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

**October 15, 2024**

**VIRTUAL MEETING**

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| 3 PM ET: CALL TO ORDER AND WELCOME, ROLL CALL | Emily Caditz, Designated Federal Officer<br>Dr. Michael Adelaine, Ph.D, Task Force Chair |

Roll Call: [highlighted in yellow if present]

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

Vice Chair:

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

Members:

Ryan Krogh, Global Combine and FEE Business Manager, John Deere (RK)

Andy Bater, Farmer, Fifth Estate Growers, LLC (AB)

Timothy Bradford, Jr., Ph.D., Director of Agronomy, Vayda, Inc. (Dr. Bradford)

Julie Bushell, Chief Executive Officer, Ethos Connected (JB)

Joseph M. Carey, Special Government Employee (JC)

Heather Hampton+Knodle, Vice President & Secretary, Knodle Ltd. Farms (HHK)

Steven Hill, President, Satellite Broadcasting and Communications Association (SH)

Carolyn Price, Executive Director, Upstate New York Towns Association (CP)

Brad Robison, Chief Executive Officer, Tallahatchie Valley Electric Power Association and Tallahatchie Valley Internet Services, LLC; President, MS Fiber (representing the National Rural Electric Cooperative Association) (BR)

Joshua Seidemann, Vice President, Policy and Industry Innovation, NTCA–The Rural Broadband Association (JS)

Joy Sterling, Chief Executive Officer, Iron Horse Vineyards (Joy)

Dan Watermeier, Commissioner, Nebraska Public Service Commission (DW)

Andy Berke, USDA

Opening Remarks

- Dr. Adelaine: This is the last chance for the task force members to think about the recommendations presented and the time to make strong edits before we take a vote on the report in December. Addresses JC to begin discussion on Mapping and Analyzing Connectivity on Agricultural Lands.

Mapping and Analyzing Connectivity on Agricultural Lands

- JC: Starts on slide 3 regarding Mobile Map Data Rates. Four items to be considered by the mapping working group that came to them from the larger task force
    - Mobile Map Data Rates
        - Currently the National Broadband Map attempts to display mobile performance levels using LTE (5/1 Mbps) and 5g (7/1 and 35/3 Mbps). The working discussed the issue and is adding a new recommendation that the National Broadband Map include a mobile layer for 100 Mbps download and 25 Mbps upload on the 5G map.
        - Questions:
            - HHK: Can you describe what it means to have two different speeds for 5G?
                - JC: This is meant to indicate there are currently three layers available on the map: LTE with speeds at 5/1, 5G with speeds at 7/1, and 5G with speeds at 35/3. We are proposing a fourth layer reflecting at 100/20 in the 5G category
                - HHK: Are these speeds meant to reflect the minimum performance level under any circumstances or only under certain conditions?
                - JC: The map reflects areas where you can expect the given speed indicated by the layer with 90% probability.
            - Joy: Does this include upload speeds?
                - JC: This would be 20 Mbps upload speeds. Unfortunately for mobile service there is a physics constraint and I imagine the 20 Mbps upload speed will set the contours of the map. The batteries in cellular phones limit their upload speed compared to base stations transmitting down that have a lot of available power.
    - Discussion of Voice Service
        - The mapping working group will not be adjusting its recommendations related to voice service. The FCC collects information from Mobile Network Operators (MNOs) and does not display it, but the information is available for download and there is no challenge process. But from the broadband perspective, the lowest level of what the map displays can support voice service. We want to focus our energy on broadband and don't think voice is sufficient itself.
    - Discussion of Sustainability

        - Current recommendations include several recommendations related to ongoing mapping efforts, surveys, and census. Listening to the accelerating deployment working group, we expanded our recommendation to include that these surveys and censuses be extended to include equipment manufacturers, co-ops, and other similar entities as opposed to purely farmers.
    - Mapping Available Spectrum
        - Some other working groups have suggested some spectrum should be set aside for agriculture. We looked at this, and it is a complicated issue. I don't think we can do it justice and the time left with this term, and it would be better handled by a following group with more time to look at the issue. We are not adjusting the recommendation to include a spectrum map. NTIA has an existing National Spectrum Strategy, which includes spectrum sharing. It is appropriate for them to look at this issue or a similar task force (if it is included in the next task force).
        - Questions:
            - AB: Do you think it would be feasible for your working group to provide a framework for those working on the national spectrum strategy about how this could be done and the parameters?
                - JC: That is an interesting idea, and I would like to think about it. JC suggests discussing the issue offline.
                - AB: There is some natural linkage between what we are developing on the task force and what will be done in the future with the National Spectrum Strategy so it may be helpful to have deliverables the next set of people can look at.
                - JC: I want to avoid making a set of recommendations that would do a disservice to everyone, but I would love to hear ideas around this.
            - Joy: Recent update of the National Spectrum Strategy focuses strongly on spectrum sharing implying there is no open, "green field" spectrum to be had. If that's the case, does it obviate the possibility of a dedicated Ag band?
                - JC: I don't think I am qualified to answer that, but in the Mapping working group there is a diversity of opinion on just how congested spectrum is. My opinion is that it's quite congested but others believe there is an abundance of spectrum that could be made available.
                - Joy: Where would we go to get adjudication on this issue?
                - JC: The FCC. Maybe Emily or Tom could speak to that before the end of the meeting. The National Spectrum Strategy is figuring out where there is underutilized spectrum and under what conditions it can be shared. A lot of this is spectrum sharing where there is coordination between the multiple users in the band.
        - HHK: I hope someone is flagging this for follow-up discussion. The larger question is whether there is opportunity for a dedicated Ag band.

- JC: If you do a dedicated Ag band, you are taking away that spectrum from somebody else, probably the Defense Department. As far as I know there is no fallow spectrum. For example, with CBRS the spectrum was only used by Navy ships offshore, so there was consideration about sharing it with inland parts of the country where there are no Navy ships using radar (HHK: except perhaps the Great Lakes).
- HHK: Last time I saw a figure, the Defense Department has 83 or 85% of all spectrum so "taking" might be the wrong word compared to an opportunity for giving.

- Joy: The current fashion seems to focus on sharing, which is very appealing especially with the ability of AI to manage that. I am trying to decide on our report whether to keep the dedicated Ag band recommendation or modify to include something like "and/or some manner of sharing" since sharing seems to be the principle these days
    - HHK: You can still advocate for a dedicated Ag band and then how the band is delivered is yet to be determined (e.g. sharing, auction, etc.). We are ideating what could be rather than designing all the pieces
    - JC: Repeating what I said in August, we got the TV white space band. With recent changes that allow mobile devices to transmit at higher powers, I am struggling to understand why that's not filling the need of the dedicated Ag band. I understand there are market forces that make this equipment more expensive than WiFi or cellular. I am thinking about, for example, DSRC and the 5.9 GHz automotive band where the industry had the band for 20 years and never commercialized it. I am concerned the same thing might happen with the dedicated Ag band. I like the idea of the dedicated band, but I am struggling with whether it will do something
    - AB: Maybe we could recommend an approach asking for priority use for agriculture in any sort of shared spectrum model. The challenge in agriculture is that there is no time to wait for availability for critical tasks (e.g. planting) and farming is a fundamental industry that is ultimately a matter of national security. If we can't have dedicated spectrum, we should at least have priority use of spectrum so that we can farm when we need to farm.
    - Joy: CBRS has that kind of tiered access, so there is an existing model for this.
    - JC: HHK, you and I discussed the possibility of using FirstNet spectrum as an Ag band and your working, as I understand, thought it was a bad idea. Do you want to talk on this?
        - HHK: We didn't think it was a bad idea. It might fall more to the connectivity needs working group and could be stated as a recommendation there. The only element that might be viewed as bad could be concern about creating a monopoly for

whomever might be in charge of the band. Also from a user perspective, where FirstNet is in place, it is not always fully functioning in terms of ubiquitous coverage and operating as intended in sparely populated areas. You can use it as a potential policy solution, but it is not perfect in its application.

- Dr. Adelaine: I don't see this as a Mapping working group effort, I see Joy and HHK getting together. I think AB's comment was the right one. You need to think about how it would fit between the two of you in spectrum sharing prioritizing rural areas for agricultural use of the band.

<u>Examining Current and Future Connectivity Demand for Precision Agriculture</u>

- Joy: Summary paragraph stands but I want to introduce the last sentence talking about future policies and programs. We are considering some more specific recommendations on something like a "digital agriculture fund" that helps farmers pay for the Last Acre of coverage. We have programs like BEAD and Rural 5G to bring connectivity to the farm perimeter, but we have the next hump of getting connectivity over the whole operation. We are working on that in terms of future policies and programs, perhaps it would fit in the next farm bill.
- Joy: Recommendations
    - We are committed to our Last Acre recommendations, our Connectivity Requirements recommendations, we stand by the proximity maps which I think will be quite the revelation.
    - Spectrum: one interesting thing is the NTIA R&D plan that just came out calls out agriculture as a major vertical for dynamic spectrum sharing. One of the frequencies they are looking at is in the mid-band spectrum and is really fantastic for 5G specifically and therefore would be great for agriculture. We will refine our document to make sure it's explicit this be looked at for agriculture.
        - Two different frequencies are really important for agriculture. Mid-band to reach the 100 symmetrical and low-band spectrum to operate the IoT network on farm. We will make it clearer on the report that there are two bands, and suggest looking at a hybrid situation so that the farmer can have both spectrums to operate rather than building two networks. This is a reinforcement of the need for edge computing to be able to achieve this.
        - There was an internal question regarding the existence of unused or fallow spectrum in rural areas where there was not infrastructure built out. We have found at least two sources confirming that there is unused spectrum where the infrastructure is not built out. We want to make sure there are incentives or mandates to make this spectrum available.
        - HHK: The two-spectrum concept is very interesting. I appreciate the way the dedicated Ag band is worded here.
    - Funding: I want to put forward whatever proposal we have to put forward a new program to achieve the Last Mile wherever it might fit (USDA program, FCC and NTIA collaboration, etc.). This empathizes the need to prioritize Precision Ag in existing programs like BEAD where the states are in various stages of finalizing their allotments of BEAD money. It's a critical time to for state officials to consider Precision Ag.

- Sustainability: Covered adding in sustainability questions about AI and spectrum.
- Timeline: Goals and Milestones: This is a work in progress since so much is happening
  - We need to add back into this raising broadband definition to 100/100 with latency under 10ms.
  - On the question of anticipating Congress reauthorizing FCC auction authority to facilitate spectrum availability for next-gen networks. I wonder if that will ever be an issue or does spectrum sharing make that a moot point. Does anybody have any thoughts on that…are we as a country at a detriment because that authority is gone has been gone for 18 months and is this a national security issue?
    - HHK: Our working group has learned the task force can't say "Congress you need to reauthorize authority" but we can say "so many of these recommendations are predicated on the FCC being able to auction spectrum." Find another way to word it, but our working group concluded this is a priority but it's an unspoken assumption that this needs to happen. It's not that there's no need for it, there's just inaction.
    - Joy: That was our thinking when we first wrote this but now, we need another bullet point about spectrum sharing and the NSS.
    - HHK: This might be the perfect place to insert this, but somewhere in our overall remarks, we should have continuing conversations. Continue doing NOIs, asking for input and feedback, having an additional task force and convening agencies to retain Precision Agriculture and serving rural areas as a priority. It would be nice to catch this in the milestone recap.
    - Joy: That's an interesting point. George Woodward suggested something to the tune of "all broadband programs need to emphasize and prioritize Precision Agriculture"
    - HHK: That's a notable goal, but I think it's important now is establishing that somebody is responsible for continuing the conversation. There needs to be a continuing conversation and action, so it should be established who has the responsibility.

- Questions:
  - HHK: Does anyone know the use case for minimum upload speeds on virtual fencing? This seems like a specific question but it's interwoven into these concepts of expanding, regenerative agriculture, etc., but we need to have more livestock on working lands not just grazing lands. Fencing is cost prohibitive and labor intensive, so it won't happen this way.
    - Dr. Adelaine: I talked to a researcher doing this at SDSU. Right now they are refining a device to make it as minimal as possible in the OIT range. Nobody has really defined what that minimum speed is at this point.
    - HHK: Considering this practically, you need to have rapid upload speeds, the virtual fences won't keep in livestock as intended.
    - Joy: I do know drones for monitoring livestock movement require mid-band speed. Regardless of fencing, if you want to operate soil sensors and drones, you need both to get sky-to-ground coverage and having that flexibility mitigates

line-of-sight issues on the farm. So that's where sharing is important. Ideally, you want AI to move you through the different bands depending on the task.
    - JC: I agree with everything said but wanted to make the observation that mid-band will have less range than lower-band depending on if you get the towers high enough but I agree you need to be able to combine them.
- Joy: Considering HHK's comment on regenerative farming my question to the group is whether the impact of regenerative agriculture in terms of connectivity is something to add to the report?
    - HHK: I like the way you recapped the sustainability points at the end. Maybe it falls under use cases, but if there's any opportunity to reiterate that where the goal is to improve soil health, it's about microbial activity and livestock has a role in that.
    - Joy: AB mentioned that we don't mention livestock operations enough in our draft. I am looking at all the different places we can plug that in, and sustainability is a great spot for that. On the sustainability issue, there is growing concern about the sustainability of satellite launches. On the one hand there is only one company that has the size to meet BEAD requirements, and this throughput is directly related to the number of satellites in space (as I learned from SH), particularly LEOs. Just this month the California Coastal Commission just denied a federal space agency request to increase the number of launches from the CA coast for SpaceX from 30-some to 50-some launches per year due to environmental concerns on the ground as well as concerns with light pollution and the number of satellites out there.
    - SH: The CA thing will probably get worked out. Long term there won't be much impact since they will move operations overseas or elsewhere. Starlink is already doing more launches out of Texas anyways. There are very real concerns with light pollution and the potential impact of 20-30,000 LEO satellites on geostationary satellites, which sit thousands of miles above and in some cases work on the same frequencies. At this point it's sort of the wild west, so we will see where this goes. Ultimately, to make this work, there needs to be 30-40,000 LEO satellites to get full connectivity, high speed, and handle volume. In addition, there needs to be constant launches since they only have a short lifespan.
    - Joy: SH, please explain that. When they die and re-enter earth's atmosphere they can drop debris?
    - SH: They really don't. They are designed to burn up. Theoretically there could be debris but no more than a meteor. A lot of meteors are just satellites burning up.
    - Joy: I think we discussed at a prior meeting that having all those LEO satellites is a security concern because they can be taken out in one fell swoop.
    - SH: It's actually easier to take out the bigger, fixed satellites because the smaller satellites are moving fast at 17,000 mph while the bigger ones are in a fixed orbit. There is always concern since they still could be hit like anything else.
- HHK: SH answered one of my questions about recycling parts, and if it's burned up and we aren't too concerned about the burn off then…

        - SH: Something cool about it is SpaceX is reusing the rockets by having then land reusing them which makes the process more sustainable than previous methods where the rocket lands in the water and is recycled.
    - HHK: One other question I have is related, Joy you were talking about AI referenced at numerous points (determining spectrum allocation, edge compute, etc.). I was thinking at one meeting it was raised that one search engine shifting all searches to AI would double the amount of required electricity for the power grid. That is not sustainable. I don't need it to tell me the hours of the local pizza place.
        - SH: That's why they are opening defunct nuclear power plants.
        - HHK: They are trying to close them in our state still.
        - Joy: AI and electricity use is a huge question in sustainability and you will see it on our timeline when we get there
    - Dr. Adelaine: Joy you mentioned you wanted to insert livestock more. I was thinking maybe use the term animal agriculture or "livestock and poultry" because it's a lot more than just cattle.
        - Joy: Thank you, I need sensitivity on anything that's not grapes.
    - Joy: (to the group) Are we capitalizing Precision Agriculture, Edge, and Cloud?
        - Dr. Adelaine: For Precision Agriculture, when you are speaking about Precision Agriculture itself rather than referencing it, then it should be capitalized. I have someone on campus once I get the reports from everybody who will take care of this issue.

<u>Accelerating Broadband Deployment on Unserved Agricultural Lands</u>

- HHK: Addresses several additional discussion items raised by the working group since September. The working group ranked recommendations within their subcategories and ranked the recommendations overall to provide a top 10 list in the final report. The intent is to deliver the report for the full task force by Halloween. We consolidated some topics under fewer headings. There may still be a few additions.
- HHK: The sections in the report are 1) Funding and Incentivizing Deployment to Unserved and Underserved Rural Areas and Precision Agriculture, 2) Leveraging Underused Spectrum and Infrastructure, and 3) Accelerating Deployment Through Improvements to Siting. We addressed several points related to spectrum so we can collaborate to find overlap and decide where certain information should go in the final report.
- HHK: Addresses each section of the report.
    - Funding and incentivizing deployment:
        - Updated 5G Fund language: We need to emphasize funds are needed for Precision Ag to deliver connectivity to the last acre especially in light of the FCC's September guidance that removed the initial intent to dedicate some funds for Precisions Ag.
        - Funding from multiple sources: We continue to have disagreement on the phrasing and intent of this concept. Optimistic that there will be resolution soon. Within the working group the primary difference, I think, is those who recognize there is a high cost to build out in the un- and underserved rural areas, so there is a need to allow funding from multiple sources for a regional or local provider

that can make a case for long-term ROI but needs assistance for initial capital outlays. Some concern has been raised that carriers accustomed to nationwide auctions and programs would view this as opening the door to creating monopolies and blocking competition.
        - Targeted subsidy program for Precision Ag: We are open to what kind of discussion should take place. We are in favor of incentives and have talked about places like the 5G Fund for setting aside funds for Precision Ag or potentially developing an additional fund. Recognized that there is plenty of opportunity for discussion on how to implement a new fund.
        - "All of the Above" Technology: Reflecting NTIA recent guidance that recognizes the ecosystem approach. But raised the point that standards (data up/down, reliability, affordability) need to be the front and center focus.
    - Changes or Additions to Leveraging Underused Spectrum and Infrastructure:
        - Process for FCC and NTIA to Enact PATF Priorities: I think it's important for the Task Force to call out the need for the FCC, NTIA, USDA, and other agencies to enact these priorities. Enacting can take several different forms, so I hope we as a Task Force elevate this. I didn't see it in the list of the bullet points in the summary that we received ahead of this meeting.
        - Unlicensed and Licensed by Rule: We were asked in August about the unlicensed and licensed by rule spectrum recommendation we had, so we would like confirmation from FCC staff that our edited language clarifies our intent.
        - Allocate Low Band Spectrum for Precision Agriculture: Connectivity highlighted this as well. We also had this suggestion regarding more low band availability.
        - Rural Service Rules and Geographic-Based Buildout Requirements: Regarding these two items, the substance of our recommendations is the same, but we need to reconcile the final ordering of these items in the final report.
    - No substantive changes or additions to Accelerating Deployment Through Improvements to Siting section since the August and September meetings.
    - HHK requested guidance and/or procedures for how to develop citations and the appendix section of the report.
    - HHK provided additional detail on the working group's recommendations:
        - Spectrum:
            - Encourage use of unlicensed and licensed by rule spectrum
            - Do not discourage the use of networks that rely on unlicensed and licensed by rule spectrum including general authorized access in the CBRS band, but we would like to make a licensed option available.
            - Recommends looking at allocating sub-1GHz spectrum for modest-speed IoT use such as a licensed version of low raw with modestly higher power levels and coordinated, but not necessarily exclusive, channel allocations
            - Creating incentives for further buildout after initial license term. Specifically, incentivizing network deployment by wireless licensees in a manner consistent with universal service objectives

        - Overlay use of un- and underused portions of license areas (e.g. subcontracting).
        - Mapping RTK towers or other existing assets that might not be currently in use and marketing them to potential providers to help them determine whether they could make it work.
    - Targeted subsidy program for Precision Ag:
        - Acknowledges this may be necessary for sparsely populated areas where it's difficult for commercial providers to serve.
        - Emphasizes the need to plan for 6G and beyond with scalable, evolving applications.
    - In general, all the recommendations are built on the foundation of fiber going as deep and far as it can go.
- HHK: Summarized that recommendations shared are a few highlights and welcomed comments from the group. Noted that she marked a few items she and Joy need to review such as spectrum sharing and prioritizing for Precision Ag use and digital agriculture fund.
- Questions:
    - Joy: I must have missed this the bit about Precision Ag being removed from Rural 5G, I thought there was a specific allocation of funds. Also, the Rural 5G Fund is for public lands. Is that part of the problem since it would be extending the funds to private lands at least to on farm? We could argue that this is a national interest as AB raised.
        - HHK: To address the second issue first, I did not realize that the language was attempting to confine the fund to public owned or managed lands.
        - Joy: It would be great if the FCC could provide clarification on both of these points.
        - HHK: I agree. My interpretation of "public" in contrast to a privately-owned network that only serves specific people like a VPN. Regarding the first one you asked, I think the language was removed right around the last Task Force meeting, so it's still new information since our last meeting as a Task Force. Do Emily or Tom have any insight on Joy's second comment?
            - Emily Caditz: Neither Tom nor I worked on those proceedings, but we can follow up with our colleagues and get back to you.
            - Joy: I would like to get some guidance on how the wording has been changed because there was a sizeable chunk devoted to agriculture.
            - Emily Caditz: Advised Joy to write down questions and email them to Emily and Tom ensure this question gets addressed.
    - Dr. Adelaine: Regarding the Rural 5G Fund, are you not thinking about satellites as a solution?
        - HHK: We had that in our August recommendations that the direct-to-device efforts should be accelerated. That's where we saw the biggest play for agriculture, but if there's more we need to say there we can. We are working from iterations of reports rather than a complete set, but we have a priority for direct to device and in our different contextual language we acknowledge the ecosystem.

They say they are requiring all the above technologies at several points in our report.
        - Dr. Adelaine: Ok, so when you put together the final report it will show a flow of the ecosystem whether that be 5G, satellite, white space, etc.?
        - HHK: We don't have a visual of the flow or how they connect but we do have bullet points or recommendations that address aspects of it. At this point we don't have any visuals in our report. If you'd like us to build some, then we'd probably need to know that.
    - HHK to Group: Question on maps. There is a general statement about ongoing efforts to ensure the quality of maps. In my mind this seems to be under the purview of the Mapping Working Group. If the task force leadership determines this, how should we approach the final edit?
        - Dr. Adelaine: This has been charged to the mapping group specifically, so you can leave this off.
    - Dr. Adelaine: You started this piece of the conversation listing a number of things under "spectrum." Do you anticipate those things would be preceded by the word "recommendation?"
        - HHK: Yes, whenever I provided the list of things, those are examples of recommendations in our report.
        - Dr. Adelaine: Could you say "in regards to our spectrum recommendations, here are the following issues that need to be considered" and then you would bullet point them.
        - HHK: We have an introductory summary under leveraging underused spectrum and infrastructure that calls out some key questions. Then we have the series of spectrum-related recommendations under that.
        - Dr. Adelaine: As long as the reader can pick out the recommendations.
        - HHK: Explained in detail of how the section specifically calls out the recommendations to the reader.

<u>Encouraging Adoption of Precision Agriculture and Availability of High-Quality Jobs on Connected Farms</u>

- JS: There is not a lot of change from the last meeting but walked through the recommendations to give an overview of where they are landing and address any outstanding questions.
    - Adoption:
        - Ag tech should be recognized as a key tool in addressing human labor shortages while increasing demand for skilled workers.
        - Federal policy should support industrial and educational efforts to upskill workers with training in both specific equipment and common core technology.
        - FCC and USDA should identify the risk of cybersecurity threats in agriculture and coordinate with DHS and other agencies to identify vulnerabilities and potential remedies.
        - USDA and FCC should coordinate to educate farmers and other stakeholders about cyber threats, including but not limited to FCC IoT labeling rules.
    - Education and Outreach:

        - USDA should expand the ability of farmers to utilize USDA loan and other programs for ag tech deployment.
        - USDA should create tiered incentive and other benefit programs that consider factors such as the size of farm, job development, productivity savings/gains, and other criteria for loans, matching funds, and other benefits
        - USDA should support research into ROI strategies for common and specialty ag tech applications and enable resources to be administered by extension services to develop ag tech curriculum.
        - USDA should work with partners to assist with the development of paid ag tech internships and apprentice programs including academic credit in both 2- and 4-year programs.
        - FCC and USDA should convene stakeholder conferences between farmers, extension services, and state employment offices to identify gams and develop solutions.
    - Partnerships:
        - FCC and USDA should assist farmers and coops with the exploration of unlicensed spectrum where licensed or Federally-supported services are not available.
        - Federal programming should support extension services working with farmers to develop economic evidence to support championship and advocacy for ag tech.
        - Federal policies should support development of digital literacy, skills, and adoption.
    - Obstacles:
        - Focus keeps returning to university extension services. They can help not only from the ag tech perspective, but they can also help model the economic and financial aspects.
    - Lessons from other sectors:
        - Looked at manufacturing, healthcare, and other sectors. We kept coming back to the observation that multi-sector relationships are incredibly important.
        - Regional differences are manifested not just in geography in crop choices but also user attitudes, priorities, and cultures. The impact and importance of land grant university systems and their extension services can be critical in helping stakeholders manage problems. This can be particularly beneficial where you might have a community of farmers to whom the benefits of ag tech are not as readily obvious due to a lack of scale. It is important to model how we can make benefits more apparent, how we can improve ROI, etc.
        - One example that came up in discussion was a precision manufacturing regional alliance project implemented almost 20 years ago in a number of New England cities where traditional manufacturing had declined. This collaborative effort in Massachusetts and the Pioneer Valley region was able to bring back some jobs and economic vibrancy to these communities by helping them make the transition from traditional mechanical manufacturing to precision manufacturing
    - Metrics:

        - There are a number of inputs to include such as nonrenewable energy, soil erosion, land use, water use, fertilizer, pesticides, chemicals, etc. How do you measure the impact of ag tech on emissions including ozone depleting gases or aquatic toxicity or waste production or utilization.
        - There is no shortage to how granular the can go. As we think about this, we started to land on different categories of metrics. For example, we looked at sales data, productivity and yield increases, the type of technology and getting into the mode of "we measure what we treasure" to inform an ROI model to find out where the tipping point is to make the ROI manageable for a small farmer.
- JS: In terms of where we are in the document itself, the working group has it now with an internal deadline to finish the last round of edits by October 21. This gives us a week to reconcile any editorial changes, clean up the footnotes, and get it back to the Task Force leadership by October 29.
- Questions:
    - AB: In the discussion about providing financial resources to farmers, I am of the opinion that sometimes loans and matching funds end up disenfranchising small farms. Small farms don't have the paperwork capability and not able to manage those programs. I am wondering whether your team has looked at grants and other ways to put the technology directly in the hands of small farms that don't encumber them with other requirements they can't meet.
        - JS: We spoke very generally about existing USDA loan and grant programs that farms can take advantage of and making sure those programs are geared so farmers can obtain that funding for precision ag equipment. In terms of bandwidth to fill out applications, that's certainly something that we see in the broadband service provider space with the small companies. There's often a lot of paperwork to be done, and there's a difference if you're a small, rural ISP with 40 employees as opposed to a farmer with a family and maybe just a few other workers. I'm wondering whether if you have farm bureau federations that can help small farmers manage some of that paperwork and provide guidance? No different than how we think about digital literacy and training opportunities but geared towards USDA grant and loan programs. There could be someone on hand familiar with the process who can help small farmers take part in the programs.
        - AB: That plan is feasible, but our experience getting people to audit their data in the National Broadband Map indicates that it's difficult to get people to actually do stuff without someone holding their hand.
        - JS: I agree. I don't know if there's an easy answer. We had talked about whether there were per-acre incentives and different things. This comes to our charge five: "obstacles." We keep coming to the affordability of equipment and the fact that it has a multiplier effect on the difficulty of deploying ag tech on small farms when you're talking about a small farm with different crop types. Here, you need to address multiple variables and potential for differentiated equipment across one small farm.
        - AB: I agree.

- Dr. Adelaine: What about FSA? When they go to sign up for farm programs, is that a place that could help facilitate with that small operator?
- JS: I think so.
- HHK: I think it's going to vary by office and a lot of them have been consolidated over the last few administrations.
- JS: A few slides back we talked about partnerships. Is there an opportunity for FSA to work with private farm bureau federations on the state or local level?
- HHK: Or NRCS if it flows under that, either one.
- JS: I am thinking about what we are doing with BEAD. State broadband offices are administering everything but there is an army of private sector organizations positioning themselves as the middlemen to bridge the gap between the SBO and the smaller entities applying for BEAD funding. Maybe that's a model that could be incorporated here.
- AB: I am going to throw out a suggestion based on spectrum reallocation work I was involved with years ago. I am wondering whether there is potential for competition from the manufacturers themselves. Hypothetically, if a farmer knew that there were multiple sources of equipment for his/her farm and similarly those manufacturers knew the farmer was a potential customer, maybe a manufacturer could help that farmer fill out some standardized form. I think this makes it more likely to happen than going to an FSA or working with an extension or other quasi-government entities. If there is a market-driven reason for people to sell things and make money, I think forms will get filled out and things would happen.
    - JS: So that would envision a universe in which the technology firm becomes the middleman between the farmer and government program to help the small farmer complete the application knowing that they will benefit from it since they are selling, leasing, or renting their equipment to the farmer
    - AB: Correct, they would be certified along with other certified vendors and compete with their peers for that farmer's business. This would ensure a "best-of" solutions. It would potentially spur creativity, clarity, and other things we want to see in a rollout, which sometimes don't happen when we have government do too many things as part of any project.
    - JS: This then raises the question of how the numbers roll out on that? How big is the incentive for the equipment manufacturer to undertake the cost? It's certainly worth exploring
    - AB: I previously did a lot of networking that involved homeland security grants. We often saw equipment vendors in that area where the vendor would wind up writing a grant proposal to the federal government. That worked well for example for Motorola because they were brilliant at writing a grant proposal. But that was typically a six-figure purchase, which I don't think we are talking about in these cases.

        - JS: I will send a note out to the working group and see where they land on this. We can certainly fold that into whatever final product emerges on October 29. At least to raise the question.
    - Dr. Adelaine: Have you looked at metrics that may not be seemingly directly related to Precision Ag? For example, all the vending machines in our residential halls are on the network, and we could determine if students were studying for finals by how much was coming out of those vending machines. Most people wouldn't think data from vending machines would indicate students studying, but there is a correlation. Have you looked at something of this nature?
        - JS: There are quantifiable metrics in terms of chemical input costs, energy costs, labor rates (and savings on labor rates due to automation). The question is how do you measure intangible benefits that include qualitative gains such as time that a farmer could spend with his/her family. I think the quantifiable data we were able to list out, but the qualitative benefits proved more difficult. But on a different day, I would like to learn more about the vending machine correlation with student studies.

<u>Executive Summary Discussion</u>

- Dr. Adelaine: Hopefully people have had a chance to look at the draft executive summary. This one takes a slightly different approach than the last two task forces. The executive summary makes a general statement about the various recommendations we were seeing out of the working groups. The intent is to use your summary paragraphs keeping the executive summary down to 1.5-2 pages and then put in full working group reports in order. The meat of the report will be in the working group reports and will end with a general conclusion. If we need to elevate some piece to the Task Force level, indicate it to Dr. Bajwa, RK, and I. Otherwise, the executive summary will be short.
    - HHK: I am forwarding the recommendation for you, RK, and Dr. Bajwa to look at. Currently it's in our report, but I think it should be the umbrella statement about how we keep moving forward
        - Dr. Adelaine: So, it's a statement about what think about for the future to keep the ball rolling after this Task Force ends. I think that's very appropriate.
- AB: The awareness of what is happening internationally with Precision Ag and spectrum is an important thing to look at even though it's not traditionally part of our charter. Now that we are at a point in time where we have seen potential for bad actors to manipulate drones against us in agriculture, for example, I think we should call that out as a subsequent action we should highlight.
    - Dr. Adelaine: Are you talking about security? Give me a little more thought there please.
    - AB: Certainly security, but there is also a piece associated with spectrum allocation and manufacturing with regard to band allocation so that there is certainty among manufacturers for what bands to utilize leading to economies of scale. Additionally, focusing on international developments could facilitate continuity from a standards perspective.
- Dr. Adelaine: Began discussion of the draft summary. The first two paragraphs are boilerplate talking about how we got together and the working groups we designated. Reviewed introduction

talking about how each working group defined what sustainability meant and used their own lens when working in their particular area. Does this approach sound reasonable?

- DW: This paragraph struck me as potentially dangerous if we do come up with four definitions of sustainability. Our group discussed the meaning of sustainability all the time. I don't know if that's what you meant with this paragraph.
  - Dr. Adelaine: Yes, I believe the Chairwoman's charge for each working group was for each group to define sustainability for their working group.
  - Emily Caditz: Yes, ultimately this Task Force is meant to advise the Commission, so whatever each Working Group or Task Force leadership discerns as the appropriate definition is what we will take.
  - DW: As long as it doesn't confuse a Congress member reading it. I am thinking about all the time we spent defining what sustainability meant just to our group.
- HHK: Yeah, maybe it should be worded in such a way to explain that each working group considered the definition of sustainability in the context of their work area.
- Joy: I agree with that, and I thought we decided at the beginning in terms of an actual definition of sustainability, we were going with the USDA definition. What each of the working groups did was assess how their particular focus impacted that definition, which is different than our re-definition.
  - Dr. Adelaine: That's absolutely right, I'll re-work this paragraph.

- Dr. Adelaine: Moved through summary to the conclusion section seeking thoughts from the Task Force. One statement to highlight is "[t]he agriculture industry is moving to the next major evoilution which is one based on connectivity and a digital first data driven business." Any thoughts on this one?
  - Joy: First of all, in item three above the conclusion there is a question mark, and I'm not quite sure why it's there. But what does "digital first" mean as opposed to "digitally driven" or "data driven"
    - Dr. Adelaine: If you just say digitally driven, it's among a host of other things. I am saying there will come a point where the technology and data is number one and other things would line up after that. If you disagree with that statement that's fine.
    - Joy: I don't disagree with the statement, but it just reads funny to me and needs a little wordsmithing.
    - Dr. Adelaine: Ok, we'll take a look at it.
  - JC: I don't know if we want to include this or not, but one of the trends I am seeing in the industry is the trend towards autonomy and connectivity is a technology that enables autonomy. I don't disagree with anything you've written, but do you want to expand it a little to include autonomy?
    - Dr. Adelaine: We can do that.
- Questions:
  - AB: Regarding the executive summary, I wonder whether connectivity to the National Spectrum Strategy should be a paragraph or at least a couple sentences. I think that's where a lot of this effort will be handled going forward.
    - Dr. Adelaine: We've been hearing it in quite a few of the working groups, so I don't have a problem with that. If you have thoughts on what that sentence or

paragraph would look like, send it to me and I can work it into the executive summary.
        - JC: I want to second AB's suggestion and would be happy to work with him to get you a sentence or two on that.
    - HHK: Can we get our materials to you on October 30? Our working group wanted one final get together to make sure we said what we meant to say and the 30th is when we could do it.
        - Dr. Adelaine: How about on the 29th you give me what you have so far? I don't expect you were going to have a major rewrite on your report on the 30th.
        - HHK: I don't expect that either. I can get you something on the 29th and send you the final thing after our final meeting.

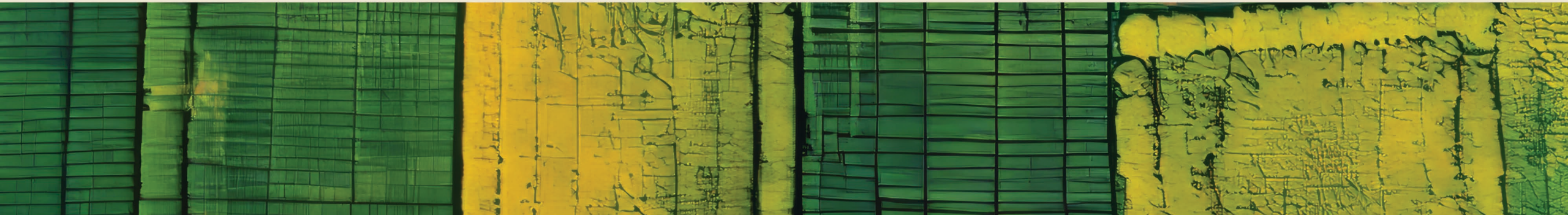
Closing Announcements and Next Meeting Date

Emily Caditz: Thanked the working groups for all the recommendations, thought, and care from in working on the report. The last meeting of the Task Force will be on December 5th, when the Task Force will consider and vote on the comprehensive report as required by statute. To make sure the report is ready for voting at that last meeting, the FCC will need at least 30 days to review the report and then get it back to the Task Force for review before the last meeting. Dr. Adelaine and Task Force leadership have been in contact on the logistics of transmitting that, but if any questions or concerns arise, please reach out. Thanks Tom Hastings and FCC and USDA liaisons for the work and support they provide as well as the support from the Commission staff.

Next Meeting: December 5, 2024

Dr. Adelaine: Added thanks and adjourned the October 15 meeting.

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



Initial Findings of the Mapping and Analyzing Connectivity on Agricultural Lands Working Group for Review and Deliberation by the Precision Agriculture Connectivity Task Force

# 1

# MAPPING AND ANALYZING CONNECTIVITY ON AGRICULTURAL LANDS

# Mobile Map Data Rates

- Currently, National Broadband Map attempts to display mobile performance levels:
  - LTE (5/1 Mbps)
  - 5G (7/1 and 35/3 Mbps)
- “Examining Current and Future Connectivity Demand” WG anticipates that 100 Mbps will be required in field.
- Autonomy applications require upload capability as much as download.
- Therefore, the Mapping WG **will add a new recommendation** that the National Broadband Map include a mobile layer for 100 Mbps download, 25 Mbps upload on the 5G Map.

# Discussion of Voice Service

- Voice service remains the “killer app” for mobile; this is especially true for precision ag.
- As part of BDC, the FCC collects information from MNOs regarding voice service
  - The information is not displayed on the National Broadband Map
  - The information is available for download
  - There is no challenge process
- From a broadband perspective, even the lowest level 5/1 LTE service supports voice as an application (e.g. WhatsApp)
  - A map showing any level of “mobile broadband” service will support voice.
- The Mapping **WG will not be adjusting** its recommendations related to voice service.

# Discussion of Sustainability

- Currently, Mapping working group recommendations include several recommendations related to ongoing mapping efforts, surveys and census.
  - These USDA surveys primarily involve farmers.
- Based on feedback from “Accelerating Deployment” WG, we **will be expanding our recommendation** to include that these surveys and census be extended to include requirements & needs analysis from equipment manufacturers and similar entities.

# Mapping Available Spectrum

- During the last Task Force meeting, there was some discussion about availability of spectrum, especially to support precision agriculture.
- The Mapping WG has an existing recommendation to map areas where TVWS spectrum is available.
- NTIA has an existing National Spectrum Strategy, which includes spectrum sharing.  It is more appropriate for them to consider this.
- The Mapping WG **will not be adjusting** its recommendations to include a spectrum map.
  - However, that would be a reasonable thing for other groups that follow us to consider more carefully.

Initial Findings of the Examining Current and Future Connectivity Demand Working Group for Review and Deliberation by the Precision Agriculture Connectivity Task Force

# 2

# EXAMINING CURRENT AND FUTURE CONNECTIVITY DEMAND

**Summary Paragraph**:

We strongly recommend implementation of "Last Acre" initiatives, policies, and incentives, highlighting their critical role in ensuring national security, particularly in terms of food and water. The core objective is to extend high-capacity internet service to croplands and livestock operations, enabling broadband requirements of symmetrical 100 Mbps speeds and low latency (ideally under 10 milliseconds).

The key drivers to achieve these connectivity goals include deploying fiber to farm and ranch premises and incentivizing the targeted build-out of high-performance wireless connectivity that provides broad, umbrella-like coverage across the entire farm. The technology is already available; the opportunity lies in securing the necessary funding and prioritizing Precision Agriculture within existing and future policies and programs.

**Recommendations:**

**1. Last Acre:** Extending high-capacity internet service to cover croplands and livestock operations, where internet access is crucial for integrating modern technologies like IoT devices, autonomous machines and farm-to-fork traceability systems.

The goal of Last-Acre connectivity is to ensure that every part of the farm is connected to the digital network, enabling real-time data collection, monitoring, and automation of farming processes. This level of connectivity is critical for improving efficiency, sustainability, and productivity in agriculture. It requires a commitment to overcoming high infrastructure costs and low population density - changing the mindset of government policies and programs from population-based criteria to a geography-based approach that prioritizes Precision Agriculture.

## Recommendations

**2. Connectivity Requirements:** Symmetrical bandwidth of 100 Mbps and latency targets below 10 milliseconds. This is the “sweet spot” to maximize the transformative power of Precision Agriculture from wide-area coverage to high-performing networks, supporting advanced technologies.

Farmers can benefit from using the basics of Precision Agriculture—such as GPS-guided equipment, variable rate application technology, and field mapping software—at relatively low uplink speeds while still achieving highly desirable results. However, the potential of higher throughput is game-changing. At its core, Precision Ag thrives on the ability to collect vast amounts of data and convert it into actionable insights through powerful computational tools.

This data-driven approach is poised to revolutionize farming, much like the tractor did in its time. In fact, thought leaders have coined a new adage: "Data is the new tractor." Just as the tractor reshaped agriculture, data-driven decision-making is set to be equally transformative, enabling smarter, more sustainable farming practices, optimizing yields and improving resource efficiency, to meet global demands.

## Recommendations

**3. Infrastructure**: A combination of fiber and wireless (terrestrial, cellular and satellite) connectivity is needed to provide the primary and failover capabilities to support Precision Ag operations as a national food safety and food security concern.

Research at Penn State demonstrates that fiber-to-the-farm-perimeter is achievable. 96.1% of all crops are located within 10 miles of existing fiber infrastructure and 99.9% within 25 miles. This proximity makes it possible to establish a fiber junction box and power source at a suitable location on the farm, serving as a mini IoT hub.

This setup would enable high-capacity wireless connectivity for Precision Agriculture applications and support Cloud/Edge computing for data-intensive processes.

Last Mile fiber would boost the capabilities of 5G coverage and facilitate the transition to 6G. Additionally, fiber-to-the-farm-perimeter provides redundancy for wireless solutions, whether terrestrial or satellite, to cover farm fields or ranches. Greater capacity and a lifespan of 30 years, give fiber the win as more future proof.

**4. Spectrum:**

- Agriculture be given access to mid-band spectrum through AI-driven spectrum sharing, which can effectively manage and minimize interference. Common wisdom is that mid-band spectrum is best suited for 5G wireless technologies.

- FCC, in coordination with the NTIA, move forward on a Notice of Inquiry (NOI), issued in 2021, on the allocation and use of low-band spectrum (under 1 GHZ) specifically for IoT devices essential to Precision Agriculture.

- That a dedicated percentage of spectrum be explicitly allocated for agricultural use whenever spectrum is auctioned. We also recommend strategies to promote deployment of dedicated spectrum in agricultural/rural areas prior to auction.

- License holders be encouraged to build out currently unused spectrum in agricultural regions with a use it or lose it mandate.

- Consideration of a dedicated agricultural spectrum band. Such a band would provide greenfield opportunities for future technologies without the complications of extensive frequency coordination requirements. We suggest that the FCC, in conjunction with NTIA, issue a Notice of Inquiry (NOI) seeking guidance on what spectrum band be considered including the ramifications to any existing users.

**5. Funding**: Prioritizing Precision Agriculture within the FCC Rural 5G Program and the Broadband Equity, Access, and Deployment (BEAD) program, utilizing their existing budgeted disbursement mechanisms to fund initial infrastructure deployment. These two opportunities are the most immediately available vehicles.

**6. Standards**: Encourage and fund the foundational work of creating standards to improve sensor and data interoperability. This foundational work is crucial for ensuring the quality, safety, efficiency, and seamless operation of products, services, and systems.

Enhancing interoperability fosters innovation and scalability, simplifies compliance and reporting, facilitates traceability, and supports global collaboration.  Agriculture needs a seat at the table in creating those standards that ensure interoperability, redundancy, and security.

**7. Redundancy:** Covering unacceptable intermittent or lost signals, which can be caused by any kind of interference. Edge Compute is invaluable for redundancy allowing local processing to continue even if there is a disruption in connectivity to the central Cloud, ensuring that critical applications remain operational.

8. **Near Future:** Agriculture interest must play a crucial role in the development and deployment of 6G by acting as both a driving force and a key beneficiary of the technology.

## Sustainability Statements

There are three sides to this core issue:

*Sustainable Connectivity* — By definition, sustainable connectivity is robust, always-on, ubiquitous, redundant, and future-proof. Another key element of sustainability in this context is fostering a healthy, competitive marketplace with multiple players to ensure resilience, innovation and choice.

*Connectivity for Sustainability* – We need to provision farmers with the connectivity needed for “smart farming” practices, i.e.  Precision Ag technologies/applications that create “sustainable value” like reducing inputs (water/fertilizer/pesticides) and implementing robust farm-to-fork traceability systems to ensure the safety, reliability of the food supply chain.

*Sustainability of Agriculture* – This means achieving cost savings by reducing inputs, improving water management, especially in states like California where fields are being fallowed due to lack of water, enhancing efficiency, reducing down-time, increasing yields, and addressing labor shortages through automation and hopefully by attracting a younger generation interested in the technology.

# Timeline: Goals and Milestones

## 2024-2026

- Prioritize Last Acre coverage.
- Earmark BEAD funding for Precision Agriculture with build out hopefully to begin in 2025.
- Launch FCC 5G Fund for Rural America, prioritizing Precision Ag.
- Anticipate Congress reauthorizes FCC auction authority to facilitate spectrum availability for next-gen networks.
- Foresee passage of the Farm Bill with provisions for Last Acre connectivity to close gaps post BEAD.
- Continue foundational research on 6G technologies, including AI integration,  and satellite networking.
- FDA FSMA rule 204 implementation In January 2026.

## 2027-2030

- Aspirational goal of mid-band spectrum available to every acre.
- UN sustainability goal to double food production and income of small-scale producers.
- Begin developing pilot infrastructure and small-scale testbeds to assess 6G capabilities on ag lands.
- Quantify sustainability outcomes with availability of current and next generation networks (i.e., 6G & beyond).
- Quantify energy and water impact of AI.

## 2030+

- Reach widespread adoption of Precision Agriculture
- Launch early commercial infrastructure projects and begin large-scale 6G network deployments, ensuring compatibility with existing 5G infrastructure.
- Implement carbon sequestration tracking systems.
- Aspirational goal by industry to have fully autonomous operations on 40% of U.S. farms.
- Net zero by 2050.

Initial Findings of the Accelerating Broadband Deployment on Unserved Agricultural Lands Working Group for Review and Deliberation by the Precision Agriculture Connectivity Task Force

# 3

# ACCELERATING BROADBAND DEPLOYMENT ON UNSERVED AGRICULTURAL LANDS

# Accelerating Deployment

Since September:

- Additional Discussion Items
- Ranked within Categories
- Ranked Overall
- Consolidated some topics under fewer headings
- Still have a few additions

# Leading Opportunities for Accelerating Deployment

(AKA Sections of the Working Group Report)

- Funding and Incentivizing Deployment to Unserved and Underserved Rural Areas and Precision Agriculture
- Leveraging Underused Spectrum and Infrastructure
- Accelerating Deployment Through Improvements to Siting

# Funding and Incentivizing Deployment to Unserved and Underserved Rural Areas and Precision Agriculture Since 9/4/24

- Updated 5G Fund language

Since early Sept, FCC released guidance that removed their initial intent to dedicate some funds for precision ag. We need to emphasize this is where funds are needed to deliver connectivity to the last acre.

- Funding from Multiple Sources

We continue to have disagreement on the phrasing and intent of this concept.

- Targeted Subsidy Program for Precision Ag

We don't know if this will be a stand alone statement or feed into the 5G fund comments or other areas.

- "All of the Above" Technology

Reflecting NTIA recent guidance – that recognizes the ecosystem approach to deliver broadband. BUT we need to keep standards (data up/down, reliability, affordability) of delivered service front and center.

# Changes or Additions to Leveraging Underused Spectrum and Infrastructure
# 9/4/24

- ## Process for FCC and NTIA to Enact PATF Priorities

We discussed this at the September PATF meeting – to encourage it to become an 'umbrella' priority that the Task Force would encourage for ongoing advancements in this space.

- ## Unlicensed and Licensed by Rule

We would like confirmation from FCC staff that our edited language helps clarify intent.

- ## Allocate Low Band Spectrum for Precision Agriculture

The connectivity needs working group might also highlight this fact that under canopy reach/readings are currently a challenge for deploying precision ag. tech. More low band availability should contribute to solving at least part of that challenge.

- ## Rural Service Rules; Geographic-Based Buildout Requirements

Our team ranked geographic-based buildout requirements as a high priority, however, it is currently found deep in the document. We will discuss how to reconcile this in our final ordering.

# Changes or Additions to Acclerating Deployment Through Improvements to Siting Section Since August 14, 2024

- There have been no substantive changes or additions in our Siting recommendations since August or September.

# Appendix and References

Could you please provide guidance on the level of detail you would like for referenced material?

Example; only those items shared with entire team vs. those items referenced by a team member in conversation with the team.

Is there a specific citation process or is title, author, date sufficient for the purpose of this appendix?

* Denotes dissenting opinions.

# Anticipated Work in October

- Add recommendation on spectrum auction authority

Congress reauthorize FCC ability to auction spectrum

- Add recommendation to pass a Farm Bill

Congress recognize the urgency and necessity of certainty, infrastructure, and innovation

- Finalize language on Universal Service Fund

We anticipate sticking closely to how the fund is applied vs. funding mechanisms. But that could change…stay tuned.

Initial Findings of the Encouraging Adoption and Availability of High Quality Jobs Working Group for Review and Deliberation by the Precision Agriculture Connectivity Task Force

# 4

# ENCOURAGING ADOPTION AND AVAILABILITY OF HIGH QUALITY JOBS

# Charge 1: Adoption

- Ag tech should be recognized as a key tool in addressing human labor shortages while increasing demand for skilled workers.
- Federal policy should support industrial and educational efforts to upskill workers with training in both specific equipment and common core technology.
- The FCC and USDA should identify the risk of cyber-security threats in agriculture and coordinate with DHS and other agencies of jurisdiction to identify vulnerabilities and potential remedies.
- The USDA and FCC should coordinate to educate farmers and other stakeholders about cyber threats, including but not limited to FCC IoT labeling rules.

# Charges 2 and 3: Education and Outreach

- USDA should expand the ability of farmers to utilize USDA loan and other programs for ag tech deployment.
- USDA should create tiered incentive and other benefit programs that contemplate the size of farm, job development, productivity savings/gains, and other criteria for loans, matching funds, and other benefits.
- USDA should support research into ROI strategies for common and specialty ag tech applications and enable resources to be administered by extension services to develop ag tech curriculum.
- USDA should work with partners to assist with the development of paid ag tech internships and apprenticeship programs, including academic credits in both 2- and 4-year programs.
- The FCC and USDA should convene stakeholder conferences between farmers, extension services, and state employment offices to identify gams and develop solutions.

# Charge 4: Partnerships

- The FCC and USDA should assist farmers and coops with the exploration of unlicensed spectrum where licensed or Federally-supported services are not available.
- Federal programming should support partnerships and relationships among farmers and non-ag sectors who share common goals.
- Federal policies should support extension services working with farmers to develop economic evidence to support championship and advocacy for ag tech.
- Federal policies should support development of digital literacy, skills, and adoption.

# Charge 5: Obstacles

- Federal policies should address affordability of ag tech for small farmers to spur adoption.
- Federal programs should support land grant university extension research to model ROI strategies, including financial modeling as well as technologies suited to small farms.

# Charge 6: Lessons from other sectors

- Federal policies should identify and proactively incentivize the development of ag tech leadership and relationships between the leading adopters and states (or regions) where similar relationships are less robust.

- Federal agencies should create programs and/or incentives for manufacturers to develop deeper product lines that can be applied to smaller farms and non-commodity crops.

- USDA should elevate awareness and understanding of how PA is an essential and expanding tool for farmers and producers for sustainable and even more cost-effective operations.

# Charge 7: Metrics

• USDA should establish metrics for progress measured by  include market indicators such as sales, revenues and profits alongside review of new technology available in the marketplace.

- USDA should work with state agricultural agencies to survey farmers, dealers, and service providers to identify type and extent to which technology is adopted for plant and animal farming.

- USDA should correlate farm productivity data with ag tech adoption and savings in areas such as water, chemical, and labor costs, coupled with productivity and yield increases.

# Executive Summary of Working Group Drafts Prepared for Deliberation by the Precision Agriculture Connectivity Task Force

# Introduction

The Task Force for Reviewing the Connectivity and Technology Needs of Precision Agriculture in the United States (also known as the Precision Ag Connectivity Task Force) arose out of the Agriculture Improvement Act of 2018 (2018 Farm Bill).

The Task Force's charge is to provide advice and recommendations to the Federal Communications Commission (FCC) and the United States Department of Agriculture (USDA) on how to assess and advance deployment of broadband internet access service on unserved and underserved agricultural lands and promote Precision Agriculture for both cropping and husbandry.

The Task Force has four working groups focused in greater detail on specific issues related to Precision Agriculture. These working groups are:

1) Mapping and Analyzing Connectivity on Agricultural Lands;
2) Accelerating Broadband Deployment on Unserved Agricultural Lands;
3) Examining Current and Future Connectivity Demand for Precision Agriculture; and
4) Encouraging Adoption of Precision Agriculture and Availability of High-Quality Jobs on Connected Farms.

Each of these working groups has conducted extensive research and developed recommendations that address current and future challenges. The sustainability lens was used to view the issues addressed in the Working Groups. Each Working Group understanding of sustainability was defined by the members of the group.

The following provides a summary of the findings from the four working groups in order.

For the 2024 term, the Mapping WG focused on mobile and in-field connectivity, analyzing the FCC's updated mapping processes in response to the Broadband DATA Act. They assessed how well these processes meet the needs of precision agriculture, particularly from a sustainability perspective. The WG identified several areas for improvement and developed recommendations regarding map presentation, validation and verification of the National Broadband Map, the public challenge process, sustainability, and awareness and outreach efforts.

The Connectivity Working Group strongly recommends implementation of "Last Acre" initiatives, policies, and incentives, highlighting their critical role in ensuring national security, particularly in terms of food and water. The core objective is to extend high-capacity internet service to croplands and livestock operations, enabling

broadband requirements of symmetrical 100 Mbps speeds and low latency (ideally under 10 milliseconds). The key drivers to achieve these connectivity goals include deploying fiber to farm and ranch premises and incentivizing the targeted build-out of high-performance wireless connectivity that provides broad, umbrella-like coverage across the entire farm. The technology is already available; the opportunity lies in securing the necessary funding and prioritizing Precision Agriculture within existing and future policies and programs.

The Accelerating Broadband Deployment Working Group has explored several areas of recommendations to promote the buildout accelerate deployment of broadband infrastructure onto unserved and underserved agricultural lands, including for use in precision agriculture applications. These options include specific proposals related to leveraging underused infrastructure including spectrum, novel approaches to funding and incentivizing private investment, streamlining permitting and equipping local officials with information and training.

The proposals adopt an "all-of-the-above" approach to the technology needs of precision agriculture, consistent with the prior recommendations of the Task Force that recognized: "[a]chieving Precision Ag's full potential necessitates the widespread deployment of wired and wireless broadband connectivity to cover the last acre." Their most recent recommendations describe a dual-track process of deploying fiber as deeply as possible into rural areas, while promoting the deployment of wireless networks for "last acre" connectivity. To facilitate prompt action, the FCC and USDA should seek public comment with respect to the Task Force's recommendations on an expedited basis.

Jobs and Adoption Work Group was charged with evaluating key issues related to the adoption of precision agriculture, including its potential to address labor shortages, ways for government to promote adoption, obstacles faced by farmers, and metrics to track progress. The report emphasizes the interconnected nature of these issues and the need for broad-scale principles that can be implemented locally with Federal guidance and in coordination with Federal and state agencies, universities, and private sector industry.

The recommendations from the four working groups fall largely within five primary categories with some additional key considerations. The five main priorities that the Task Force recommends are to:

1) Improve federal broadband wireless and mobile maps and consistently verify and validate accuracy as relates to connectivity on agricultural lands;

2) Increase incentives to build out a robust broadband infrastructure;

3) Future proof connectivity standards to meet the technology needs in a changing agriculture sector?;

4) Improve collaboration between federal agencies and State sister agencies as well as Agribusinesses including removing regulatory impediments; and

5) Increase access to broadband education and training for individuals engaged in farming through partnerships with land-grant institutions.

## Conclusion:

It is evident from the working group reports that there are many in the agricultural community working on advocating for greater connectivity across agricultural lands to fully utilize the newest technologies to support a resilient and sustainable agriculture production system. The agriculture industry is moving to the next major evolution which is one based on connectivity and a digital first data driven business.

The speed and the strength of achieving a digital data driven sustainable agriculture system through connected farms will be determined by how fast and how extensive the efforts are by both the FCC and the USDA to support the various recommendations provided by this task force as well as those provided by the past two task forces.