

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

NOVEMBER 6, 2023

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

**10:00 AM CALL TO ORDER AND WELCOME,
ET ROLL CALL**

Christi Shewman, 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 (TB)

Vice Chair:

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

Members:

Dale Artho, Dale & Kathy Artho Farms (DA)

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

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

Julie Bushell, President; Irrigation Association (JB)

Anthony Dillard, Tribal Councilman; Choctaw Nation of Oklahoma (AD)

Michael Gomes, Vice President, Strategic Business Development; Topcon Agriculture (MG)

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

Robert Hance, President & CEO; Midwest Energy & Communications

Ryan Krogh, Manager, Production System Program Management; John Deere (RK)

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

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

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

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

Andy Burke, USDA

Aylene Mafnas, USDA [not Task Force member, but in attendance to represent USDA]

Teddy Bekele: announced the agenda

Opening Remarks: Anna M. Gomez, Commissioner, Federal Communications Commission

- Connectivity is essential to feeding our Nation and meeting the production and sustainability needs of our country.
- The Task Force has provided its expertise to the Commission and worked hard under extraordinary circumstances the past two years.
- The efforts of the Task Force have been crucial and we thank them for their work.

Future of Agriculture: Ryan Krogh Manager Production Systems, Program Management, John Deere

- Will go through 3 issues: 1) macro level problems for customers; 2) technology used and how it is advancing; 3) corn and soy production planting
- Problems
 - o The population is growing and we need greater output. How do we maximize outputs will decreasing inputs?
 - o Growers don't have control over many variables over their enterprise.
 - o Managing daily decisions. Growers have to make many decisions every day.
 - o There is a decreasing labor pool—there are fewer hands on a farm than ever before and it is not expected to meaningfully grow in the future.
 - o There is one chance a year to get everything right.
- Technology
 - o Traditional agriculture will not solve these problems, but the next frontier of agriculture using technology and automation can.
 - o Automation is using technology to achieve “super human” performance to increase profitability, sustainability, and productivity
 - o There is end to end automation and technology is transforming agriculture. For example, sensors, cameras, and communication are used and will improve over the next years. Connectivity shouldn't be the factor that prevents farmers from adopting precision ag solutions.
- Corn and soy planting
 - o Overview of the precision ag technology that John Deere uses to plant and fertilize; and how CVML can help farmers make decisions and be more efficient, increase cost savings, productivity, and profitability.
 - o Shows how technology in sprayers can help farmers spray herbicide only on weeds
 - o Data sharing at harvest
 - Harvest is a challenging time and sharing data is crucial to maintaining a productive harvest
 - o Autonomy
 - Overview of technology on a tractor that allows it to be able to operate in a field without a human operator in the cab. This is the future of agriculture.
 - Video of customer testimonial on his use of an autonomous tractor. States that it will be a life changer for him. Ryan points out that this lets the customer get out of the cab and do a more valuable job, but he knows that the job is being executed at the same level as if he was in the cab.
 - Automation and autonomy products are real, ready, and helping farmers today.
 - These solutions will not happen without connectivity and will rely on it going forward.
- Questions
 - o Dr. Adelaine: if you move away from commodity crops and go to truck farming (vegetables), is there work being done in that area?
 - RK: He would have to defer to others, as that isn't John Deere's area. For commodity crops he knows investigations are happening.
 - o HHK: are there cost savings after equipment upgrades?

- Ryan: absolutely.
- JT: a challenge is having people who are technologically trained to work on this on farms. Labor will be a challenge.
 - RK: agrees. A big thing is moving labor to a different area on a farm and the skills moving forward will need to be reflected in the future.
- Dr. Bajwa: when she sees presentations on precision ag it usually concerns crops. What is the future of precision ag for livestock? How can precision ag apply to organic crops?
 - RK: need to figure out how precision ag can be used in livestock. But he thinks there is a lot of crossover from crops to livestock. He has been to many dairies that are technologically advanced. With regards to organic it can be used and is helpful, as seen on the use in herbicides.
- JB: Speaking for the adoption and jobs working group, autonomy and technology on the farm will allow rural communities to farm and transition to being a security specialist or IT specialist.
- DA: Agrees educational systems will need to adapt to using and working with these technologies.
- HHK: Notes that she recently went to a ranch where they had to install 3 towers to make this technology work. Connectivity is crucial.
- MG: How is see and spray related to 5G and connectivity of networks?
 - RK: provides overview of how see and spray is used and how you can get data back from it, and that it has connectivity input and output. Autonomy needs constant connectivity to work because as an automotive it cannot stop and has constant input and output. Once you lose connectivity, you lose productivity because once it sees something it doesn't recognize you have to drive back and reestablish connectivity.
- Dr. Adelaine: How does security relate to autonomy and enter into the picture, generally?
 - RK: John Deere has a team of security experts that have designed every aspect of their systems to provide a safe product.
- AB: how does autonomy factor into a future electric tractor and need to deal with recharging?
 - RK: We think it makes a lot of sense, especially once you get to lower horsepower range, that you can get enough done between charging times to gain productivity. There are electric drives that can drive productivity in the large ag space and they will continue to revisit this issue over time.
- TB: Any thoughts on how connectivity needs will change over time?
 - RK: connectivity needs will increase over time and helps explain the connectivity recommendations their working group provides. It is critical that farmers are able to make decisions regarding technology from everywhere on the farm.

Discuss Report

- Provides overview of the structure of the report. The report is not final, that will have more pictures, graphs, and be more fun.
- Goes through recommendations and allows each working group chair to discuss them.
- Mapping
 - Dr. Bajwa: provides overview of recommendations
 - The recommendations have not changed since they last met. But they want every farm to have connectivity.
 - Had two main areas of emphasis: 1) many organizations, state and federal agencies, are collecting data and they are working in different silos. There is a need for federal agencies to work together; and 2) there are different methods to

- collect data and there should be standardization.
 - Recommends enhancing the FCC BDC map to be more friendly to farmers who would like to use it, such as location be geolocation or postal code.
 - The FCC should include a verification data layer in the BDC.
 - The FCC and USDA should adopt a framework to define served, underserved, and unserved lands
 - There should be federal interagency (e.g., USDA, FCC, BIA, US Census Bureau, NTIA) cooperation with regards to collecting and verifying data, and conducting mapping analysis.
 - Adopt connectivity use case driven standards for data and mapping purposes, and provides 3 use cases.
- Questions
 - JS: She is interested in data from drones not needing that information immediately. There is a case where a drone needs information immediately, such as if a drone catches a pest and you don't want the pest to get intermingled in the crop.
 - Dr. Bajwa: that is captured in the first use case of continuous, real time heavy data processing. She also thinks there are drone use cases that you don't need immediately, such as mapping your soil.
 - JM: She is interested in recommendation one and the inclusion of structures in maps. How should the FCC add them (collect the data) and how do we deal with that they could change frequently?
 - Dr. Bajwa: Her understanding is that it is possible based on current height based algorithms. She thinks interest is in houses and commercial buildings, but for farmers their barn is critical for example.
 - JM: the second recommendation, 3rd party data sources, would that include crowd sourcing?
 - Dr. Bajwa: They don't currently include crowd sourcing, but a member noted that they do include crowd sourced data if there is a way to verify it.
 - HHK: With regard to hexagons and wireless processing, please describe the working group process with regard to providing a finite level of 100 meter.
 - Dr. Bajwa: She thought 100 meter is the next step, given where the current map is and would not be cost prohibitive.
 - JT: With regard to mapping and structures, the current map is based on the last mile. Something we probably want to emphasize is that last acre and the outbuildings and where ISPs provide service. With regard to crowd sourcing, we need to be careful with regard to verifying that data and that it is accurate.
 - Dr. Bajwa: with parsed data, verifying accuracy is harder, but if they have data with regard to a location from a sufficient number of sources it is possible.
 - AB: Farms typically have a farm number and that is how they are registered with the USDA. Can we get to a place in time where farmers can input their farm number and automatically see the boundaries of an operation and if they have coverage or not and whether certain solutions, like an autonomous tractor, will work or get stuck?
 - Dr. Bajwa: She discussed this with USDA and a problem is that this includes confidential data, so it cannot be publicly available.
 - AB: This wouldn't be available to the public, but just to the farmer.
 - Dr. Bajwa: She will take it back to the USDA and discuss.

- Connectivity
 - HHK: overarching themes are connecting not only to the terminating point, but to a seed of lettuce, and the farmer's hands, and recognizing that connectivity must support as robust upload as it does download. It takes an ecosystem that is far reaching, employs a variety of technology, and is continuous to make this happen.
 - Prioritize deploying wired, wireless, and satellite technologies to ag lands.
 - Farmers should be encouraged to form co-ops and work together to create networks on ag lands.
 - Establish a symmetrical upload and download speed of 100/100 in the field and 300/300 to decision making headquarters.
 - Establish a national spectrum policy to make enough spectrum available for agricultural use.
 - Amend the Reconnect program to incentivize applications that encourage use for precision ag.
 - Improve RUS loans.
 - Consider the unique problems when implementing precision ag solutions and use solutions, each farm and farmer is unique.
 - Ensure seamless connectivity by addressing current cellular networking limitations, such as roaming agreements.
 - Embrace emerging AI techniques for multifactor analysis in agriculture and invest in training for accurate AI use.
 - Leverage edge computing technology and private 5G systems to extend cloud capabilities to remote farm locations.
 - Incentivize private cellular networks to meet high-speed connectivity requirements in agriculture.
 - Points to many policies that federal and state agencies, including the FCC, can pursue to improve cellular connectivity.
 - JS: Wants to underscore that their working group feels is a sense of urgency. The needs this group is describing are current. The needs for savings are critical and their reporting requirements are increasing.
 - George Woodward: given the urgency of the current needs, the group focused on the art of what is possible. They honestly believe that 100/100 is not impossible and that innovation will continue to come at a faster pace. The key to innovation is connectivity. It is very important to automate releasing information related to the farm number because it is stifling innovation that offers solutions.
 - AB: We need a suite of communication capabilities at the tractor. There may be gaps in connectivity, so a tractor needs to be able to connect to a variety of technologies, such as satellite and wireless. We also need farmers to have more control over the technology they are using, so they are embracing private networks or private networks used in conjunction with others.
 - JB: Wants to clarify some points because the Farm Bill may not allow for it right now. How did the working group get to the symmetrical speed requirement?
 - JS: looked at the USDA Reconnect that has a 100/100 requirement. The Treasury also recently rewarded funds to implement 100/100 in California to the CPUC. There are also carriers who offer 100/100, so it is feasible.
 - JB: With regard to 300/300 they include fixed, does that mean fiber? For recommendation 6 thinks that "tower constriction" is not needed because you don't necessarily need a tower.
 - HHK: the point is to get to 300/300, the technology is not important.
 - JM: with regard to the 100/100 and 300/300, it is not technologically feasible nor will it be in the near future. Using symmetrical also suggests fiber. Current applications

currently do not require symmetric speeds and its questionable whether symmetry is possible for non-fiber networks. It also is extremely costly to deploy fiber everywhere and Congress will not approve such funding. And it's unclear whether that type of speed is needed. She likely dissents from this recommendation.

- HHK: Sounds like we should discuss later in the meeting. Targeting funds to truly underserved or unserved areas should be the focus for now.
 - TB: Would like to put this on the parking lot items and discuss later.
 - Dr. Adelaine: With regard to private networks, by increasing those do we create a barrier so everyone who wants to be in precision ag can be?
 - HHK: This is about enabling this is one of many options, and we should enable it so it is feasible on small scale farms.
 - AB: There are options for private networks that go beyond just a single farmer. There is an opportunity for farmers to group together to build networks that would benefit them that might otherwise not be connected.
 - JT: In response to private network issues, a private network means a network for private use, not that it is a network meant for only one farm. Believes that upping the wattage to singular towers is more feasible in a rural area than urban areas because it is less likely to create noise.
 - Dr. Bajwa: With regard to private networks, their working group has discussed how to incorporate private networks into maps. They weren't sure how to do it, so they left it off the report. Something to consider is how to incorporate this into a map.
 - George Woodward: Including private networks was about accelerating innovation without compromising commercial networks. Trying to balance helping provide commercial service and accelerate and augment private systems.
 - AB: With regard to mapping private networks, a way to do it is to work with USDA and tie it the farm number.
- Deployment
- From JM:
 - All federal agencies should adopt a uniform definition and update it every 2 years or so
 - Prioritize grant applications that include wide-area coverage, including from the farm office or house
 - The FCC, NTIA, and USDA should require the use of interoperability standards
 - The FCC and USDA should support rural networks by including incentives for connectivity to rural ag lands
 - The FCC should make available dedicated terrestrial spectrum for dedicated precision ag use
 - The USDA should provide funding for buildout and operation of last-acre networks
 - The FCC should continue to make incentives available to encourage precision ag deployment
 - The FCC should revisit its NGSO requirements
 - The FCC should implement geographic build-out requirements for spectrum based licenses
 - The FCC should strengthen policies that require auction bidders to show the long-term sustainability and scalability of their proposed networks
 - The FCC and USDA should work with stakeholders to build a playbook for creating and operating rural community based, nonprofit solutions
 - The FCC should work with states and localities to ease regulatory and administrative burdens associated with deploying networks

- In Tribal areas, states and localities should work with tribal authorities to help speed deployment
 - Questions:
 - AB: What is the conflict of using private networks versus commercial networks?
 - JT: The problem is that general service is to a household rather than to every part of the land. If we are to do that, that's a different service.
 - AB: would like to discuss later that when we provide private networks, we may need some specificity on what service we are trying to provide with regard to broadband
 - JT: the last-acre type network is different than other types of networks. That is where the benefit of using networks for the last acre came into discussion
 - Dr. Bajwa: a comment on the last recommendation—they had a couple speakers come on and it became clear that the burden placed on tribes from the BIA was large. It's unclear if they should be talking to states and localities or the BIA to reduce the burden of getting broadband to Tribal lands.
- Adoption and Jobs
 - JB: the focus of the working group was security.
 - The USDA and FCC should consider connectivity a critical component of our Nation's food and homeland security
 - The USDA should focus eligibility and awards on climate smart outcomes
 - The USDA should allow all new smart irrigation systems to be under EQIP
 - USDA RMA should include a Precision Ag Premium Reduction in crop insurance. Crop insurance should reflect the influence of improved field science.
 - Using less energy should be rewarded similar to generation of renewable energy.
 - USDA programs should empower farmers to use hardware and software that improves efficiency for machinery that is used in the field
 - There should be a conservation payment under the USDA FSA and NRCS EQIP program
 - USDA and other relevant agencies should dedicate increased funding for those that produce cover crops
 - The USDA should increase educational materials regarding precision ag
 - USDA should implement department and agency wide interoperability of internal program formats
 - In partnership with other agencies, the USDA should establish a biosecurity program in the Land Grant University system
 - Land Grant University systems must be fully funded and hiring qualifications should focus have the long term technical skills to support precision ag
 - All systems should require multi-factor authentication
 - Industry should adopt NIST 800-53
 - States should adopt bills that withhold state USF funding from any provider using equipment on the FCC covered list
 - Provides recommendations for what data privacy standards should include, at a minimum.
 - The FCC, NTIA, and USDA should adopt uniform standards for measuring precision ag use
 - Congress should adopt the Precision AG Loan Act
 - Questions
 - JS: a number of us have referred to the Last Acre Act. The Last Acre Act has specific speed recommendations, so maybe we should modify our

recommendations to reflect that we are recommending higher speeds than the Last Acre Act

- JB: Keep in mind that the Last Acre Act was the result of telcos, industry, and farmers to get more connectivity at higher bands to the last acre. She thinks it does a good job of getting connectivity to ag lands, so she's hesitant to modify their recommendations for it.
- AB: Asks to have a further discussion on the Last Acre Act because there are parts that he finds could be troublesome for small farmers. Could we also have a greater recommendation on tying incentives to climate change because there isn't uniform agreement on climate change in the farming community.
 - JB: she is just asking of the mentality for the producer to use a technology that works for them, not forcing particular practices or technologies on them.
- AB: Regarding recommendations on AI, have you considered the implications of AI in the data from large language models that combines data from many different farmers?
 - JB: They did consider that and how to leverage data lakes to improve ML and AI. The aggregate statistics must still be signed off to give consent for the data to be included.
 - MG: the biggest thing we worked on was for producers to opt into a pool so they have the ability. They mostly talked about the data being retrievable in its original form so you if you retrieve it. If you are trying to get derivative data back, that seems that it would be too complicated.
- HHK: Likes digital literacy coordinator recommendation (recommendation 20). Is there any discussion of how exactly that would be included in educational programs?
 - JB: Yes, we discussed how Idaho implemented this in their educational system.
- RK: In recommendation 32b, do we need more definition for "real time" with regard to when data must be able to be retrieved?
 - JB: Julie thinks we can add a definition and that the work group would be open to adding it.
 - MG: We could add "raw, original form" of data because that was the spirit of this recommendation and wanting to retrieve original data without manipulation.
 - RK: That would be helpful.
 - JB: The change could be "data must be retrievable in its original form without manipulation in near time". Provided this change to Teddy for the report.
- Dr. Adelaine: When discussing getting financial support for using certain technologies, he did get a grant for a structure, but they defined what the structure should be. How do we account for all of these specific technologies?
 - JB: We should focus on outcomes rather than solutions. Solutions shouldn't be prescriptive, and thinks that if we can accommodate all solutions we'll be better for it.
- Dr. Bajwa: For recommendations 3-5 is the idea that changing USDA funding programs that it will encourage greater precision ag adoption?
 - JB: Yes. We should adopt funding programs that allow farmers to choose the technology that works best for them and keeps up with how technology is changing.

Break from 2:24pm to 2:40pm

Discuss Outstanding Items and Vote on Report

- TB: provides overview of changes discussed that will be added to the final document that we will vote on
 - o Connectivity recommendation regarding symmetrical speed. Will change to recommendation to that current FCC standards for connectivity should be raised and continually reevaluated as technology continues to advance. Since we don't have a specific timeline, we do not need to put a specific number on how those speeds for upload/download standards should change.
 - HHK: "continuously reevaluate" is a given. The working group would like the standards to continually go up.
 - JM: The problem is that regulatory bodies can't continuously reevaluate. We could say something like evaluation every 2 years or "on a regular basis".
 - TB: we will include "on a regular basis"
 - MG: Could we say instead of "address the needs" we include "to accelerate innovation in precision ag"
 - MG: Always have said that download speed is as important as upload, so he would like to include "nearly symmetrical speeds" language
 - TB: We are planning to leave this out and task the next working group can pick it up because there are too many variables in play to set a number.
 - Dr. Adelaine: as we add new technologies, until we know what applications really need certain download or upload speeds, requiring it right now may be too much of a burden
 - DA: The Farm Bill expires next year, so we may not have the opportunity to get more granular or specific in the recommendations. We should include as much as we reasonably can in the recommendations.
 - HHK: Would like to keep the sentence that download is for consumption, upload is for production in agriculture.
 - TB: added it back
 - o Page 4: remove the word "but" in recommendation 1.c.
 - o Page 6: remove the word "cell" from recommendation on cell towers
 - o Edits to page 13 to recommendation 13 on BIA
 - o Other nits on page 14 recommendation #2 and to add mention to a companion bill
 - o Add language on page 17 recommendation 32 regarding real time data
 - o Page 18 to include a recommendation 36
 - o Page 31 to make the sentence readable, it seemed like it was missing a comma because it is so long
 - o Page 48, it is unclear if retroactive RDOF oversight is achievable.
 - HHK: we could strike the specific program name
 - Group agreement: We will strike RDOF but keep recommendation
 - o Page 79: on continuity of ag systems, this is missing a word.
 - TB: Adding the word "security"
 - o Page 84: a sentence that ends with "it should be also be recognized that it is high", should we strike it or add something to it?
 - HHK: the point is the peak usage of the systems, so we could add "peak demand times". In this para. "optimum" should be "optimal".
 - Group agreement: we will change to HHK's suggestions
 - o TB: Another change is the appendix: we will add in working group members in appendix

- A with titles
- TB: include or remove charges for each working group.
 - Group agreement: we should include them
- TB goes through a few other small nits and changes in the report
- Page 17, recommendation 32: RK: should this be producer controlled data? There are situations where there are grey areas of who owns data versus control of data.
 - JT: If we start dictating relationships between farmers and vendors that seems beyond the scope of the task force.
 - RK: the feedback he has gotten at John Deere is that this should be producer controlled.
 - HHK: Their working group has tried to be very farmer-centric.
 - Group agreement: change to “producer owned and producer controlled” and make sure the language is farmer-centric in this recommendation.
- Private networks-is this just for agriculture?
 - AB: the document does seem to be articulate to discuss last-acre and usage of private networks. In a final review that be looked at, that that is the agreed upon premise we should add throughout the document.
 - Group agreement: we can make the change.
- Last ACRE Act potential issues with small farmers
 - AB: eligibility revolves around being a full time producer. In a lot of states in the northeast and as a small farmer, this is not the case. Asks that we should look at the document and consider that all farmers should be eligible. It also is not clear that private networks would be eligible under this Act, and we have discussed how important private networks can be. This Act also includes a challenge process that is cumbersome will make actually getting funds to small farmers unlikely.
 - JS: we could include an amendment where we mention it that we support certain tenets of the Act, not the Act in its entirety.
 - JM: agrees that we should be careful in how discuss support for a bill, especially when its not passed and supports JS suggestion.
 - Group agreement: review document to ensure the spirit of the Act is supported.

Voting:

Teddy Bekele

- Approved

Dr. Michael Adelaine

- Approved

Dale Artho

- Approved

Dr. Sreekala Bajwa, Ph.D.

- Approved

Andy Bater

- Approved

Julie Bushell

- Approved

Anthony Dillard

- Approved

Michael Gomes

- Approved

Heather Hampton+Knodle

- Approved

Robert Hance

- No vote

Ryan Krogh

- Approved

Jennifer Manner

- Approved

Joy Sterling

- Approved

Jimmy Todd

- Approved

Dan Watermeier

- Approved

Closing Remarks

- Thanks extended for the hard work on report, contributions of all members, and everyone who helps with the Task Force.
- Expect the next Charter to be ready by December 2.
- Still finalizing membership, and extending thanks to those who may not return to the Task Force under the next chart.

To Do Items

- Teddy will follow up to get digital signatures from all members. At this point, Teddy will also ask if current members have ideas for the next Task Force to consider
- Teddy will also reach out for an address if members would like a paper copy
- After the report is finalized, Teddy will submit the report to the Chairman and Secretary of Agriculture

Teddy Bekele: called meeting closed at 3:43pm EDT