GOVERNMENT TECHNOLOGY
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E-gov kiosks make a comeback

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THEY'RE COMING...

Civilian use of drones is poised to explode. Are you ready?

PLUS:
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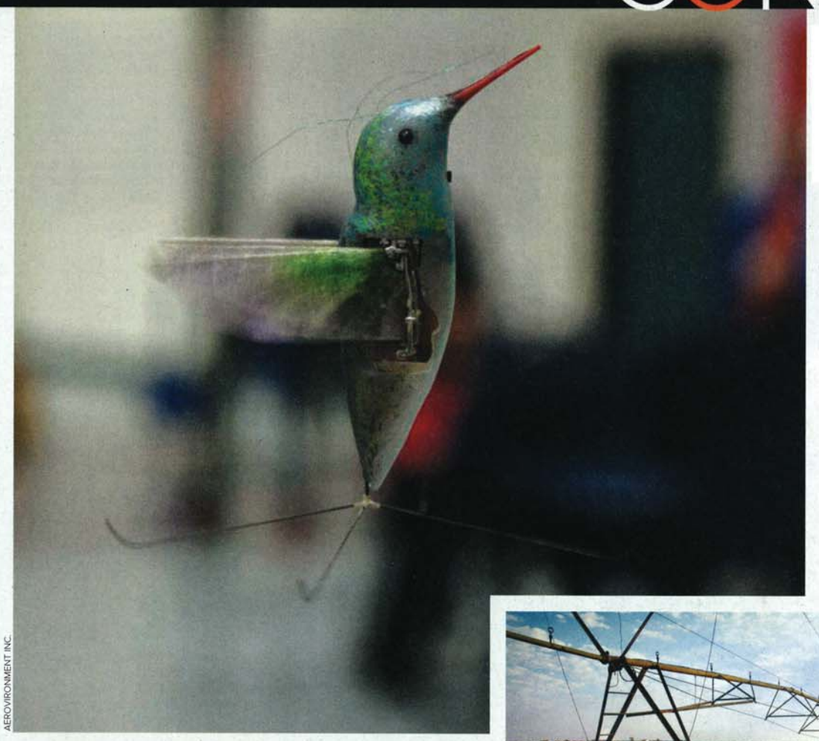

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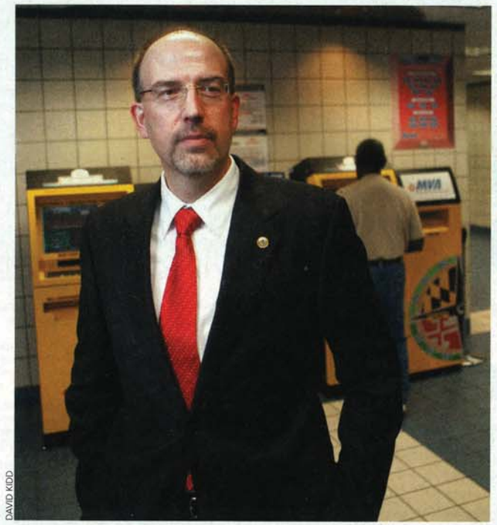
With the expansion of unmanned aerial vehicles into civilian life, drones could search for missing persons, feed photos and video to news outlets, and even deliver your takeout.
By Christina Hernandez Sherwood



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Fresno, Calif., the most productive agricultural region in the nation, works to roll out wireless broadband across a landscape populated primarily with fruits and vegetables.
By Wayne Hanson

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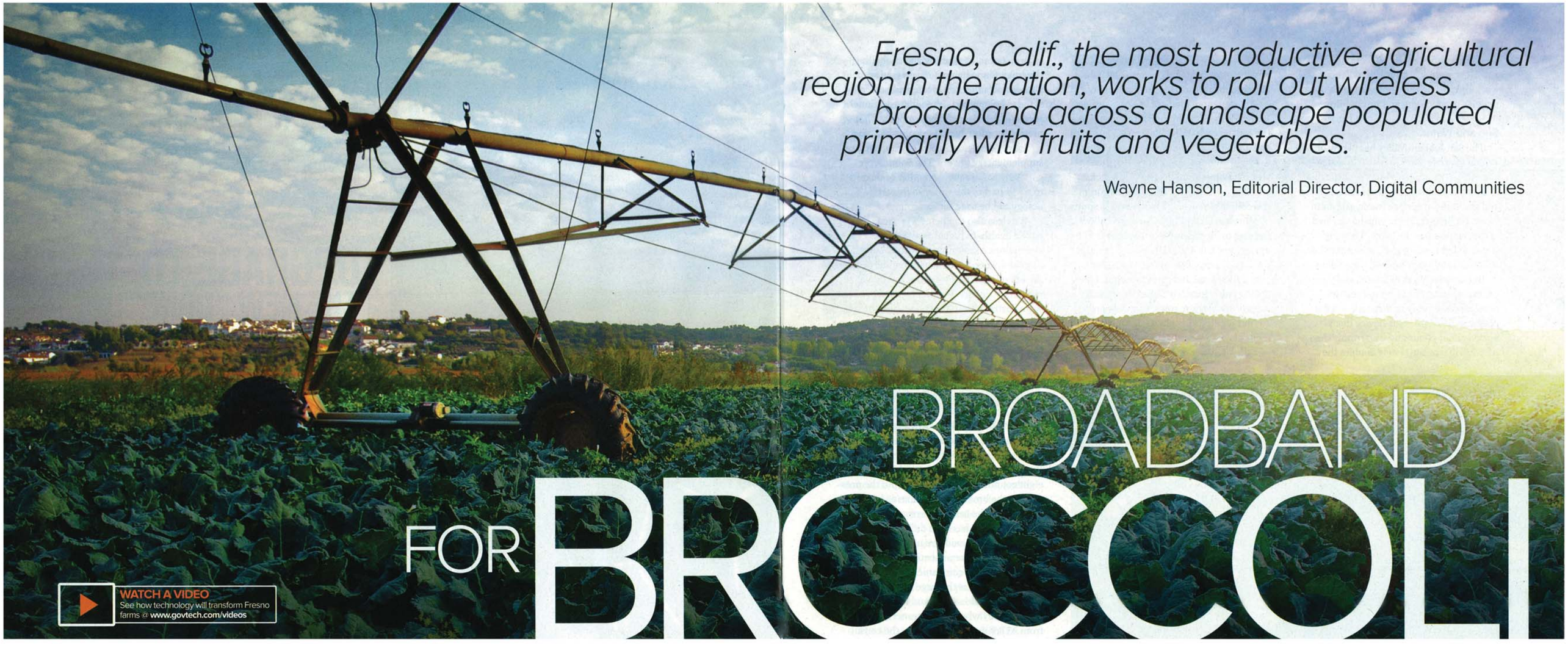

Fresno, Calif., the most productive agricultural region in the nation, works to roll out wireless broadband across a landscape populated primarily with fruits and vegetables.

Wayne Hanson, Editorial Director, Digital Communities

BROADBAND FOR BROCCOLI

WATCH A VIDEO
See how technology will transform Fresno farms @ **www.govtech.com/videos**

With 15 million acres under cultivation and about $6 billion in farm product sales per year, California's Fresno County has some of the most productive agricultural land in the nation. The county sits in the San Joaquin Valley, which is responsible for more than half of California's agricultural production. The region's rich soil, abundant sun and Mediterranean climate mean that nearly 400 different types of crops are grown and harvested there — from oranges, pistachios, olives and alfalfa to peaches, tomatoes, almonds, cotton and broccoli.

Though connecting all rural areas with broadband is a national priority, why would anyone get fired up about blanketing this particular region with wireless broadband? For Fresno CIO Carolyn Hogg, the answer has to do with olive trees as wireless subscribers, tracking tomatoes from vine to dinner plate, self-driving tractors, and agricultural research and education that could boost the state's economy and help feed the world. Hogg, along with a coalition of federal, state, private-sector and local interests, are working to secure high-speed wireless broadband to take the region's agriculture to the next level.

Population Growth and Demand

Although farmers have grown food and fodder for thousands of years without wireless broadband, times have changed. The world's population is expected to grow from 7 billion today to 9.3 billion in 2050, according to Robert Tse, a community planning and development specialist with the U.S. Department of Agriculture (USDA). But the Earth has only 12 percent more arable land available for crop production. And, as millions of people in Asia enter the middle class, diet staples like rice are being replaced with fruits, vegetables and meat.

The key to feeding this growing population is increased efficiency, bigger crop yields and new varieties of plants that resist diseases and pests. Tse forwarded the notion that agricultural productivity could double — and therein lies the opportunity for Fresno County and the San Joaquin Valley's wireless vision.

To that end, Fresno is one of six cities receiving assistance from the federal government's Strong Cities, Strong Communities Initiative (SC2), which is designed to help ramp up economic development by supporting community programs. To get things moving in this direction, Hogg and Fresno Information Services Manager Bryon Horn are co-chairs for the SC2 federal partnership and assembled a "consortium of consortiums" as Hogg termed it, which is composed of state government; the city of Fresno; the San Joaquin Valley Regional Broadband Consortium; private-sector agriculture and telecom companies; and representatives from the U.S. departments of Agriculture, Energy, and Housing and Urban Development, as well as the Environmental Protection Agency. Hogg — who has a background in languages, business, banking and IT — said agricul-

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ture and technology are two of California's strongest sectors. And in Fresno, they're working to unite the two to enhance the region's productivity and profitability.

Sun and Water

The San Joaquin Valley has plenty of sun, so the only other necessity is water — something that's been a bit of an issue due to boron in groundwater and restrictions on and shortages of surface water, said John Horn, 75, Bryon's father, who has farmed in the region since the 1970s. The long-standing fight over water rights has left dead fruit trees and rich cropland lying fallow.

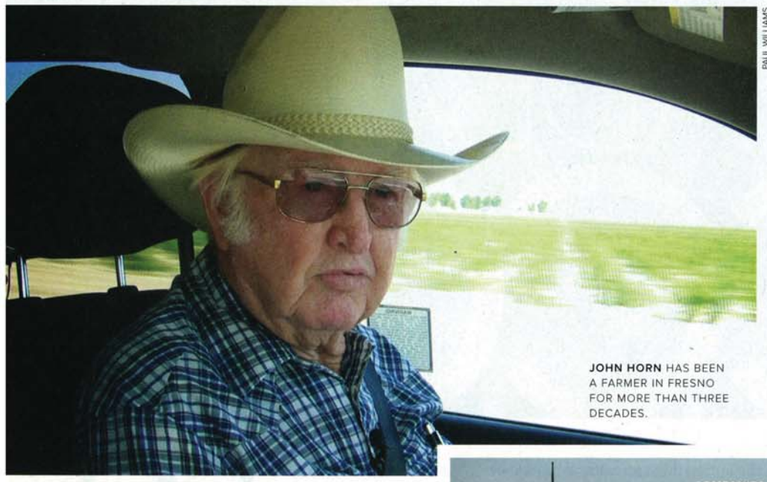
But farmers are resourceful, and the effects of water shortages and restrictions are lessened with drip tape — a flat plastic soaker-hose-type device that's buried under plants and waters only the roots. Drip tape ultimately doubles the number of acres a farmer can irrigate with the same water allocation, said John Horn, so the efficiencies are significant.

An even more efficient use of water, said Bryon Horn, is to put moisture sensors into the soil beneath individual trees, like olives and almonds, so that each tree gets exactly the right amount of moisture. But that requires something that the valley lacks: wireless connectivity. In fact, even commercial cellphone coverage in the area is spotty.

Wireless technology also would allow farmers to incorporate GPS into their operations. Sub-inch GPS is used to guide tractors during planting; rows are then precisely spaced and arrow straight. Later, during cultivation, GPS steers the tractor exactly down those rows, so weeds are cut out while young plants only a few inches away are spared — and the tractor or cultivator is running much faster than with an operator steering and eyeballing the rows. Some harvesters are equipped with sensors that can locate and note sub-standard plants by GPS so that additional seed and fertilizer can be applied to that precise location during the next planting.

Survey-grade GPS accuracy requires supplementary towers. The John Deere company has erected a number of those to cover part of the valley so this technology can be used for agriculture.

Wireless also can help safeguard public health. In recent years, spinach and melons contaminated with E. coli and listeria sickened people nationwide. Before the offending farms were tracked down, millions of dollars of perfectly good produce were destroyed and their sales plummeted. Constant wireless monitoring of agriculture production and shipping would safeguard health and quickly track down any source of food contamination. Wireless sensors that can monitor contaminants in near real time are also under development.



PAUL WILLIAMS

JOHN HORN HAS BEEN A FARMER IN FRESNO FOR MORE THAN THREE DECADES.

JOHN DEERE

COMPANIES LIKE JOHN DEERE OFFER HIGHLY ACCURATE POSITIONING SYSTEMS.

PILOT CITIES: The Strong Cities, Strong Communities Initiative also includes Chester, Pa.; Cleveland; Detroit; Memphis, Tenn.; and New Orleans. Each city has mayoral support and will spearhead its own project, from high-speed rail, education and area revitalization to health services.

Consortium Wireless Strategy

To make such technologies a reality, Hogg said the San Joaquin Valley Regional Broadband Consortium is working with all eight counties in the region "to put the pressure on the broadband vendors to come and build out in the rural underserved areas."

But doing so has been difficult. The larger telcos, she said, are not interested, and a consultant representing smaller telecommunications companies told Hogg and other officials that the large telcos make it almost impossible to expand to underserved areas. To buy wholesale Internet access from AT&T in the Salinas area, the consultant said, costs $136 per megabit per month compared to 50 cents per megabit per month in the city of Sunnyvale.

AT&T, in an email response, said the Internet service product that it sells to its wholesale customers in Sunnyvale is the same product it sells to its wholesale customers in Salinas. "A price difference could potentially occur due to either speed or distance. Price per [megabits per second] depends on what speed of Internet service is purchased. In general, higher-speed business-class products require fiber. If fiber isn't available nearby, a one-time cost would apply to enable construction to connect the locations."

CITY OF FRESNO

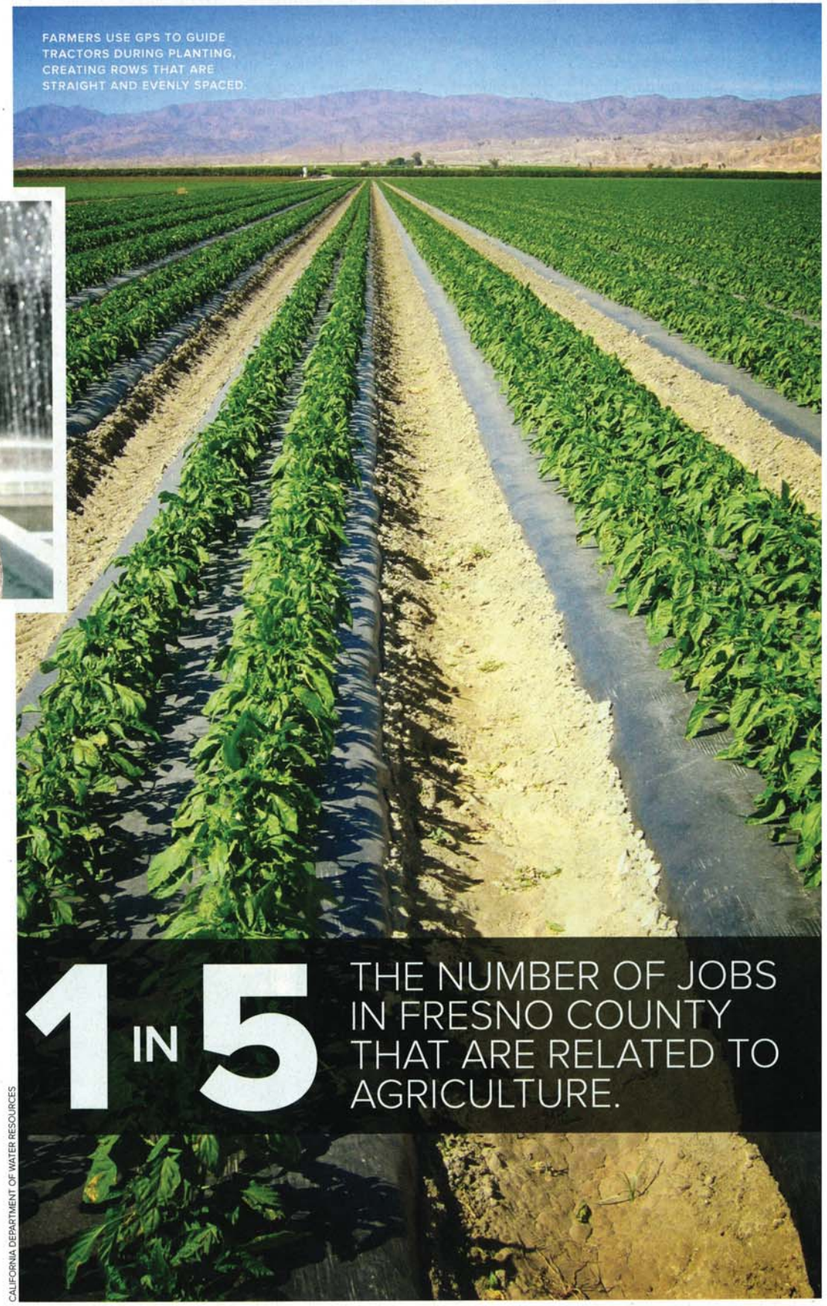
CAROLYN HOGG SAYS WIRELESS BROADBAND ISN'T ONLY AN AGRICULTURAL BENEFIT.

To help resolve those issues, Hogg said California Public Utility Commissioner Timothy Simon issued an RFP. The consortium is focusing on smaller telcos, and it has a California Advanced Services Fund infrastructure grant to assist with that.

A group called Citris, made up of four University of California schools, is identifying locations where wireless broadband will have the most economic impact. Hogg and the coalition partners are now mapping towers and other infrastructure that could be used to help roll out wireless.

The USDA's Tse says broadband is essential for rural economic development — as important as rural electrification in the 1930s. "The electric companies weren't going to come out and wire up the last farmhouse, it was too far away, the economics weren't there," he said. But the New Deal's Rural Electrification Program helped solve that. "Now, electricity is everywhere," he added. "So today's infrastructure piece that's needed is broadband in rural areas. That is a priority of USDA." GT

whanson@govtech.com
twitter@Dcommunities



FARMERS USE GPS TO GUIDE TRACTORS DURING PLANTING, CREATING ROWS THAT ARE STRAIGHT AND EVENLY SPACED.

CALIFORNIA DEPARTMENT OF WATER RESOURCES

1 IN 5 THE NUMBER OF JOBS IN FRESNO COUNTY THAT ARE RELATED TO AGRICULTURE.