SMART AGRICULTURE

AND THE ROLE OF BROADBAND

Rural Telecom Educational Series

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"I know of no pursuit in which more real and important services can be rendered to any country than by improving its agriculture."

THESE WORDS WERE SPOKEN in the late 1700s by President George Washington, but they still hold true today. Talk to modern American farmers and, no doubt, access to broadband networks and the advanced telecommunications services they deliver would top the list of most farmers' definition of "real and important services."

BROADBAND NETWORKS—both wired and wireless [see box for definitions and delivery systems]—allow for high-speed Internet connections, smartphone applications, video conferencing, and a host of other communications-related services. For farmers, the need for this technology is important now and will be virtually mandatory in the future.

"Broadband is critical to the average farmer," explained Jack Harvey—president of the National Rural Telecommunications Cooperative (NRTC), a group that represents rural utilities—pointing out that farming has changed significantly over the years. "So many farmers are involved in commodity markets and need to hedge their crop losses. They're also getting into futures with grains and corn, as well as buying and selling cattle on the Internet."

Sharon Strover—director of the Telecommunications and Information Policy Institute and a professor of communication at the University of Texas (UT)—agreed that farmers cannot be efficient 21st century business owners without being wired. Like all businesses, she said there's a need to gather data into a central spot, analyze it, and make adjustments in order to have greater productivity and efficiencies. "With farming, there's so much remote sensing and monitoring and tracking information—soil moisture, crop readiness, land conditions, weather forecasts," she said. "Farmers want the opportunity to make use of broadband, and it's not just for email."

SPOTTY COVERAGE

Not every American farmer has that opportunity. According to the most recent data from the Department of Commerce's National Telecommunications and Information Administration (NTIA), only 60 percent of rural households have broadband Internet service, which is 10 percent lower than the adoption rate of urban households. And while many urban residents report that they don't subscribe to broadband service because it is either too expensive or they feel they do not need it, most rural Americans cite lack of availability in their area as their reason for not having the service.

For the farmers fortunate enough to have broadband access, there's no question that they deem it essential to their operations. Brandon Meyer, a farmer and rancher with a 7,000-acre farm in south central Nebraska, said he uses his broadband service every day. "I'm able to use my smartphone to check market reports and buy and sell cattle," he said, explaining that in the past, he had to travel all over the country to find quality Angus cattle. "We'd fly to Texas, Georgia, Utah, Missouri, Kentucky, Illinois. The average trip took three to five days, and often my wife or hired man would come along, so we'd have the price of airline tickets, hotel, food, rental car. Now, I can sit in the tractor and do my planting and buy cattle."

Not only does broadband access save Meyer time and money, it also allows him to sell his cattle to new buyers. "Being online opens up your market to buyers who wouldn't have been able to travel to your farm," he said. "Now they can watch online and bid on your cattle. On the selling side, it's real time—the delay is less than half a second."

NRTC's Harvey pointed out that these online livestock auctions are one of the reasons why high speed Internet access is key. "People want faster speeds," he said, pointing out that livestock markets are becoming a thing of the past. "Farmers are out in their fields videotaping the herds—cattle, sheep."

WEEDING OUT MISPERCEPTIONS

The notion that farmers are high-tech businesspeople who need advanced telecommunications is a foreign concept to

most urbanites. “The belief in D.C. is that farmers sit around and drink coffee,” said Todd Henecke, an Iowan farmer and sales manager for National Information Solutions Cooperative (NISC), an information technology company serving utilities and telecommunications companies. “If you live on a farm, the work is never done”

Nebraskan farmer Meyer agreed that farming is more work than most people realize. “It’s not 9 to 5—it’s sun up to sun down—and it’s typically 70 to 80 hours a week,” he said, pointing out that having livestock makes it a 12-month operation.

Farming Facts and Stats

- There are 2.2 million farms in the United States.
- About 46 percent of the country is farmland.
- The agriculture industry employs more than 21 million American workers, representing 15 percent of the country’s total work force (and more than six times as many workers as the U.S. automotive industry).
- U.S. farms sell approximately $370 billion in goods each year, which is larger than the gross domestic product of nearly 200 countries.
- American farmers grow 40 percent of the world’s corn.
- One in three U.S. farm acres is planted for export.
- Each year, $115 billion worth of American agricultural products are exported.
- Americans spend 9.5 percent of their income on food—less than any other country.

Sources: United States Department of Agriculture, Center for Food Integrity, Farm Policy Facts

Farming is becoming more complex and highly diversified, explained Harry Watts, managing director of government relations for the Kansas Farm Bureau (KFB). “Most farmers have a combination of animals and crops because that allows you to make up for one poor crop—like wheat if there’s a drought.”

Another misperception is that farming is a small, low-cost operation, Watts said. “Farms are getting bigger. Instead of one farm being 500 acres, they’re now thousands of acres with multiple landlords,” he said.

Broadband Delivery Systems

The Federal Communications Commission has defined “broadband” as “high speed Internet access.” High speed is considered anything faster than dial-up Internet access but can range from 200 kilobits per second to 30 megabits per second (Mbps) depending on the delivery system and other logistical factors, such as how close the end user is to the provider’s equipment and stations. The Commission also spelled out the various broadband delivery mechanisms:

WIRED BROADBAND

- **Digital subscriber line**
  Telephone companies provide wired broadband over copper telephone lines.
- **Cable modem**
  Cable operators offer broadband over coaxial cable.
- **Fiber**
  Telecommunications providers deliver broadband over fiber optic networks.

WIRELESS BROADBAND

- **Wireless**
  Broadband delivered via radio signals and antennas.
- **Satellite**
  Broadband provided via satellite systems.

The equipment costs alone to run a modern-day farm are staggering. "A tractor runs $300,000; a combine and heads to harvest is half a million dollars; a planter is just under $200,000," Meyer said. "It's not cheap. It's a big business. We're not out here with a donkey hooked up to a plow."

MAKING THE CONNECTION

Edyael Casaperalta—rural broadband policy coordinator for the Center for Rural Strategies, a nonprofit organization—agreed that the perception is that farming is a rustic, slower-paced type of lifestyle. The thinking among many urban policymakers is: What kinds of people live in rural areas? Backward people.

"When they talk about the cyberbridge to nowhere, they're basically saying: `Look, no one out in rural America needs it—they don't even know how to use it,'" Casaperalta said. "But building a national broadband network benefits everyone. It's an essential service that should be available to everyone regardless of geography."

Policymakers need to deploy broadband nationally and convince the public sector that this is important, Casaperalta said. "Many people fail to recognize the connection between farming and the food supplies to urban areas."

That connection isn't lost on Troy Stickels, marketing manager of Glenwood Telephone Membership Corp. (Blue Hill, Neb.) "The farmers are the ones working to feed all of us," he said, pointing out that his cooperative has

I'm a Farmer (or a Broadband Network Provider) and I Grow It

Any farmer worth his salt knows it's not enough to just plant the seed—a crop must be tended to and maintained. The same holds true for broadband networks.

Jack Harvey—president of the National Rural Telecommunications Cooperative, a group that represents rural utilities—said it's a common misperception that there are no broadband networks in rural America. "There are certainly areas that have made significant investments to deploy broadband networks in rural areas," he said, pointing out that once the networks are in place, they quickly become a self-perpetuating phenomenon.

"As you get more broadband networks out there, the adoption rate goes up and the usage goes up, so it's important to continue to add capacity—otherwise you go from served to underserved," he said. "Just building the network is the first step. You've got to keep it, grow it, and expand it."

Technological innovations are another piece of the puzzle. "There's always the evolution of technology—fiber, wireless, satellite," Harvey said. "These continual advancements and enhancements allow networks to expand capacity. You must continue to invest to make these upgrades to keep up with consumer needs for broadband."

offered broadband services for more than a decade. “Our customers are farmers, and they absolutely use it. Everything from checking on the weather and grain prices to buying and selling online—farming is driven by technology.”

Many small telephone companies and cooperatives have done a good job of making sure that everyone has Internet access, Stickels said. “We’ve also worked hard to train our farmers and explain how they can use our services in their farm operations. We see these people every day at the coffee shop, at ballgames. These are our neighbors.”

Meyer, a Glenwood Telephone customer, agreed that the co-op does a good job of working with the local farmers. “Glenwood started offering a system for pivot checking by smartphone,” he said, explaining that a “pivot” sits in the middle of a field and operates like a lawn sprinkler. “This application lets you check to see if it’s on or off. If that pivot is 20 miles away, you’ve saved yourself a 40-minute trip. If the pivot shuts off, the system sends your phone a text so you’re aware that it’s off and may need to be fixed.”

NRTC’s Harvey said it’s no coincidence that so many small telephone companies and cooperatives are working lockstep with the farmers. “These companies have defined service territories and have been serving these areas for years and years,” he said. “In fact, there are very few co-ops and independents that don’t have farmers on the board. The farmers are in the room.”

NISC’s Henecke pointed out that grain elevators are often the tallest structures in rural areas. “So the telcos will partner with the farmers to put antennas on the tower,” he said. “The John Deere dealer in town is usually hooked up with the telco.”

Aaron Bartholomay—product manager for John Deere, the farming equipment and services giant—echoed that fact, noting that John Deere dealerships often work with local telephone companies to set up base stations and towers for enabling real time kinetics. “This is our sub-inch accuracy and automatic steering capability,” he explained. “It’s a real service for the farmers.”

Farmers with this service can use the global positioning system (GPS) in their tractors, and the accuracy is within an inch or two, explained KFB’s Watts. “The tractor

Q&A
with an Agribusiness Pioneer

Fred Ziari is a CEO and an irrigation engineer with more than 30 years of experience. His companies’ clients conserve 10 billion gallons of water every year.

1. Do you think the average American farmer can benefit from broadband access?

These days farming is a big and profitable enterprise and access to high speed internet is not a luxury anymore, it is a must have. As our farms are getting larger and labor scarcer, relying on technologies is becoming much more relevant in farms. High speed Internet on the farm is a game changing technology of the future.

2. Do you think most farmers have access to broadband?

I believe most farmers do have or can have access to broadband. In most rural areas, however, it is the lower speed, higher expense, and lower reliability of the services that is the problem. While many advancements have been made in the recent years, we still have a way to go for having high speed and reliable Internet in rural America.

3. What are the biggest misperceptions about farmers and farms? If you could educate policymakers and urbanites, what would you like them to understand about farming?

The global population increases and the higher income level in previously poor countries like China has created a huge demand for American agricultural products. In the last few years while our country has faced harsh economic problems, agriculture in general and irrigated farming in particular have experienced higher commodity prices and are proving to be one of the few bright industries contributing to a healthy U.S. economy. Exports are significantly up, demands are at all-time high, and U.S. agriculture is in a great position to help feed the world with healthy and nutritious food.

drives itself pretty much; and, at the end of the row, the farmer just has to turn the wheel," he said. "This computerized system can tell them how much fertilizer or seed to put down—it's incredibly efficient."

John Deere's Bartholomay said greater efficiency allows farmers to better understand what's going on in their operations. "Our technology can let them see what's happening out in the fields with their equipment, with their hired hands," he said, adding that farmers can receive texts and emails about where and when to apply fertilizer and herbicide. "Having real time data transfer allows farmers to better manage their operations. Farmers must make so many decisions on the spot. If they know that rain is coming in, they can decide to stop spraying."

Broadband technology is not just a boon for the large growers but for the small farmers as well, Bartholomay said. "The small growers tend not to have an IT staff. With broadband access, our dealerships can remotely troubleshoot by pulling up their screens and looking at the same screen that the farmer is looking at. This is a huge benefit to the smaller grower."

Because so many of its products require cellular connectivity, John Deere works with rural independents and cooperatives to make sure the tower structures are there and the signal is strong, Bartholomay said. "These smaller telephone companies are truly providing a network that fills in the gaps that large companies do not—they are key to our business," he said. "Advanced telecommunications will help farmers now and in the future. We look forward to continuing to work with the small telephone companies."

Watering Rural Roots

Think of the cities and urban areas as the plant and the surrounding rural areas as the roots, suggested Mark Erickson, city administrator and director of the Economic Development Authority for Winthrop, Minn. "We can't just focus on our urban areas," he said, making the analogy about broadband for everyone. "If we only focus on them, the rural areas will die off and that's not good for the cities."

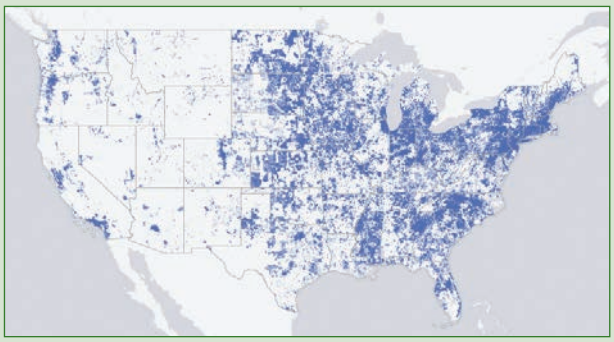
The goal should be a nationwide broadband network that works seamlessly across the United States, Bartholomay said. "Farmers often have acreage that spans different regions, so it's not uncommon for them to have different service providers and get hit with roaming charges. It can also be a problem when one area has broadband access and the other does not, and it's only three or four miles away," he said. "We struggle with this."

THE ECONOMICS OF THE LAST MILE

The economic reality of providing broadband services to sparsely populated areas is an ongoing struggle for providers and users. The farmers and other residents of two counties—Renville and Sibley—in rural Minnesota have become so frustrated with the low speed of their local Internet service that they are in the process of building their own fiber network.

Mark Erickson, city administrator and director of the Economic Development Authority for Winthrop, Minn., spelled out the cost differential between rural and urban in terms of providing broadband. "It costs $9,500 per farm

FCC's U.S. map of broadband coverage



The National Telecommunications and Information Administration reported that 5 to 10 percent of Americans lack access to broadband at speeds necessary to support basic online functions, such as video conferencing, as well as downloading web pages, photos, and video.

"The FCC [Federal Communications Commission] spent a lot of money to develop maps of the unserved and underserved areas of the country and came up with something like 8 to 10 million unserved households in the United States, but that's really a moving target," explained Jack Harvey, president of the National Rural Telecommunications Cooperative.

versus $2,200 per city resident," he said. "In some areas, we'll have 60 people per mile. In others, we may only have one, two, or three people."

Despite the disparity and high costs, Erickson said it's not right to charge the farmers more. "To make this work, we must blend it all in and share the cost," he said, explaining that the counties' partnership, RS Fiber, will pay for the broadband network through funds borrowed in the long-term bond market. "The only policy that works here is long-term low interest loans or the federal government providing incentives to companies to make this investment. You can't make this work if you're only looking at three to five years down the road and a prescribed rate of return."

UT's Strover agreed that broadband services must be priced democratically. "Rural people want the same services that people in urban areas have, and they want those services at the same price," she said.

CRS's Casaperalta likened broadband connectivity to electricity and telephone service. "It's a vital public utility," she said. "If it's not available to everyone, it hurts all of us. We all need it to participate in today's economy, democracy, culture, and society."

KFB's Watts agreed that the goal should be full broadband connection for every farmer and rancher. "We should have a 100 [percent] adoption rate," he said, adding that this will not only benefit the United States but the rest of the world as well. "Knowing that a particular country needs a particular product will allow farmers to get a premium return on their investment."

Going forward, research and technology is what will allow farmers to grow more products per acre and feed more people, Watts said. "You have to grow a lot of corn and wheat to feed 2 billion people," he said.

"Farmers and ranchers are entrepreneurial by nature, Watts said. "They could develop a new tractor part or farm machinery and start a manufacturing entity right there on the farm and that becomes a job creator," he said. "They need high speed Internet access to make all of that work."

Building a nationwide broadband network benefits the entire country, said Edyael Casaperalta, rural broadband policy coordinator for the Center for Rural Strategies, a nonprofit organization. "It's like Route 66 that connects Chicago to L.A.," she said. "You can't just have the road in those two cities. You must go through all the rural areas to connect the two. The Internet connects all of us. It's necessary for all of us."

The notion of having broadband connectivity only in urban areas is antiquated, Casaperalta added. "This type of thinking and argument probably dates back to the time of the aqueducts," she laughed. "Those people who live out of town don't need water. Let them walk down to the river."

Broadband connectivity adds to the quality of life in rural America and entices young people to return to the family farm, explained R. J. Karney, director of Congressional relations for the American Farm Bureau Federation. "Broadband creates opportunities in rural areas—not just on the farm but outside the farm gate as well," he said. "It contributes to children's education through distance learning; it contributes to healthcare with telemedicine. It makes rural America a place where people want to raise their families and gives them the best opportunity."

Neil Mylet is an example of an entrepreneurial young person who returned to the family farm after graduating from college. He founded LoadOut Technologies, a 20-employee technology company built around a farming application that allows farmers to use smartphones to load grain into trucks. "When I first started, we did not have high speed Internet access at the farm," he said, explaining that his family's 5,000-acre farm in Indiana has been in the family for five generations. "I cannot tell you the level of frustration of trying to build a website and waiting five minutes for a picture to upload, especially coming from college where there was unlimited high speed Internet."

Mylet's farm now has broadband access. "I couldn't have my technology company without it," he said. "The older generation had to work really hard to get the ag industry where it is today, and we can thank them for their sacrifice. Broadband technology is what will take the industry to the next step. There will be a lot of challenges to bring this to every farm, but the benefits far outweigh the costs."

Foundation for Rural Service

The Foundation for Rural Service is a 501(c)(3) nonprofit organization based in Arlington, Va., that serves rural communities across the United States. Established in 1994 by the National Telecommunications Cooperative Association, their mission is to sustain and enhance the quality of life throughout rural America by advancing an understanding of rural telecommunications issues. FRS educates the public about the benefits of a nationwide telecommunications network and promotes rural connectivity as an essential link in this network. FRS believes that rural communities—regardless of their size or location—deserve the same connection to the world as do residents of urban areas. FRS provides a variety of programs, ranging from youth-based initiatives and educational materials to consumer awareness and rural economic development.

For more information on FRS, go to www.frs.org

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