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Executive Summary

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 land 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) Accelerating Broadband Deployment on Unserved Agricultural Lands; 2) Mapping and Analyzing Connectivity on 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 done extensive research and developed recommendations that address current challenges.

Through the collective work of the Task Force, the Working Groups and conversations with several farmers, ranchers, producers, and those living in rural communities, it is evident that the digital infrastructure is tightly linked to the success of this great nation. Unfortunately, access to this infrastructure is not readily available in rural America which has become a fundamental necessity in the digital world. The challenges are enormous including decreased agricultural productivity, education achievement gaps, declining rural communities, lower health care outcomes, hospital closures, crumbling main streets, lack of access to credit, and, paradoxically, the lack of fresh food in America's heartland, among others. Digital connectivity is also directly linked to improved sustainability as farmers today use cutting-edge technologies to enhance decision making and reduce their environmental footprint.

The Task Force knows that providing broadband service to unserved and underserved locations is a priority in today's virtual world. Over the last two years, Americans, where possible, have been working, going to school, seeing their doctor, and engaging in the global economy virtually – from their homes. However, far too many families are unable to perform these daily activities due to a lack of high-speed broadband service most often referred to in the media as "The Digital Divide". [INCLUDE QUOTE FROM FCC and USDA]. This Task Force seeks to address these gaps with recommendations that will advise the federal government on ways it can improve access, specifically on rural, agricultural lands. Broadband is the foundational element that is a force multiplier for all other issues. We need broadband accessibility to better address critical challenges and build economic opportunity, competitiveness, and prosperity. This Task Force is doing its part by making this work a priority and addressing the technology and connectivity needs of Precision Agriculture across rural America.

The recommendations 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 maps and consistently validate user experiences; 2) Increase incentives to build out a robust

infrastructure; 3) Enhance the high-speed standards to meet the technology needs in agriculture; 4) Improve collaboration between federal agencies and remove regulatory impediments; and 5) Increase digital access to education and training for individuals engaged in farming. Additional consideration should also be given to cyber security concerns and interoperability standards. The following notes provide a summary of the findings from the Precision Ag Connectivity Task Force Working Groups.

1. **Improve federal broadband maps and consistently validate user experiences**
    a. We recommend that the FCC and the USDA begin working immediately using data sets with the greatest breadth and preeminent industry authority and **derive public-facing FCC broadband availability maps that reflect and confirm the unserved and underserved areas on agricultural lands** based on the current broadband standard for fixed and mobile internet service to facilitate Precision Agriculture practices and adoption.
    b. We recommend that the **most recent map for agricultural producers be hosted on the Agricultural Research Service (ARS) website** to include the base layers of National Agricultural Statistics Service (NASS) cropland data and the US Geological Survey (USGS) data on rangeland and 3-D Elevation Program (3DEP) data.
    c. With respect to the Broadband Data Collection (BDC), we recommend **a uniform set of practices and validation processes to be developed by the FCC including crowd sourced data validation and on the ground testing mechanisms to verify quality of service against broadband provider claims**. Furthermore, we recommend that the USDA and Extension Service be used to facilitate measurement in this process. Finally, the broadband fabric data must include agricultural structures to which broadband is or would be deployed in addition to the home location and the shop or office.
    d. We recommend that the **broadband availability and quality data be independently verifiable**, using methods consistent across the country. Within this process of verification, the needs of the Native Communities should be assessed and met with culturally appropriate and locally accepted approach to gathering accurate data.
2. **Increase incentives to build out a robust infrastructure**
    a. While incentives and subsidies for connectivity deployment continue to be considered, **we recommend that these incentives and subsidies be substantially increased to drive deployment of connectivity**, with an overarching goal of deploying future-proof networks and relying upon various means, terrestrial/non-terrestrial, fixed/mobile platforms as they may be appropriate, and to include other elements to enable Precision Agriculture deployment in the areas of edge computing, private 5G like technology infrastructures, and Precision Agriculture application development. These incentives should be deployed and administered at the most local level possible to ensure that they are efficiently, and effectively utilized, and localized accountability of deployment can be monitored and enforced.
    b. The FCC should work with USDA and other relevant agencies to **create incentives for specific types of infrastructure build-out that will support Precision Agriculture networks** and operations, including:
        i. Connectivity to rural agriculture land headquarter facilities.

ii. Expansion of middle mile infrastructure.
iii. Deployment of local/last-acre network facilities for use by Precision Agriculture systems and devices.

3. Enhance the high-speed standards to meet the technology needs in agriculture

a. Given the increasing data flowing to and from agricultural operations because of current and future Precision Agriculture offerings as well as the need to deploy technologies that have an element of future proofing, **we recommend that a broadband definition (both fixed and wireless) be enhanced to higher levels on both the download and upload speeds.** The FCC's current speed benchmark of 25 Mbps download/3 Mbps upload for advanced telecommunications capability is not only low in nature to drive innovation and utilization of Precision Agriculture, but the upload benchmark speed does not account for the vast amounts of data needed to be transferred from the field or farm to the cloud for storage, analysis, and insight generation. Data networks, the key facilitator of Precision Agriculture, are operating to gather, calculate, and report intelligence from within agriculture production. These offer fiscal efficiency, superior environmental practice, and responsible resource allocation, leading to higher yields of safe, wholesome, and sustainable food, fiber, fauna, and fuel products. The suggestion is not to drive a rigid symmetrical standard but rather to raise the standard on both ends significantly and recognize the uplink capacity is not inferior to downlink needs. This approach should follow the recognition in the Communications Act that universal services are an evolving level of services. Implementation and subsidized investment of on- farm networks and supporting communities and ecosystems is critical to Precision Agriculture adoption as well as the availability of high- quality and digitally dependent jobs.

b. The FCC should **identify, implement, and/or strengthen policies to facilitate use of low, mid, and high-band spectrum** for Precision Agriculture applications, including:
   i. Policies that facilitate access to licensed spectrum in rural areas where that spectrum is underutilized.
   ii. Policies that remove technical impediments to rural agricultural use cases.
   iii. Auction policies that create incentives for bidders to deploy broadband infrastructure in a useful manner (e.g., policies that require bidders to show the long-term sustainability and scalability of their proposed networks).
   iv. Technical policies that improve the performance of rural wireless networks.

4. Improve collaboration between federal agencies and remove regulatory impediments

a. The FCC should work with other federal agencies to **adopt and implement a common set of performance targets and standards** that reflect the specific needs of Precision Agriculture, such as:
   i. Build-out requirements (e.g., in connection with spectrum auctions) based on geographic covered *area that comprises croplands or ranch lands* vs. covered *population*.
   ii. Multiple performance targets tailored for specific Precision Ag use cases (and reflecting quality metrics such as speed, latency, jitter, and packet loss).

iii. Service availability metrics (reflecting location- and time-based elements) that can be used in industry-standard propagation models; and
iv. With respect to cybersecurity guidelines.

b. United States Department of Agriculture (USDA), National Agricultural Statistics Service (NASS), Farm Service Agency (FSA), Risk Management Agency (RMA), Natural Resources Conservation Service (NRCS) and other agencies should **align their existing and individual file management systems to have the capability to receive electronic data layers that are commonly created through the normal course of farm operations**. This improvement of use and incentives for federal reporting and compliance agencies will encourage the adoption of Precision Agriculture and modernize the very systems this Task Force set out to accomplish.

c. The FCC and other stakeholders should **identify and eliminate regulatory impediments** to:
   i. The use of novel business models to support infrastructure and broadband deployment.
   ii. The ability of parties to obtain support from multiple funding sources for the same deployment project.
   iii. Regulations pertaining to broadband build-out on tribal lands.

d. The FCC should work with other stakeholders to **prepare "playbooks" to provide appropriate guidance** to relevant stakeholders, such as:
   i. A playbook for the creation and operation of rural community-based, non-profit solutions.
   ii. A playbook for Bureau of Indian Affairs program staff to facilitate build-out on Tribal lands.

5. Increase digital access to education and training for individuals engaged in farming

a. With the demand for skilled workers expected to increase with the adoption of Precision Agriculture, career technical education, apprenticeship programs, community colleges, extension and land grant universities provide an avenue to rapidly fill this demand while providing hands on training for a skilled workforce. Increasing access to distance learning, allowing rural citizens to satisfy post-secondary education and college level degrees, more specifically allowing individuals engaged in farming to stay active in operations while achieving their educational goals should be a priority. **We recommend state, local, and federal agencies increase funding for STEM and digital vocational programs at the K-12 and community college levels specifically focused on technology, cyber security, and manufacturing careers in agriculture**.

6. Other key considerations

a. Agriculture is an essential industry and is subject to cyber vulnerabilities: equipment, data layers and supply chain. To accelerate Precision Agriculture adoption and most

importantly, as a means of national security, federal cyber security policy should recognize agriculture as critical and essential infrastructure and malicious acts should be treated accordingly. **We recommend that priority be placed on developing Precision Agriculture cyber security specialists** by the USDA, Department of Homeland Security, and President Biden's American Jobs Plan.

b. As the world looks to agriculture for climate solutions and consumer interest in how, when, and where their bio-based product is grown, **it is imperative a standard for interoperability is established**. One of the key incentives to adopt Precision Agriculture technologies is efficiency of resource use (land, seed, livestock, chemical, machinery, labor, management, and natural resources) and improved interoperability directly impacts the quality of such decisions. Traceability through a supply chain requires interoperability so verified data moves effortlessly as products change hands, processes occur, and services are performed. Increased interoperability will directly result in increased Precision Agriculture adoption, high-quality jobs, and consumer confidence.

Conclusion

This Task Force seeks to address several gaps with these recommendations that will improve deployment and access to broadband in rural communities and agricultural lands. Broadband is the foundational element that is a force multiplier for all other issues. We need it to better address critical challenges and build economic opportunity, competitiveness, and prosperity. However, the Task Force also recognizes that expanding high-speed broadband is a complex issue that carries significant costs. Nevertheless, given the economic, productivity and quality of life benefits associated with achieving digital connectivity, timely investment is critical. With the collective efforts of the FCC, USDA, and other relevant agencies, we remain encouraged that we can make broadband connectivity available to every corner of our great nation. We ask that that you keep in mind the thousands of families who struggled throughout the pandemic because they had no access to broadband internet. The time is now to invest in our communities.