

## The Case For Sensor Based Mapping

### *Building An Agricultural Facing Broadband Mapping Methodology* ©

Presentation Before  
The USDA  
American Broadband  
Initiative Federal Funding  
Workstream Mapping  
Subgroup

February 14, 2020

- By  
Garland T. McCoy, Co-Founder and Executive Director  
PAgCASA (Precision Ag Connectivity Act Stakeholder  
Alliance)
- And  
Peter F. Harter, Co-Founder PAgCASA

## Introductions

PAgCASA Co-Founders Garland T. McCoy and Peter F. Harter each have over three decades of experience in the Internet technology, policy and legal areas. They have known each other over much of this time collaborating on important policy issues.

In December 2018 when we saw the Farm Bill mandating the Task Force we created the Precision Agriculture Connectivity Act Stakeholder Alliance, PAgCASA.

From January 2019 to present we've canvassed many who have been involved in rural broadband and specifically mapping and have not found anyone focused as much as we are on creating a citizen based, bottom up solution centered on data. We hope to find others out there doing what we are doing, and we are open to joining forces.

Our work caught the attention of Carolyn Roddy who was kind enough to extend an invitation to present PAgCASA's first proposal which is the one we will focus on in our presentation today.

## Setting The Stage

*"Data is the new oil" -- Clive Humby 2006*

For much of rural/agricultural America population density and distance have challenged the creation of viable broadband delivery businesses.

To put it simply demand at affordable prices has been insufficient to support the expenses associated with the provisioning of robust broadband access in much of rural America.

This business model is about to change with the arrival of Precision Agriculture and the billions upon billions of sensors that will be the new drivers of demand.

Consumer's hunger for more information about the food and drink they consume has been on a tear. Agricultural businesses have benefited greatly from this new information exchange by providing the specific foods and drinks consumers want based on this rich data exchange.

This paradigm of "locally sourced" is about to change exponentially as well with the arrival of a tsunami of rich granular data made possible by the sensors that are at the core of Precision Agriculture.

## Why A Sensor Survey?

A Survey of the Sensors, their Enabling Spectrum and the Networks they Create Beyond the Farmer's Front Porch will be the Barometer of both the Growth in Demand for Broadband as well as the growth in the new Financial Fuel (data) that will more than pay of it.

Data will be Agriculture's Next Cash Crop (just ask the BIG players)!

There is an old saying, "follow the money" and if money is a validation of a market then what is already happening in the emerging market for agricultural data is telling!

### **Agriculture Giants Being Investigated by Canada's Competition Authority**

By Leah Nylen and Liz Crampton

*Canada's Competition Bureau is probing allegations that agriculture companies including Bayer, BASF and Cargill sought to quash competition by startup Farmer Business Network.*

*The bureau today confirmed the investigation and said it was also looking into Corteva Agrisciences, Univar, WinField and Federated Co-operatives, a federation of more than 350 cooperatives in Western Canada. The agency declined further comment on the probe.*

*In court documents filed in Ottawa on Jan. 30, a Canadian investigators aid manufacturers like Bayer and BASF and wholesalers like Cargill have refused to supply FBN.*

*FBN, an online platform based in California, aggregates data to help farmers make planting and other agronomic decisions as well as compare pricing. It expanded into Canada in 2017 and bought Saskatchewan retailer Yorkton Distributors in April 2018.*

*Yorkton had existing contracts with the companies, but many of them began to restrict supply or deny it access to rebate program after the FBN purchase, according to the court documents.*



*"Some of these parties have engaged in communications that are suggestive of coordinated behavior," Daniel Jensen, a lawyer with the Competition Bureau, said in an affidavit filed in court.*

*The bureau asked the court to order the seven companies to turn over documents to aid in the inquiry. A court hearing on the request is scheduled for Monday*

*The companies did not immediately return requests for comment.*

*Andy Blatchford contributed to this report.*

This article goes hand in hand with news reports of agricultural equipment manufacturers selling products to farmers who don't want to pay for all the available options yet they are turned on anyways so that the manufacturer can aggregate data about trends and make bets on the commodity markets.

## Understanding The Challenges

There is a plethora of Broadband Mapping initiatives ongoing across the country.

Some are Federally sanctioned/funded by government agencies such as the USDA, FCC, NTIA while others are “home grown” originating from State, local and private sector initiatives and increasingly being built on “crowd sourced” gathered data.

Examples we would highlight demonstrate how broadband mapping surveys that are locally born, where participation and thus the data is largely drawn from the consumers, as opposed to many that rely exclusively on data from the access providers, can provide a much richer picture of the actual areas of broadband coverage and speeds throughout the day.

You will see examples of this in both the Lumpkin County Georgia and Polk County Oregon surveys and we have included the North Carolina Farm Bureau survey of its members which is ongoing.

## “Rural broadband is a problem, and Georgia is mapping it”

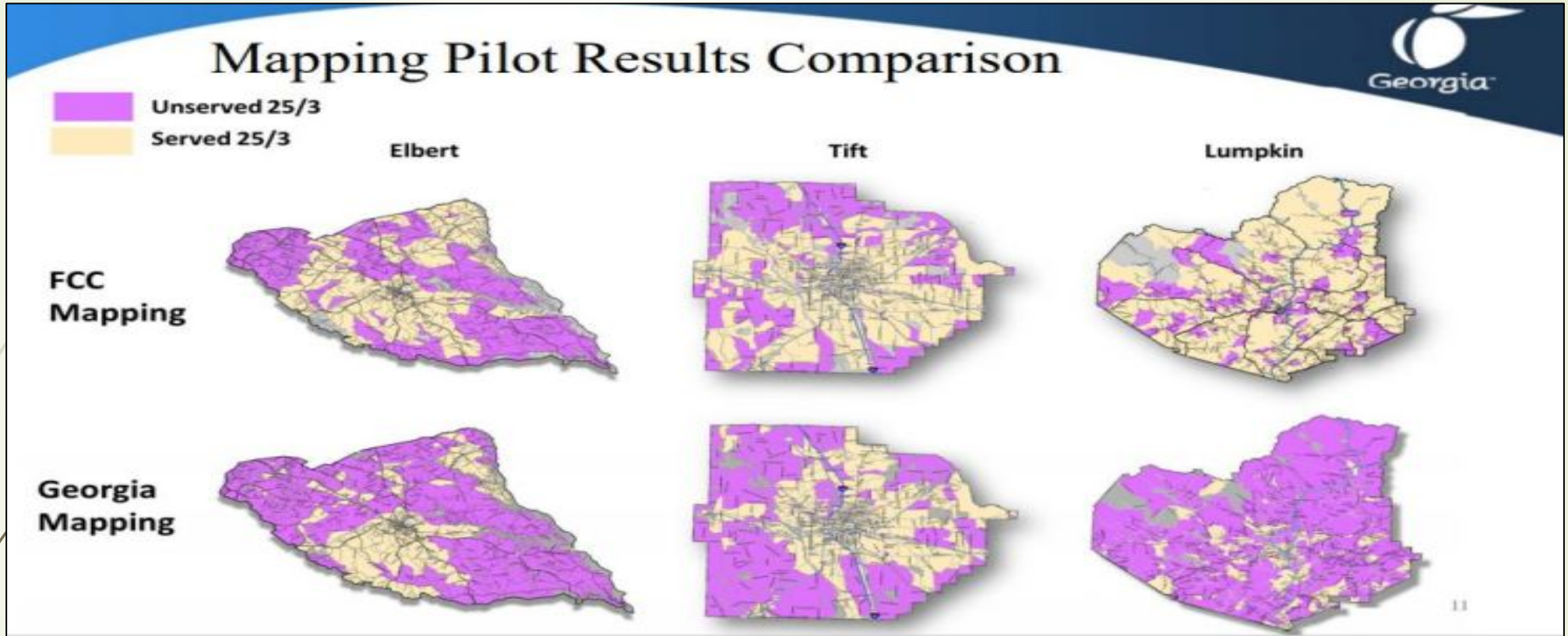
By Emma Hurt Oct 23, 2019

► People without internet access at home visit the Lumpkin County Library 24 hours a day to use its fiber-optic broadband connection. At night, they pull up in the parking lot to connect to Wi-Fi.

Emma Hurt/Marketplace







Georgia decided to map broadband availability to prove that maps prepared by FCC are inaccurate. A three-county pilot shows the federal maps missed half of all addresses without broadband service. The statewide survey is scheduled to be completed by June. (Emma Hurt/Marketplace)

Polk County, Oregon circulated a survey via the Sheriff on Facebook last summer and generated a square mile map of the county illustrating the kinds of services available in each square mile, the uses, the quality, the pricing, the kinds of users and other layers of information and factors. The illustration was generated by ESRI software used by Polk County Commissioners and their staff.



The Digital Divide: Polk County Rural Broadband Study

**Dean Anderson**

**IT Director**

**Polk County, Oregon**

<http://polkgis.maps.arcgis.com/apps/MapJournal/index.html?appid=cfa3d05ea50142239ab9071bf1f156e5>

North Carolina Farm Bureau is as of this presentation conducting an online Internet Connectivity Survey of its members: <https://www.ncfb.org/>

Over a thousand of its members have already completed the five-minute survey!

What has become obvious to all stakeholders in the rural broadband ecosystem is the fact that there are great differences between the data gathered and presented in the traditional Census Based Broadband Mapping Methodology which draws from traditional US Census data reported by the incumbent access providers from what local, customer or “crowd sourced” broadband data surveys are presenting.

**As discussed at the beginning of our presentation, providing rural broadband access is a business and like any business it can only operate long-term when demand and price are sufficient to ensure the business can generate a sustainable profit. Agriculture is inherently about sustainability.**

**We believe the arrival of Precision Agriculture with its sensor generating data business model will positively impact both of these key business ingredients.**

## Now The Good News

**A great deal of bi-partisan support and financial resources are now focused on dealing with the challenges of providing rural America with robust broadband access.**

We will quickly review some of the legislative and policy highlights as well as the funding and content agencies have to offer in this area.

- October: NTIA update on their multi-state pilot on the availability of broadband
- December: House passed two bipartisan broadband mapping accuracy bills
- December: USDA announced opening of ReConnect funding round 2 is and applications are due March 16, 2020
- January: FCC announced a \$16+B auction for rural broadband
- February: President Trump's State of the Union highlighted rural broadband funding
- 2020 election: Many of the Democrat 2020 campaigns feature rural broadband in their policy platforms

Money, bi-partisan support, political focus, and technology are all available.



**The Next Step** is identifying and deploying a minimum viable product for rural areas with a focus on agriculture.

## **Our Proposal**

We'd like to share with you our ideas for viticulture – the farming of grapes for making wine – and how they apply to agriculture broadly speaking.

We believe that “Sensor Based” mapping based on a bottom up, citizen driven, crowdsourced approach provides the improved accuracy that many are calling for and enables many to showcase what problems they are solving and share solutions which can then accelerate demand for broadband investments.

Imagine a citizen-based app for farmers and their smartphones that taps into their machines and sensors to provide granular data for true broadband mapping and also the Internet applications that are occurring. This can help unlock new value in existing government data and to enable people to share data (like very local, small weather and pest data stations).



A question on the table for people to chew on for our discussion today is whether money will flow to Sensor Based maps and if so, then how may PAgCASA help drive awareness and development of Sensor Based maps?

1. Should PAgCASA apply for a ReConnect grant and build a rural school for Sensor Based data? This school can collaborate with farmers, community colleges, local colleges and universities, local and state ag organizations, local and regional foundations, and also share data and best practices with other states and their ecosystems.
2. Given the similar cold weather climates of the wine growing regions of Oregon and upstate New York there may be an interesting collaboration to consider.
3. Sensors exist on individual vines, blocks of vines and on stations to gather data that builds a very local view that can also be shared to create a very accurate regional perspective on weather, pests, spray drift, smoke and other factors that impact the ground and what is above and below.

4. Some of this hyper local sensor and data activity is based on university research, on products and services from companies large and small, foreign and domestic, on repurposing equipment from other kinds of agriculture or industries, on the creativity of tinkerers.
5. This kind of data thrives because farmers are sharing it to help one another get more accurate information for their local area and to better understand what is going on in their region so that they can better appreciate trends and plan ahead.
6. Sensor and data innovation in mapping in viticulture can then be extrapolated to neighboring agriculture uses as sharing information about weather and pests helps all growers. That kind of data infrastructure and community then spills into forestry – trees are a crop. And that spills over into fire management and tourism.

**Starting with Sensor Based mapping in viticulture then into agriculture and then more broadly may be a path of least resistance.**

It also helps rural communities that are underserved or overlooked have a new chance to understand what is really going on and in a hyper local manner.

Assuming that what states and counties are trying to do on their own to improve mapping is useful, hen why not take an additional step by funding Sensor Based mapping and in a fun context?

Grapes are grown on nearly every continent and have been a part of civilization for thousands of years.

As we expand our sensor-based survey work we can include the sensors already deployed (sample list below) and seeing how they are or are not being interconnected to one another and also to the newer, precision ag and IoT sensors recently deployed or being planned to be deployed:

- Weather station sensors
- Sensors used for forest management and early fire detection
- Seismic monitoring sensors
- Natural Gas Pipeline sensors
- Electric Utility Transmission, Distribution and substation sensors
- Highway and Car Toll sensors
- Air quality sensors
- Water quality sensors
- FAA and Rural Airport sensors
- GPS system sensors

Given the Precision Ag Connectivity Act's **mandate of providing 95% Internet broadband coverage for rural, agricultural areas by 2025**, new ways of gathering valuable data and new mapping methodology for displaying this data will be needed to provide the guide posts for deployment and tracking of broadband in agricultural, mining and forestry lands across the US.

All of this comes at a time when many are eager to deploy 5G, to take advantage of new kinds of licensed and unlicensed spectrum (LoRaWAN, "White Spaces") being made available and to rip out and replace the Huawei equipment that many rural ISPs purchased and deployed.

There is also some reflection on the history of the USDA on rural electrification and how rural broadband done right can spur economic development and innovation.

This is timely and highly relevant. Last year President Trump signed into the law the bipartisan and bi-cameral SUCCESS Act which focuses the USPTO on fostering women, veterans and people of color to invent and patent more. It also boosts involvement of underserved communities based on geography and demography. The USPTO is standing up a new "Expanding Innovation" National Council to focus on this mandate.



## PAgCASA Is Built On A Set Of Principles

19

- AIM (All-In-Mapping) Methodology: We need precision mapping for Precision Ag and real precision ag connectivity generates so much granular, hyper local data and location sources. We are enabling the Sensors to inform a much smarter broadband map and break the logjam of Census Block maps.
- All (All-In-Infrastructure) Focus: Traditional industry, public and other silos are broken down in order to create new partnerships that benefit from shared unused or underused infrastructure. Of particular focus will be building partnerships with local electric utilities where our broadband mapping methodology will correct the current paradigm of trying to use “bump maps” to support “smart grids” and where dual use of newly deployed fiber is already in play.
- Necessity is the Mother of Invention: Provision reliable broadband services encompassing farmhouse to the field and sub-soil to stratus while being agnostic on the issues of spectrum, embracing a “whatever works” approach.
- Lodestones: platform interoperability, standards, open data, crowdsourcing, evidence-based process, relentless “in the field” experimentation, and validation/accountability.

- Clearinghouse for Public/Private data for the AIM & All initiatives; best practices, emerging technologies, standards, government RFP, etc. in the precision Ag connectivity space.
- Embrace data management systems specific to Precision Ag enabling blockchain supported secure supply chain management for transparency to the benefit of Farmers, Customers, and Mother Earth.
- Precision Ag produces the quantity and quality of data that drives demand for rural broadband access, which in turn makes it good for carriers, cloud providers, app developers, data research, and oversight. It also encourages long-term investments in infrastructure. A good example of this would be the plethora of small terrestrial weather stations networked over the Internet on a variety of digital platforms that produce critically important data for use both locally and nationally.
- Bring broadband to those who need it most in rural America with particular focus on often forgotten indigenous peoples on Tribal land.

- Integrate the National Security imperative of building a secure “China free” distributed and meshed VPN robust enough to act as the secondary or reserve communication network for America’s new “smart” grid should events warrant.
- Sustainability: PAgCASA will operate under the principle articulated by Ben Franklin of “doing well by doing good” which unlocks both financial and social values responsibly.

**Let’s take your comments and questions now.**



**For more information please contact:**

Garland T. McCoy  
Co-Founder & Executive Director  
PAgCASA  
202-906-0654 mobile  
[gmccoy@technologyeducationinstitute.org](mailto:gmccoy@technologyeducationinstitute.org)

Peter F. Harter  
Co-Founder  
PAgCASA  
202-641-4778 mobile  
[farrington@gmail.com](mailto:farrington@gmail.com)