the buildout of local/last acre networks.
- When determining agency broadband funding decisions, recommends prioritizing grant applications that include wide area coverage to agricultural acreage including to the farm/house.
- The FCC should make spectrum available for precision ag at low cost.
- USDA should provide funding build out and operation of last acre networks.
- FCC should continue to make incentives available to encourage deploying precision agriculture.
- FCC should revise broadband satellite service coverage for non-geostationary orbit satellite systems.
- FCC should implement geographic buildout requirements for spectrum-based licenses.
- FCC, NTIA, USDA should require the use of interoperability standards and encourage the use of these standards through outreach.
- FCC should strengthen policies that require auction bidders to show the long-term sustainability or scalability of their proposed networks.
- Additional incentives should be provided to build-out precision agriculture to rural land headquarters.
- FCC and USDA should work with stakeholders to build a playbooks to create community-based non-profit solutions.
- FCC should work with states and localities to address zoning and ease regulatory and administrative burdens.
- States should work with tribal authorities to help speed up precision agriculture deployment.

Next steps: finalize the report

Andy Bater: in research on requirements for autonomous vehicles, they are pretty confident that ubiquitous spectrum is going to be a requirement. Also, in rural areas, farmers are often first responders. Those are two areas where spectrum could be helpful in rural areas.

- Jennifer Manner: They plan to expand examples in the report.

Joy Sterling: could we use FirstNet in this context?

- Jennifer Manner: Not sure that is appropriate here since the legislation was specific it was for public safety.

Heather Hampton+ Knodle: Something that could play into the playbook concept is that there also is a rural cooperative finance council. They may already have starting points on a playbook that could be looked to in this context.

Working Group Update: Examining Current and Future Connectivity Demand for Precision Agriculture: Heather Hampton + Knodle

Remain committed to recommendation to have 100/100 to the last acre.

- Recommends ubiquitous, high speed, symmetrical service
- This service would enable decision and action at the last acre
- Support an ecosystem of interoperable technologies
- For underserved and unserved lands, there should be efforts to get 100/100 connection or up to 1

GB.

- Concerns about "overbuilding" could lead to rural areas not being served at all

The connectivity conundrum

- There is low return on investment in these locations, but farmers won't adopt precision ag without a guarantee it works and is reliable.

Provides overview of working group process

- Considers use cases, cloud/edge computing, needs of network infrastructure, and how policy could be used to achieve identified goals
- Use cases: demographics, on-farm technology needs, ecosystem of connectivity.
    - To drive adoption, farmers will need to feel confident that an autonomous solution will work across all of their fields without disruption.
    - Needs will change based on geography, equipment, and other factors. Some areas are not reasonable to deploy fiber, so other and varied solutions will be needed.
    - Use case-autonomy: agriculture needs basic and dedicated low band spectrum (the "farm band") with ubiquitous coverage to ensure safe operations en-route and in field
- Recommendations:
    - Encourage mobile network operators to enact a Precision Agriculture Wireless Operating Agreement.
    - Intentional fiberoptic buildout to support backhaul of cellular and edge computing
    - RUS expand tower loans, establish grants in underserved and unserved areas
    - Incentivize and obligate providers to make service available to all customers in their territory, consistent with the standard of service that cooperatives must meet. disincentivize 'spectrum warehousing' through specific milestones.
- Use case: AI
    - Emerging AI techniques will allow for a huge amount of analysis that was not possible before
    - Will require training for farmers for them to use
    - Recommendations:
        - Agriculture needs dedicated spectrum with extremely high data payload capability
        - Explore prioritizing and funding agricultural connectivity projects that make use of unlicensed fixed wireless, NGSO satellite infrastructure, and private cellular networks
- Precision tuning the Farm Bill: Recommendations
    - RUS grant/loan improvements for tower construction
    - Last mile and cell tower (or other backhaul) fiberoptic priority
    - Weighted scoring on ReConnect where benefit shown for precision agriculture
    - Incentivize interoperability among legacy equipment and varied manufacturers
- Future proofing through the Farm Bill: Recommendations
    - Provides overview of recommendations on how the Farm Bill could be used

Andy Bater: by all measures, the Land Grant University research is underfunded in this country. We should do better.

<u>Working Group Update: Encouraging Adoption of Precision Agriculture and Availability of High-Quality Jobs on Connected Farms: Julie Bushell</u>

Provides overview of current report outline

Presented updated recommendations since last meeting

- Clarified collaboration with land grant universities

- Updated recommendation on cybersecurity

Provided overview of sections in their report on cybersecurity and data privacy, adaptability, and future of farming

Open discussion:
Dale Artho: There is a movement to take AM radio out of vehicles. Farmers are dependent on AM radio for weather, alerts, and what they use on a farm. He understands why the argument is there, but for his farm and many others AM radio is very important for what information he needs to stay aware of.

- Heather Hampton +Knodle: Also notes that AM radio is important for first responders.

Dr. Adelaine: We need to talk about the aggregation points for networks. If there is a big storm, for example, what will happen? Need someone to help guide them on that area. Could be the future needs.

- Ryan Krogh: Have discussed how to have backup communications that aren't impacted by terrestrial severe events, such as satellite.
- Andy Bater: There were efforts to harden radio and tv stations in the past. Efforts to understand how we harden our telecommunications networks would be helpful.

Dr. Adelaine: We should consider how some technology is IPv6 and if there is an accelerated timeline to get IPv6 adopted before we run out of IPv4 addresses.

- Jimmy Todd: the majority of service providers have IPv6 capabilities in their network, but not all of them. As we see the evolution of the networks need IPv6 or at least utilize it, we are getting closer to the transition to IPv6. Not sure what the timeline will be on this, but the vast majority of providers are going to be prepared for that already.
- Andy Bater: There are still farmers using tractors from the 50s, 60s, 70s. We are used to equipment lasting for a long time. While it may be good for some to have equipment or systems that need to be updated more frequently, farmers may not like that so we should try to make equipment last for as long as possible.

Other Updates:
Lauren is stepping down as DFO, Christi Shewman will be taking over moving forward.

To Do Items:
Each working group will fine tune their sections and the next step is putting the full Report together.

Timing on Next Steps:
Task Force will vote on the Report at the November meeting. To make sure the Report is ready, the FCC will need to review it for at least 3 days. The FCC will need the Report by October 6.

Teddy Bekele: called meeting closed at 3:53pm EDT