digital communities™

Special Report

Critical Mass

How digital technology will redefine the way you live.

BY PAUL W. TAYLOR | CHIEF STRATEGY OFFICER, CENTER FOR DIGITAL GOVERNMENT

A Community Built for 'You'
Why your town will never be the same.

Digital communities are where you live — that's "you" as in *Time* magazine's Person of the Year for 2006, which recognizes and celebrates "the small contributions of millions of people and making them matter." In beating out an impressive list of villains and heroes for the distinction, the magazine's editors contend that "you" — by which they mean the 120 million Americans who are active online as users and creators of content and services — are changing the world by redefining it around your preferences and predilections, and by the technologies you use and the way you use them. The magazine contends its choice just scratches the surface of "a story about community and collaboration on a scale never seen before." The choice was celebrated in some quarters, left others scratching their heads and prompted one humorist to call you by your full name, "YouWikipedicYouTubingMySpacers."

A study by ABI Research reports a surge of social media activity via mobile handsets. The number of wireless users engaged in virtual communities is approaching 50 million worldwide and is projected to reach 174 million in 2011. The study's author, ABI Vice President of Research Clint Wheelock, observes, "The rapid rise of online social communities — gathering places such as MySpace and Facebook — has done more than bring the 'pen pal' concept into the 21st century."

Indeed, "you" live, work and play in mobile social communities and are increasingly untethered from home. In another study, the Pew Research Center reported last spring that 9 percent of Americans do not have home phones

and use their mobile phones as their primary phones.

This suggests that people still love what they can do with their phones — and they do more with a full range of text, data, photo and video features — but don't want to be tied down by a cable. It is reminiscent of the experimentation that came with the introduction of the commodity Internet in the mid-1990s, during which the unique interactive qualities of the network were commingled with content and conventions that were familiar to creators and users alike. Everything of value from earlier media and ways of doing business was carried forward while eliminating much of the physical burden that weighed them down — whether paper, brick and mortar, or the now anachronistic notion of "regular business hours."

The people immersed in social networking and consumer-generated media have much to teach public servants as they extend everything of value from the first decade of digital government into a world that's connected but untethered. To the degree digital government has been perfected (and there is still much to be done), it has been perfected to the desktop PC — delivering information, services and transactions on a 17-inch screen from about 26 inches away. The challenge and opportunity in dealing with all of "you" in a wireless world is adapting to the "third screen" — one that is

a fraction of the size and used in uncontrolled environments, but whose users expect the same quality of experience (and functionality) as any available on a connected PC.

The new season of experimentation has taken root all over. In Franklin, a town of 30,000 in southeast Massachusetts, the Police Department received positive notice for launching a series of public safety podcasts in 2005. In 2006, it began using YouTube to post surveillance video from convenience stores and patrol cars, annotated with a case file number, to show "you" suspects in any number of investigations.

In Nebraska, a group of government, education, community and industry groups created a mobile platform for training and community outreach. One key initiative is a podcasting pilot through which community and regional groups can learn how to tell stories that are important to them, with a view to sharing them the way "you" would expect.

For its part, Wyoming is working out the details for podcasts that would allow visitors to "relive" and share their experience at Yellowstone National Park or any other attractions in the state by repurposing a growing library of video and audio content. State park systems in other states are taking "you" seriously by streaming live video from Web cameras in scenic spots within the parks. Cameras in Arkansas state parks — including those at White River, Bull Shoals, Mount Magazine and Cossalot Bridge — can be controlled remotely by anyone with a Web browser anywhere in the world, putting users in control with the ability to pan, tilt and zoom.

Who Are You?

✓ **80 million** MySpacers

✓ **40 million** bloggers

✓ **1 million** amateur encyclopedians

Source: Wired, Issue 14.07, July 2006

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It is worth noting that the video rides on the same wireless networks that support weather stations and park management systems. Once in place, the wireless networks will be used to provide a Wi-Fi canopy over select state parks in Utah and Arkansas to make "you" feel at home by providing broadband access to the campsite and beyond — a move intended to keep state parks competitive with resorts and commercial tourist attractions.

Back in town, and most places in between, wireless technologies are catching up with a long-held vision to untether public servants, keeping them connected while ensuring they are working when and where they are needed. South Dakota is outfitting its social workers who have tablet PCs with wireless connectivity to help redeem downtime while waiting for court proceedings and ensure they have all the information they need while making home visits.

In communities across the country, wireless connectivity is being used by local governments to monitor, detect and respond to public health threats, such as:
- Mosquito-borne diseases
- Radiation and environmental toxins
- Restaurant inspections

At the same time, wireless technologies are being integrated into the management of:
- Fleets of police, fire and animal control vehicles, plus street cleaners, garbage trucks and the like
- Train stations and airports
- Water and waste water infrastructure
- Illegal dumping
- Fire hydrants
- Road signs

- Electrical sub stations
- Weed abatement

To do all this, and the many things not yet deployed or even imagined, communities need the underlying wireless infrastructure. To that end, municipal wireless initiatives have been pursued in cities of all shapes and sizes — Philadelphia; San Francisco and Mountain View, Calif.; Tempe, Ariz.; St. Cloud, Fla.; Anaheim, Calif.; New Orleans; Annapolis, Md.; and Walla Walla, Wash.

In *Untethered Nation*, a series of strategic planning guides from the Center for Digital Government, we identified three choices for getting wireless services and the underlying infrastructure:

Build — An entity owns and builds the infrastructure, and delivers wireless services across the network.

Buy — These governments mainly consume services from third parties for their own internal operations but essentially leave citizen provision of wireless broadband to the myriad private-sector providers that decide where, when and if they will offer services within various geographic subregions.

Broker — Other governments have assumed the role of broker. Brokers may enter into agreements or contracts with one or more wireless service providers to ensure service provision within their jurisdiction. These may also be referred to as public-private partnerships.

The results of the 2006 *Digital Cities Survey* from the Center for Digital Government demonstrate the multiple hybrids being cobbled together to build out civic wireless infrastructure. Almost all (97 percent) of responding cities are pursuing wireless infrastructure through multiple hybrids. Cities reported doing Wi-Fi (78 percent), broadband cellular (65 percent), mesh (58 percent) and WiMAX/WiWAN (49 percent). If cities were not pursuing a multi-pronged wireless strategy, those numbers would add up to something around 100 percent. The overlap in responses, however, points to the level of hybridity among formerly discrete wireless approaches.

Wireless broadband can make a community more attractive to new industries and new residents, both of whom assume wireless connectivity is part of a community's infrastructure and every bit as necessary as electricity, running water and the like.

It is important not to get stuck in what we thought we knew. Early on, wireless was pitched as a key differentiator. That is, if a jurisdiction was lit up, it was among a relatively small number of progressive places to live, work and raise a family. Now, wireless infrastructure is expected — having it is a cost of doing business; not having it is a liability. But don't take my word for it — just ask "you."

It's Happening

Citywide Wi-Fi initiatives spread like wildfire as local governments choose from the expanding crop of business models.

BY ANDY OPSAHL | STAFF WRITER

THE NEXT STEP in our infrastructural evolution is upon us. Wireless Internet networks are poised to join roads, bridges, sewer systems, running water and electricity as essential ingredients for economic growth.

Thanks to wireless laptops, working professionals are abandoning offices and taking their work wherever they want. They now expect that freedom wherever they travel, and local governments seeking more economic activity are scrambling to accommodate that expectation.

Proponents of citywide Wi-Fi networks promise increased economic development, mobile applications that improve agency efficiency, as well as citizen access to wireless Internet service.

These wireless network infrastructures also serve as catalysts for digital inclusion programs. Many medium and large cities with a Wi-Fi network fund free Internet service coverage for select public school students. The service typically includes a free laptop and training. City officials figure the best way to bring every low-income household online is to begin with the children.

Citywide Wi-Fi networks are breaking out of their infancy with imminent completions in Philadelphia; Portland Ore.; Anaheim, Calif.; and elsewhere. Corpus Christi, Texas, completed its network in summer 2006 and already boasts successful mobile applications.

Other cities are still examining the various business models. No commonly accepted set of best practices exists yet, and experimental models are still emerging.

Local governments and some Wi-Fi providers are learning this business together, occasionally hitting unforeseen obstacles that are measured in millions of dollars. Sometimes a "We want what they got" attitude fouls up contracts later as cities notice new and improved contract features other cities get from their vendors.

Large Internet service providers (ISPs) entice densely populated cities with offers of covering the costs of these wireless network infrastructures. A provider attaches the necessary antennas to the city's streetlights and becomes the sole Wi-Fi provider on that network. The model is a seemingly free lunch, allowing cities to tout citywide Wi-Fi access while barely doing any of the legwork.

Smaller cities typically must pay for the infrastructures themselves and find creative ways to earn back their investments. Leasing broadband not used by agencies to local ISPs is the most popular solution.

Some cities are staying out of public broadband altogether, purchasing the bandwidth they need for internal operations from a private provider and leaving public-use networks to the private sector.

Many metropolitan areas — like Detroit; Orange County, Calif.; Johnson County, N.C.; and Tempe, Ariz. — embrace an incremental deployment as an affordable implementation. These networks typically start out only serving a community's select high-traffic areas. Oftentimes, certain agency staffs are the only authorized users on a network. Local officials then expand the networks as increased funding and demand emerge.

Funding Communitywide Wireless Networks

Funding Approach Best Described As	Cities	Counties
	(Percentage of respondents)	
None	22	49
Advertising (directly or through third party)	2	1
Public appropriation	18	23
Subscriber fees/ charge backs	17	13
Hybrid	32	15

Source: Center for Digital Government

The Do It Yourself Model

Corpus Christi, Texas, adopted a publicly funded model for its widely admired city-wide Wi-Fi network. The city's smaller size forced it to pay the infrastructure costs, requiring $7.1 million on top of nearly half a million dollars in annual maintenance costs. Naturally the advantage is that Corpus Christi owns the network and completely controls the network's direction.

After setting aside 40 percent of the bandwidth for mobile applications designed to streamline agency functions, the city chose to lease the remaining 60 percent to ISPs. The resulting revenue will pay for the network's startup and maintenance costs, and possibly turn a profit that could pay for the city's other technology needs, according to Leonard Scott, program manager of the Corpus Christi Wi-Fi network.

The recently finished network will power several mobile applications, one of which is already succeeding, according to Scott.

Corpus Christi implemented a home building inspection application long before finishing the network. Verizon, Cingular and Sprint installed their own medium-speed cellular equipment at various spots throughout the city where the main Wi-Fi network hadn't yet been installed.

Before the new inspection application, the city's roughly seven home building inspection processes took at least five days each to complete from the time a builder requested an inspection to the time the county approved it.

"Each one of those steps took a minimum of five days — to have the developer make the request, get it on somebody's schedule, bring them into the office, get them the copies of the drawings, get them the copies of the regulations and code, put them in a truck, get them out to that site, survey it, come back, fill out the paperwork, route the paperwork to the supervisor for approval, get the paperwork down to the service center, have somebody notify the developer that the paperwork's ready to pick up, send somebody back to the site and post the notice on that board," said Jeffrey King, director of the utilities business unit at Northrop Grumman, the city's Wi-Fi vendor.

Now inspectors receive their work orders on Wi-Fi-enabled laptops in the morning and drive directly to their first inspection site without stopping at the office. Their laptops are equipped with all necessary documents, a digital camera and Internet access for reference materials.

Inspectors go to inspection sites, complete their inspections, take photos, fill out forms, capture signatures from various city approvers and send the information via e-mail to their supervisor, who approves it and posts it to the building division's Web site the same day, King explained.

He said the application cut 35 days to 40 days out of the time it took to build a house in Corpus Christi.

Scott said the city is introducing a new mobile application that would let engineers inspect repairs of city property from their desks. On-site workers would use a Wi-Fi-enabled video camera to send footage back to engineers in real time. Scott said the application would raise everybody's productivity by eliminating engineers' travel time to and from repair sites.

He also noted that the citywide network gives local dial-up providers a chance to offer Wi-Fi-based services at a time when dial-up demand is vanishing. Since the network already exists, any provider wanting to transition to offering Wi-Fi-delivered Internet services would bypass the expensive network infrastructure costs normally involved.

"Estimates are, in the next three to five years, those folks will be out of business if they don't find some other technology," Scott said. The providers can sell Wi-Fi Internet services and make a better profit. "There is no overhead," he added. "They buy it. They resell it. All they've got to do is support their customers because they didn't have to build an infrastructure first."

Boston is densely populated enough to attract a privately funded Wi-Fi network but recently opted for the public model. Beantown preferred a model that would let several providers share the network and compete against each other.

The Boston Wireless Initiative will likely form a nonprofit organization, separate from city government to fund the project, said Mark Horan, consultant to the initiative. Community organizations and corporations would supply most of the funding rather than taxpayers.

Horan said Boston doesn't plan to subsidize Wi-Fi access for low-income citizens. The city's Wi-Fi nonprofit couldn't afford to fund a service speed that was worthwhile for low-income citizens, he explained, and offering substandard services to those citizens would certainly not close the digital divide.

Horan added that subsidies would ultimately raise prices for paying users. He said an inexpensive rate for a desirable speed generated by the market would be a more practical way to bridge the digital divide than politically and financially treacherous subsidies.

The Ad Experiment

Model: Ad Revenue/Free Service Model

Advantages: The city gets a head start on closing the digital divide with free service for everyone in the city. The provider funds, builds and runs the network while the city boasts of citywide free access.

Drawbacks: The model is in its infancy. Many doubt advertising dollars could support such a network. Little technical support available to users.

Some cities are embracing an experimental advertising model for free citywide Wi-Fi access. In this case, the vendor offers free Wi-Fi to anyone in the city willing to endure a 1-inch advertising banner constantly at the bottom of the screen. Some vendors claim the resulting ad revenue will recoup their infrastructure costs and produce a profit. They boast of guaranteeing online visibility for ad clients because the user looks at those ads no matter where he or she travels on the Internet.

San Francisco accepted an offer from Google and EarthLink to install and pay for a citywide Wi-Fi infrastructure. Google would provide the free ad-funded service, while EarthLink would contribute the infrastructure and regular fee-based services for those wanting to skip the ads and have a faster connection.

Portland, Ore., released an RFP for its Wi-Fi network in 2005, expecting the winning vendor to offer free Internet service in just a few select spots in the city. Portland also asked for a "walled garden" arrangement, which would allow all citizens free Wi-Fi access to 20 Web sites of the city's choice.

MetroFi, a venture capital-backed ISP, offered Portland the citywide advertising-funded model and won the contract. Construction is under way, and the vendor will complete two square miles for testing by early 2007, said Logan Kleier, project manager for the Portland Wireless Initiative.

"Once that's finished, tested and approved by the city, then MetroFi will build out to the rest of the city, finishing by mid-2008," Kleier said. "MetroFi thinks it will finish sooner."

The free service, advertising model may sound enticing, but "free" often comes at a price. Normally when you lose your Internet connection, you call technical support.

Building Communitywide Wireless Networks

Build-Out Approach Best Described As	Cities	Counties
(As a percentage of respondents)		
None	17	43
Public Utility	8	6
Private Provider	32	32
Hybrid	36	19

Source: Center for Digital Government

MetroFi's free Wi-Fi services don't include phone support. Kleier said the company would set up an online forum for users to trade advice on how to fix connection difficulties and other service problems. It seems fair to note, however, that users might have trouble participating in this online forum while disconnected.

Portland users wanting to bypass the advertising banner and help forum can purchase services from MetroFi for $20 per month, a deal that includes telephone technical support.

The Portland Wi-Fi deployment faced a few major difficulties however. The city does not own its public utility, and MetroFi had to negotiate power rates with Portland General Electric (PGE).

PGE had a minimum rate that would have charged MetroFi for far more power than its antennas used, Kleier said. The utility eventually agreed to file a new tariff
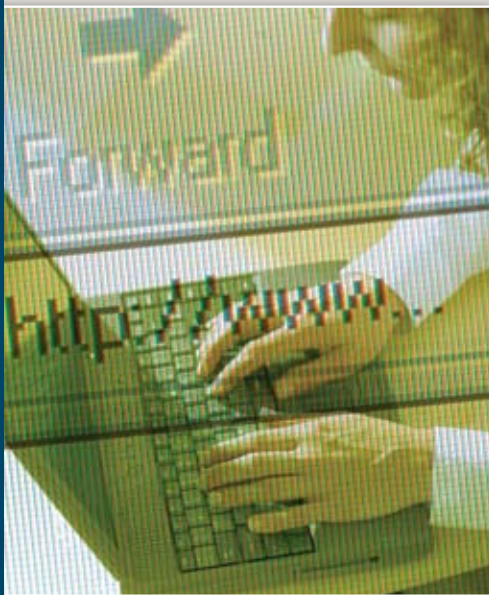
that would bill the city at a rate closer to the antennas' power usage. MetroFi would then reimburse the city for paying that bill.

Sacramento, Calif., is on its second attempt at an advertising-based, citywide Wi-Fi network. Before Portland's MetroFi contract, Sacramento accepted a proposal in 2005 from MobilePro, an ISP offering Wi-Fi at 56 Kbps and free service for two hours a day. Later, the vendor rescinded its offer when Sacramento officials demanded additional terms and conditions they began seeing in other citywide advertising-funded Wi-Fi contracts.

MobilePro said it couldn't do a financially viable advertising model under those demands, according to Sacramento CIO Stephen Ferguson, who added that MobilePro tried saving the deal by requesting that Sacramento commit to buying more than $1 million in Wi-Fi services annually, but the City Council declined.

"As time went on, and we saw other deals happening, the City Council got a clearer picture of what they really wanted," Ferguson said. "When we issued the new RFP after MobilePro withdrew, we were very specific, unlike the first time where we

just said, 'We want Wi-Fi. Tell us what you can do.'"

Craig Settles, an IT analyst based in Oakland, Calif., opposes the advertising model, doubting its business viability. Publicity expenses, he said, and network-related building and maintenance costs create too much overhead.

"You have to build a $7 [million] to $10 million network," Settles said. "That requires a lot of ad money to generate that kind of revenue. Then you have to support and sustain the network, which runs you about 10 to 20 percent of the cost of building it out. If you build out a network for $10 million, you've got to raise $1 million a year for ongoing support and upgrades."

Power Struggle

Sacramento, Calif., learned the hard way that a city should first check whether it has gang-switched streetlights or streetlights using light-level sensor technology before releasing an RFP, said Stephen Ferguson, the city's CIO.

Light-level sensors individually power streetlights, keeping electricity in the poles 24 hours a day. Gang-switched streetlights — thus called because a single switch controls several lights — are only powered at night.

Wi-Fi antennas can't operate on a gang-switched streetlight during the day without expensive alterations to the pole or antenna. Sacramento officials didn't know most of the city's streetlights were gang-switched, Ferguson said.

"We didn't ask the Street Department because I didn't know the difference between gang-switched and light-level sensor-switched," Ferguson said. "We basically said it was up to the vendor to determine any issues with using the city streetlight poles."

Tempe, Ariz. — MobilePro's last city Wi-Fi client — used light-level sensor streetlights, Ferguson said, and MobilePro assumed Sacramento used them too.

"When MobilePro didn't do their research and submitted their bid, we then told them, 'Well, tough luck guys. You were responsible for determining that, and you made assumptions that were inappropriate. You're stuck with it,'" Ferguson said.

The oversight added roughly $2 million to MobilePro's infrastructure costs. Ferguson said MobilePro indicated it was willing to swallow those costs before negotiations dissolved.

Portland, Ore., used the potential for a Wi-Fi powered automated meter reading system to help sell the wireless initiative to citizens. Later, city officials learned that the technology wasn't mature enough, said Logan Kleier, project manager for the Portland Wireless Initiative.

"They take too much power and drain the battery down from our wireless parking meters," Kleier said. "That's really a technological issue that has to be overcome. The city's not a research and development lab, so we can't hurry that process along."

Free Ride

Philadelphia was the first large metropolis to pursue a citywide Wi-Fi network. Wireless Philadelphia, the city-created nonprofit organization charged with implementing the network, accepted an offer from EarthLink to build the infrastructure for free. EarthLink will be the sole ISP on the network.

"We've got a pretty good arrangement that shifts the financial burden and the risk to a private company, but ensures through strong agreements and the presence of a nonprofit partner that we achieve our civic, public and social mission," said Greg Goldman, CEO of Wireless Philadelphia.

EarthLink agreed to start paying Wireless Philadelphia 5 percent of its profits after the third year of the project's life. The company will also offer below market price Internet service accounts to qualifying low-income users. Regular users will pay $20.95 per month while select low-income users pay $9.95 for the same quality of service, Goldman said.

IT analyst Craig Settles derides the private model as a municipal copout. He argues that a city can only ensure a Wi-Fi network fully benefits citizens if the city itself controls the network. A private-sector ISP would prioritize its shareholders' well-being before that of the city as a whole, Settles explained.

Goldman said he couldn't deny the benefits of a city-owned network, but he countered that the Philadelphia arrangement has mechanisms to protect city interests.

"It's not like Philadelphia just went forward and said, 'Here, EarthLink; here are the keys to the city — have at it,'" Goldman said. "There is a very strict network agreement and series of agreements between Philadelphia, its agents, Wireless Philadelphia and EarthLink to ensure that this network meets the objectives of the city."

Settles said the potential for agency mobile applications, citywide Wi-Fi access and the likely economic development ought to justify a city funding the network independently. Many municipal officials reject that option, he added, saying it constitutes the city exceeding its boundaries and entering the telecommunications business.

"In Springdale, Ark., they levied a sales tax, raising $33 million to pay for a minor league baseball stadium. No one ever says, 'The city is getting into the sports management business,' or, 'The city is going to own a baseball team,'" Settles said. "All of these arguments you hear against municipal wire-less, you don't hear in the sports stadium scenario, yet it's the same basic thing."

He added that cities pursuing the private model are misguided to think citizens won't blame city government instead of the provider if problems occur. Perception is reality, Settles said, and users will perceive the city as responsible for the network's success or failure.

"If something goes wrong [the average citizen] is going to city hall," Settles said. "If [he or she] is unhappy, it's going to show at the voting booth. There is going to be a price to pay for failure, and if it's not dollars, it will be in political fallout."

As a middle ground, Milwaukee is combining elements of the Philadelphia plan with aspects of the Corpus Christi model. Midwest Fiber, a private broadband provider, is paying to build Milwaukee's network, but only to lease it to several competing ISPs. Milwaukeeans won't pay a dime to build the infrastructure but will still get a slew of competing service provider choices.

Toward a Wireless World

A look at wireless trends and innovations in local governments.

BY EMILY MONTANDON | EDITOR, SPECIAL PROJECTS

EVERY YEAR, THE CENTER for Digital Government conducts the *Digital Cities* and *Digital Counties* surveys. The 2006 surveys polled more than 300 local governments about everything from organizational arrangements to infrastructure to services.

The surveys show that local governments deploy wireless networks to solve a number of challenges — often simultaneously — including economic development, digital inclusion, increasing government efficiency and improving constituent services.

The dominant technology currently in use is Wi-Fi/mesh. But for some jurisdictions, broadband cellular cards have proven more advantageous for mobile staff. Though microwave access appears somewhat common for nonpublic government networks, such as mobile police networks and fixed WANs used by government staff, at least one WiMAX-standard deployment for public access has cropped up in Manchester, Conn., where the city is deploying a small test network for webcam video surveillance, and the city plans to cover the entire city in the future.

Broadband Plan

Broadband deployment strategies are diverse. The majority of local governments are relying to some degree on private providers for community wireless broadband deployments, with less than 10 percent of jurisdictions using a public utility or government-owned network model.

Regional collaboration has also come to light in a few places, often with a county and the cities within it collaboratively developing a broadband strategy. In one of the largest regional collaborative initiatives, 10 cities in the Denver metro area banded together, forming a consortium, known as Colorado Wireless Communities (CWC), to attract a private-sector partner to cover approximately 200 square miles area with wireless access.

There is much to be learned from the aggregated data collected by the Center for Digital Government's local government surveys, and plenty of inspiration to be found in the innovative projects brought to light. The following pages highlight emerging wireless trends in government as well as some of the innovations reported in 2006.

Types of Wireless Infrastructures Present in Jurisdictions

	Cities	Counties
	(Percentage of respondents)	
None	3	10
Public Safety 700/800 MHz Radio	81	62
Broadband Cellular	65	47
IEEE-based Broadband Wireless Access Point (Wi-Fi)	78	62
IEEE-based Broadband Metropolitan Wireless Access (WiMAX, WiWAN, etc.)	49	28
Mesh	58	26

Source: Center for Digital Government

The Multiplier Effect

Communities of the 21st century take a different approach to economic development than communities of the past. In today's globalized world, telecommunications infrastructure is key to successfully stimulating a community's economic environment.

As a result, today's leaders have actively invested in network infrastructure, such as fiber optics or citywide Wi-Fi, to create the backbone necessary for 21st-century commerce.

Stimulus

In 2002, Tallahassee, Fla., leaders authorized spending for a "Digital Canopy" project that provides free wireless access to the Internet for the city's airport and a large downtown area. City officials said the Digital Canopy is a crucial component to projecting the tech-friendly environment that IT companies look for in a community when considering relocating offices or opening up new ones.

Colorado cities too recognize the economic development benefits of telecommunications infrastructure. Boulder, Colo., IT staff began an initiative in April 2006 to evaluate the feasibility of a communitywide wireless broadband network to, in part, stimulate economic development.

Nine other cities in the Denver metropolitan area partnered with Boulder, creating the Colorado Wireless Communities (CWC). The CWC planned to release an RFP in January 2007 for private-sector investment in wireless Internet connectivity that would blanket approximately 200 square miles and serve about 630,000 people in those 10 communities.

Economic development isn't just about bringing new companies to a community. Revitalizing an existing neighborhood can create grass-roots growth in a community's economy. The Hollywood, Fla., Community Redevelopment Agency sponsored a similar project that offers free Wi-Fi Internet access in the city's downtown and beachfront areas for residents and tourists.

Looking Forward

Some economic development efforts look to the long haul. These efforts often take the form of "digital inclusion" programs, which use information technologies to foster education and improve a community's quality of life.

City leaders in Riverside, Calif., created SmartRiverside to attract and retain high-tech companies. The initiative aims to increase the city's technology literacy through digital inclusion and build a smarter community through free citywide wireless Internet access. SmartRiverside also endeavors to identify new programs that encourage technology innovation and use in Riverside, and attract high-tech companies to the city's Technology Park.

The city's mayor serves as chairman of SmartRiverside, and the city's CIO serves as the nonprofit's executive director. City officials use incentive programs, such as tenant-improvement assistance for as much as $30,000, and employee-relocation programs for as much as $5,000 per employee, to attract high-tech firms to the city.

Such efforts aren't limited to cities. Counties too realize that the cities within their boundaries depend, in part, on county government's willingness to institute economic development programs.

Oakland County, Mich., is behind the Wireless Oakland initiative — a planned wireless cloud that will provide Internet access to a 950-square-mile area. The county is also developing a Telecommunication and Technology Planning Toolkit for Local Governments to help those governments plan for the future and devise their own programs to stimulate economic development efforts.

Similarly Richland County, S.C., participates in community development conferences on broadband access, both wired and wireless, with leaders from economic development agencies, local government, education, business, public housing, community development corporations and technology companies. The goal is to spur, support and sustain economic development in low-income neighborhoods.

*— Shane Peterson, Associate Editor,
Government Technology*

Percentage of Jurisdictions with Wireline Broadband

	Public Facilities		Business Districts/ Commercial Areas		Residential Areas	
	Cities	Counties	Cities	Counties	Cities	Counties
None	8	31	24	55	29	57
1/3 or less of facilities	7	10	8	9	5	9
1/3-2/3 of facilities	13	9	10	9	14	9
2/3 or more of facilities	65	49	50	24	44	20

Source: Center for Digital Government

Building Bridges

Still important in the public sector is digital inclusion — or bridging the digital divide. Many counties nationwide are working toward access for all citizens — urban and rural, wealthy and poor — and pursue these goals in diverse ways. Key trends include public-private partnerships, providing Internet access at libraries and other public facilities, and offering these services at low or no cost.

Reaching Rural Locales

Some rural localities have partnered with the private sector to bring wireless mesh broadband to previously unreachable areas. In 2005, Franklin County, Va., conducted a Broadband Assessment Study to document the current state of service nationwide. After issuing an RFP and partnering with a vendor, work to link outlying local government offices and provide broadband to rural areas of the county is well under way.

Another county partnering with the private sector — as well as other local units of government — to expand broadband in the region is Kent County, Mich., which is currently pursuing a Wi-Fi-based approach, since the wired approach is economically impractical.

the public in the airport, the library and county courthouses.

Palm Beach County fully funded its wireless initiative and is in the early stages of planning a broader deployment of public Wi-Fi that will create hotspots in the downtown areas of several municipalities.

In Roanoke County, Va., private ISPs deliver wired and wireless access to citizens through subscriptions. Without competing with these vendors, the county hopes to enhance the lives of citizens who live in areas where broadband is unavailable. With tax dollars, the county built limited wireless broadband access in many county administrative buildings, and usage is free to visitors. The county library system also offers publicly funded broadband access at all its annexes.

Universities, convention centers and public schools are also common sites for public Wi-Fi networks.

Forsyth County, N.C., is working through WinstonNet, a nonprofit initiative established in 2001 to bring broadband access to underserved communities in the county. The organization — whose members include the city of Winston-Salem, Forsyth

nism to provide equipment for low- to middle-income households.

Low-Cost Wireless

Many counties and municipalities are working with wireless providers to deploy low-cost broadband access.

In Philadelphia, Wireless Philadelphia worked with a private ISP to launch a citywide Wi-Fi network. Low-income residents can obtain broadband access by visiting several free hotspots throughout the city or by subscribing for a reduced rate.

Montgomery County, Md., initiated a program that provides free Wi-Fi to the general public. The Silver Spring Wireless Fidelity project provides wireless access in open-air public spaces in downtown Silver Spring, Md.

Also working to provide free wireless Internet access is Oakland County, Mich., whose Wireless Oakland initiative will provide free high-speed Internet access to every county resident, business and visitor. The project will be accomplished through a unique public-private partnership, leveraging technology investments already funded by Oakland County residents to create a blend of free and for-fee services. The initiative also aims to provide computing devices and technical training to residents who normally would not have access to the technology.

— *Jessica Jones, Editor,*
Emergency Management

Percentage of Jurisdictions with Broadband Wireless Deployments

	Public Facilities		Business Districts/ Commercial Areas		Residential Areas	
	Cities	Counties	Cities	Counties	Cities	Counties
None	9	38	25	59	39	63
1/3 or less of facilities	35	33	38	24	32	24
1/3-2/3 of facilities	27	33	15	24	8	7
2/3 or more of facilities	21	13	14	7	13	6

Source: Center for Digital Government

In both Franklin and Kent counties, extending wireless broadband to rural areas will also help improve public safety by increasing flexibility and information capabilities.

Public Access

Many communities offer broadband access in public facilities. In Palm Beach County, Fla., Wi-Fi access is available to

County, and local schools, libraries and other organizations — is working to bridge the digital divide by providing computer labs throughout the county in churches, libraries, parks and other public locations. The group is now planning a community-wide wireless initiative that would provide free wireless in all computer labs, and free or low-cost service in Winston-Salem. WinstonNet is also establishing a mecha-

Enhancing Efficiency

Government efficiency is on the rise as more municipalities adopt wireless technologies and mobile applications. This increased efficiency is being realized in such areas as field inspections, law enforcement, internal communications, disaster recovery and security.

For example, one-third of counties responding to the Center for Digital Government's 2006 *Digital Counties Survey* said wireless broadband is available in certain public facilities, such as government offices, schools, airports and libraries, though wireless broadband connectivity isn't as prevalent as traditional broadband.

These broadband strategies enhance efficiency in various ways. Typical examples include connecting field employees to the office, improving law enforcement communications and enhancing first response.

Mobile applications, such as meter reading, permitting and inspections, are changing the fundamental nature of government business by decreasing paperwork, reducing costs and improving service delivery — all of which come under the umbrella of improving government efficiency.

Field Operations Streamlined

Field inspections have been significantly enhanced as many counties adopt cellular broadband capabilities. For example, Loudon County, Va., has an e-permitting project under way that is helping to transform both internal and external operations. Contractors, builders and other customers are witnessing their wait times for permits slashed from days to minutes as wireless connectivity allows for on-site permitting. Inspectors are no longer tethered to the office as jurisdictions embracing a wireless strategy realize the potential of mobile telecommuting. Furthermore, worker productivity increases have cut the need for hiring additional staff.

Public safety is experiencing a revolution as wireless and other technologies change the way police officers, firefighters and other first responders do their jobs. Yakima County, Wash., for example, claims to have the nation's largest 802.x wireless public safety network, covering approximately 700 square miles with high-speed data access that is available to law enforcement agencies. Additionally this wireless network is being adapted to serve multiple purposes such as courthouses, county offices and libraries.

There are a number of other wireless broadband applications for public safety being deployed. Wi-Fi hotspots at police and fire stations, for example, allow for the rapid exchange of mission-critical information. Mobile computers in patrol cars let officers perform tasks such as querying the National Crime Information Center and filing paperless police reports. GIS tools also help first responders locate and navigate to emergency scenes.

Testing Positive

Results from the survey are encouraging. Many responding law enforcement agencies don't rely exclusively on traditional communications technology, such as two-way radios. In fact, nearly 60 percent of respondents said local law enforcement is connected to a digital communications network that affords them access to license plate data, drivers' licenses, mug shots and criminal histories. In addition, those same respondents are fully integrated with federal and state criminal databases, local courts and corrections facilities. A majority of respondents have also deployed citizen-facing Web sites for those seeking information regarding convicted sex offenders' whereabouts.

Another strategy for effecting change are city and county approaches that link outlying facilities and employees. Clay County, Iowa, for example, worked with a private ISP to deploy a wireless network to connect distant county offices.

Survey respondents who are actively working to strengthen their overall IT infrastructure make possible these gains in efficiency. According to the survey, a majority of responding counties said they have taken an enterprise approach to their technology infrastructure, with many or all operating departments and agencies using a common network computing infrastructure.

— Chad Vander Veen, Technology and Politics Editor, Government Technology

Crossing the Line

Constituent service is, or at least should be, the core reason for government's existence. Findings from the Center for Digital Government's 2006 *Digital Cities* and *Digital Counties* surveys indicate that communities nationwide are implementing technology strategies to enhance the citizen-government relationship. The aging yet relevant axiom of "online, not in line" continues to drive the efforts of governments large and small. Today there are more online applications available to citizens than ever before, meaning the ability for people to conduct their business with government is becoming more efficient.

Giving citizens the opportunity to complete online transactions that in the past required them to visit one or more government offices is the most common and most compelling way to apply technology to constituent service. As the survey details, cities and counties offer an increasingly diverse suite of electronic services. Most provide commonly used forms online — with a growing number of jurisdictions allowing users to submit those forms electronically as well.

Survey Says

For example, 73 percent of survey respondents have property assessment and tax forms available online, with 56 percent reporting such forms can be submitted electronically. Forms for jury duty and other court services are available online in 38 percent of responding counties, with 33 percent affording citizens the ability to submit forms electronically. Almost half of responding counties offer county records searches online, approximately one-third of respondents allow citizens to submit forms for building permits and recreation services, while fewer than a quarter accept online submissions for child support and services or occupational license renewal.

These numbers indicate local governments are stepping up in terms of service delivery. Yet it is also clear there's still a long way to go.

Returning to the occupational license renewal example, only 12 percent of responding cities say their citizens can complete and submit forms online. Online license renewal could therefore be considered one of the key services cities and counties might choose to focus on in their drive to improve constituent service.

There are a number of excellent examples of the efforts of cities and counties committed to enhancing their ability to deliver the kind of quality, in-demand service their citizens want. Tucson, Ariz., is one such example. The city designated its business licensing for a significant upgrade. After the upgrade is implemented, most tax and license transactions will be available online to city residents. In Contra Costa County, Calif., an online application for accessing and paying taxes is being implemented in conjunction with an interactive voice response system that will provide telephone access and payment services for those citizens unable or unwilling to use the online application.

Practical Application

Effectively improving constituent service is more than providing online transaction, permit and payment applications. CRM and 311 systems have also emerged as technologies vital to the local government strategy. In a related question, the survey asked counties whether there is a single online citizen service area where constituents could request services, report problems or lodge complaints, and complete citizen satisfaction surveys. The results were mixed. Thirty-eight percent of respondents said they had a citizen service area on the county Web site. Ten percent of county respondents also reported having a database consolidated between the Web application and a telephone call center. Forty-five percent, however, do not have an online citizen service area — meaning ample room for improvement exists.

Looking at Chicago, one will find some innovative applications for CRM and 311 systems. Chicago is using CRM, 311 and GIS technologies to provide mobile "one-stop shopping" for families in need of social services. The system is available during emergencies — such as Chicago's handling of Katrina evacuees — as well as nonemergency events and ongoing service delivery. The one-stop combination of relevant services from multiple levels of government can be customized to meet individual citizen needs.

Many cities and counties across the nation continue to adopt CRM and 311 strategies. Many are also deploying innovative services like citywide Wi-Fi, public GIS applications and all sorts of online permitting applications. In terms of constituent service, the survey shows that much has been accomplished, and yet much remains to be done.
— Chad Vander Veen, Technology and Politics Editor, Government Technology

Digital Pioneers

Local governments are experimenting with a broad range of wired and wireless services aimed at streamlining government operations and improving the quality of life for community residents.

An examination of the 2006 *Digital Cities* and *Digital Counties* survey results shows that local governments are using innovative technology to enhance city libraries and parks, boost public transit use, deter crime, and even compete for scarce employees.

Smart Libraries

Public libraries often are an early target for municipal wireless initiatives. These are among the first facilities to receive wireless network infrastructure, usually in an effort to improve citizen satisfaction, enhance education and serve residents who lack home Internet access.

Communities also have done a significant amount of work in making transactions, such as renewing library cards, available online. Approximately 40 percent of coun-ties responding to the 2006 *Digital Counties Survey* provided such services via the Web.

Now some forward-looking library systems are using wireless technology to boost citizen convenience and reduce library staffing requirements. Carlsbad, Calif., and Lewisville, Texas, are among several communities using RFID technology to automate and simplify the process of checking out books, CDs, videos and other library materials. Advances such as this contribute to the Carlsbad library's consistently high ranking in the city's annual citizen satisfaction survey. More than 97 percent of Carlsbad residents ranked library services as good or excellent in the 2006 citizen survey.

Enhanced Recreation

Communities also are experimenting with wireless applications to boost the popularity and usability of parks and recreational facilities.

In summer 2006, New York City announced that free Wi-Fi networks would be installed in 10 major city parks, including Central Park, Union Square Park and Corona Flushing Meadows. The project is a partnership between the New York City Department of Parks and Recreation, New York-based WiFi Salon and Nokia.

Mecklenburg County, N.C., installed its own wireless network in Freedom Park more than a year ago, using seven wireless access points to blanket the 98-acre facility with free Wi-Fi service. The county intends to add wireless access to other parks and greenways in the future.

Meanwhile, Lincoln, Neb., plans to add RFID tags to public swimming pool passes sold by the city Parks and Recreation Department for the summer 2007 swimming season. The city expects RFID to reduce fraud by making it harder for people to share pool passes. RFID-equipped passes also could incorporate medical alert information and emergency contacts for pool patrons. Furthermore, the technology will let the city track when visitors enter and leave pool facilities, a boon to parents trying to keep tabs on their kids during the summer.

Public Transit

A growing number of communities are developing technological amenities designed to attract more riders to public transportation systems. These applications are aimed at making waiting for a bus more tolerable and improving the rider experience once citizens are aboard.

Lafayette, La., plans to use GPS technology to perform real-time tracking of its transit bus fleet. The system will deliver the information to bus terminal displays and Web-enabled handheld devices, giving riders up-to-the-minute data on arrival times.

Bus terminals will display a large projection of a map showing designated bus routes. Buses will appear as unique icons along these routes, providing a spatial view of their current locations. Tracking information will be updated twice per minute. Any rider with an Internet-capable device will be able to link to the transit bus Web site, and view the same location and status information provided in the terminals.

Besides improving rider satisfaction, Lafayette expects tracking technology to

improve management of the bus system. The new technology will automatically collect timeliness and performance data. It also will warn dispatchers if a bus leaves its designated route and alert the appropriate responders if an onboard emergency alarm is sounded.

Tempe, Ariz., will offer Wi-Fi service at city bus stops, giving riders something to do while they wait.

And Colorado Springs, Colo., has equipped some of its transit buses with free wireless service since late 2004. Colorado Springs officials say it costs about $50 to equip a bus with wireless connectivity, using a broadband cellular connection that's linked to a wireless router in the vehicle. The low-cost technology has proven popular with bus riders. Offering free wireless service on the 75-minute commute between Colorado Springs and Denver helped boost sales of monthly bus passes by more than 82 percent, according to the city.

Safer Communities

Of course, public safety agencies are long-standing users of wireless technologies. But communities still are finding opportunities for innovations that improve the health and safety of residents.

Virginia's Roanoke County equipped its fire and rescue stations with wireless broad-

band access points that work in conjunction with local hospitals to quickly transfer secure patient data to health-care professionals.

Similarly Richardson, Texas, expects its citywide Wi-Fi project to greatly benefit emergency response. The city Fire Department hopes to provide real-time video from the back of an ambulance to a doctor waiting at the hospital. And the Richardson Police Department expects wireless broadband to complement its shift from analog to digital video for in-vehicle cameras. Officials say the increased bandwidth offered by Wi-Fi may allow dispatchers to view live digital video from in-car cameras, improving both communications and officer safety.

Other communities will use wireless video to extend the reach of law enforcement agencies even further.

Roanoke, Va., is working with Nortel to build a wireless mesh network along its downtown corridor that will support digital video cameras at heavy traffic intersections. Data will be fed to the city's police, fire and traffic engineering departments.

And two Florida cities — Delray Beach and West Palm Beach — said they're contemplating the use of wireless surveillance cameras to tame high-crime areas. West Palm Beach officials said the technology could deter criminal activity and aid in

prosecuting individuals caught breaking the law. The city already has selected appropriate camera locations and expects to begin deployment in early 2007.

Automated Recruitment

Although not a wireless service, several local governments say they're using Web technology to streamline the recruiting and hiring of new employees. Widespread availability and popularity of commercial employment Web sites have prompted local governments to move a growing number of public employment resources online.

For instance, it's now fairly routine to find job openings posted on city and county Web sites. But some jurisdictions are going several steps further.

Vacaville, Calif., intends to implement an applicant tracking system that will let job seekers apply for city jobs online, then track their applications electronically throughout the hiring process.

Business rules will be built into the process, and tasks such as prescreening and progress monitoring will be automated, allowing the city to handle job applications more effectively and efficiently. Furthermore, job seekers will get a quicker response and better information about the status of their applications. Beyond the fact that it will streamline internal operations, Vacaville views the new system — expected to be deployed within the next several years — as a competitive edge for recruiting talented workers.

Tip of the Iceberg

Given the fact that municipal-scale wireless infrastructure development remains in its infancy, the deployment of innovative mobile services is poised to grow dramatically in the coming years. Much like the public sector's first foray into "e-government" a decade ago with the emergence of Web-based services and information, it'll likely take a while to arrive at definite uses for the emerging wireless channel.

In the meantime, these forward-thinking jurisdictions are helping pioneer the evolution of digital communities.

— *Steve Towns, Editor,*
Government Technology

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