Six Steps for Building an IoT-Ready Network

How state and local governments can use robust networking to become a connected community.

INTRODUCTION

Opelika, a city of about 36,000 residents in eastern Alabama, is on its way to becoming a connected community. The city is experimenting with energy-saving controllable LED street lights that could reduce electricity costs by 50 percent and sensors that monitor parking, nitric oxide, industrial park gases and water quality.[1]

Opelika is a relatively small city, but it's leading the way for communities across the United States as part of a bigger trend to capitalize on the Internet of Things (IoT) and implement an array of smart technologies. A recent national IoT survey of state and local government officials conducted by the Center for Digital Government (CDG) found that 45 percent of respondents are already procuring IoT technologies. These communities want to improve service delivery, public safety and quality of life for their residents with smart street lights; intelligent transit; public Wi-Fi; and sensors to monitor air quality, flood zones, earthquakes and more.

But the volume of sensors and other network-connected smart devices necessary to achieve these ends is staggering. According to Cisco, 50 billion IoT-connected devices are expected to be in use by 2020.[2] IDC predicts New York City alone may collect information from as many as three million connected devices, while a typical city of 100,000 people ultimately may manage more than 25,000 sensors.[3]

Supporting exponential growth of smart and connected devices requires a different approach to networking. This activity will strain outdated government networks, eating up bandwidth, limiting performance and consuming scarce budget dollars. It will also strain government IT departments as they try to keep pace with growing network management and maintenance requirements.

Ultimately, smart city or smart state initiatives will only be as good as the networks behind them. To take full advantage of the IoT, government leaders will need a new generation of network technology that's dramatically easier to deploy, manage and scale.

SMARTER AND CONNECTED: A GROWING IMPERATIVE

There are several drivers behind the push for connected communities, but most can be distilled into three categories:

Improving citizen services and quality of life. Becoming "smart" doesn't only mean connecting endpoints, it's also about ensuring citizens are connected to the government services they need. Increasingly, this means offering information and services online or through an app. In a 2018 CDG survey of more than 2,000 U.S. citizens, 40 percent said they prefer to do business with government via a website, and nearly the same amount (38%) had accessed government services from a mobile device in the last year.

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But providing government services digitally is only half of the equation; residents then need access to these online services. Nineteen million Americans, a majority from rural or underserved communities, still lack broadband access — which is essential for everyday activities, from applying for jobs to completing homework or requesting assistance from community organizations. Many look to government organizations to fill this connectivity gap.[4]

Strengthening public safety. In the 2018 CDG IoT survey, 35 percent of government respondents said improving public safety was a top driver for becoming a connected community. It's no surprise — IoT technologies hold a lot of promise to increase security. Intelligent traffic management solutions help control congestion and reduce the risk of accidents. Smart lighting senses motion and adjusts brightness to match security conditions. Smarter security cameras can alert law enforcement when motion occurs in certain areas. Sensors and data analytics allow city personnel to better respond during emergencies or find individuals who need help during a natural disaster. These technologies will reduce accidents, deter crime and enhance situational awareness for first responders, but they'll also require more bandwidth from government networks.

Driving economic development. Smart technology and a strong network infrastructure can lure businesses to specific regions and cities, therefore attracting new talent with increased opportunities. In fact, one in five respondents in the CDG IoT survey said they were improving their network connectivity to bring in new businesses. This same technology can also make downtown areas

Addressing the Digital Divide

Not all citizens have the same access to the internet. Residents in impoverished neighborhoods and remote locations often lack reliable wired and wireless connections, putting them at a disadvantage. To provide equal economic opportunities to all residents, access to the internet is required, and governments must take on this responsibility if they want thriving communities.

Cities are already stepping up to the plate to overcome the digital divide by providing internet access in public spaces and government-operated facilities such as parks, museums and libraries. In Boston, Wicked Free Wi-Fi — the city's public network — is offered at no cost to all residents, small businesses, tourists and students along main streets, in parks and near government facilities.[5]

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And in Opelika, the city began deploying wireless access points in high-traffic areas — including every government-owned building and facility — in an attempt to better serve disadvantaged citizens.

"Everyone needs power and water, and if you are going to succeed in the world economy today, you need internet access," says Opelika Chief Technology Officer Stephen Dawe. "You need to figure out something that is cost effective and provides a service people can use."[6]

more attractive to residents and visitors, driving more business to local shops and restaurants.

"Our Main Streets Districts are the economic engines of our neighborhoods. Free Wi-Fi service provides a valuable amenity and helps all residents stay connected," says Boston Mayor Martin Walsh.[7]

BUILD A CONNECTED COMMUNITY WITH ROBUST NETWORKS

Creating connected communities requires governments to rethink their approach to networking. Earlier generations of wired and wireless solutions lack the coverage and capacity to meet growing demand; therefore, public sector leaders must take a careful, comprehensive look at their network infrastructure. The following six steps will help governments evaluate their networking strategy:

1. Assess needs across the entire community.
Start with the end user in mind. What areas impact citizens the most — internet access, improved services, air quality, public safety or something else? Answering these questions will help IT teams prioritize projects and technologies that will generate the biggest return on investment and deliver on citywide goals.

For instance, the city of Opelika's mission is to improve quality of life for citizens, provide

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>
> Martin Walsh, Mayor, Boston

jobs through economic development and be a good steward of citywide resources through sustainability. The IT team will only evaluate technology projects that support one of these three areas. This way, all technology initiatives align with the city's strategic goals.

"Cities are not smart, people are," says CTO Dawe. "A lot of people want to talk about the toys. I look at it from a different point of view — what are the outcomes?"[8]

2. Break down agency silos. Once leaders identify their overarching needs, they must bring government agencies together. This remains a challenge for governments launching IoT initiatives; only 8 percent of CDG survey respondents said their IoT procurements were part of a multi-agency effort. And even fewer — 4 percent — said they were part of a holistic effort that includes all levels of government.

> Connected community initiatives rely heavily on data collection and analysis, which can give government leaders new insights into how to deploy resources most effectively to address citizen needs.

Bringing stakeholders together from the outset helps ensure new technologies address the needs of all agencies, employees and citizens. Better coordination also reduces duplicate efforts, allowing cities to save time, resources and budget.

The Boston Department of Innovation Technology (DoIT) works across all city departments to provide consistent technology solutions. Vendors are selected and standardized to simplify management and control. For example, DoIT deployed Cisco Meraki access points to address citizen connectivity needs throughout the city, schools and libraries. Having all city agencies on the same wireless network solution improves visibility and greatly simplifies network troubleshooting and maintenance.[9]

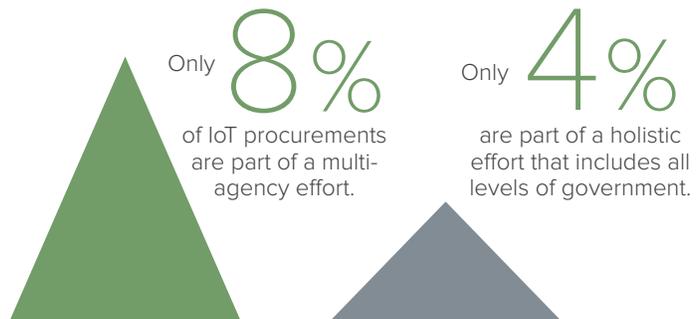### 3. Build capacity for analytics and data.

Connected community initiatives rely heavily on data collection and analysis, which can give government leaders new insights into how to deploy resources that most effectively address citizen needs. Analytics solutions were the top planned purchase for governments over the next 12 to 18 months, according to CDG's IoT survey. But many public agencies struggle to attract data-savvy employees to staff analytics projects.

A new generation of network solutions can help governments address this shortcoming with built-in analytics capabilities that turn raw data into actionable insights. Fayetteville, Ark., is ahead of the curve in using data to make citywide decisions. The city uses heat maps built into Meraki MV security cameras to see which equipment in the city gym is most frequently used so it can better plan when to replace it. City leaders also intend to use heat maps to monitor traffic patterns to see when city garages are full and when traffic is busiest at City Hall.[10]

4. Simplify network provisioning and management.

Most governments operate with lean IT staffs. When these small teams spend the bulk of their time managing and maintaining aging, traditional networks, they have little time to focus on higher-value applications and innovative initiatives.

The limitations of legacy on-premises solutions are driving networks to the cloud. Cloud-managed network solutions offer easy set-up, simplified

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management and remote access. These benefits are critical for government IT teams that manage sites across an entire city, county or state.

That's the situation for the Florida Department of Environmental Protection (DEP), which is responsible for managing a network that spans 175 state parks. The network enables park rangers to stay connected in remote areas and supports credit card machines to process entry fees and other purchases within the parks. In addition, DEP plans to provide wireless access to park visitors and strengthen network and physical security at its facilities.

A cloud-managed Meraki network enables DEP to support these activities with a team of just five people — two senior network engineers, one part-time network engineer and two junior engineers. Through the cloud, the team can configure the network, schedule firmware upgrades and troubleshoot problems without traveling to park sites, which are often located in remote parts of the state. A Meraki security appliance encrypts all data on the network and creates a secure VPN connection between DEP headquarters and park sites to protect sensitive information.

"Across the whole Meraki product line, there is flexibility and simplified firmware upgrades and maintenance — it is a single interface for managing switching, routing, wireless — the whole works," says Florida DEP Network Engineer Arthur Wilson.[11]

5. Empower employees. Just like citizens expect more digital services, government employees expect their work environments to provide technology that lets them do their jobs efficiently and effectively. Whether it's better applications and mobile devices, or seamless network access in the field, governments must give employees better tools as part of smart community initiatives.

The city of New Haven, Conn., deployed a wireless network with Layer 3 roaming capabilities that lets employees travel throughout the city without losing connectivity, as well as teleworker gateways that enable access from home. Previously, employees used wired connections that tethered all 1,600 city workers to their desks. Implementing citywide wireless access enables government leaders and staff in New Haven to be more productive and proactive in their day-to-day tasks.

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Arthur Wilson, Network Engineer, Florida Department of Environmental Protection

"The great thing about teleworker gateways is that government officials rarely have issues connecting to the network. They just click on the network that says City of New Haven, and they're on," says Network Administrator Eric Valli.[12]

Beyond basic connectivity, providing the opportunity to work with new and emerging technology can help attract the best and the brightest workers to government — just as it does in the private sector.

Due to a wireless network with Layer 3 roaming capabilities, city of New Haven employees can travel across government sites without losing connections, while Meraki teleworker gateways allow seamless access from home.
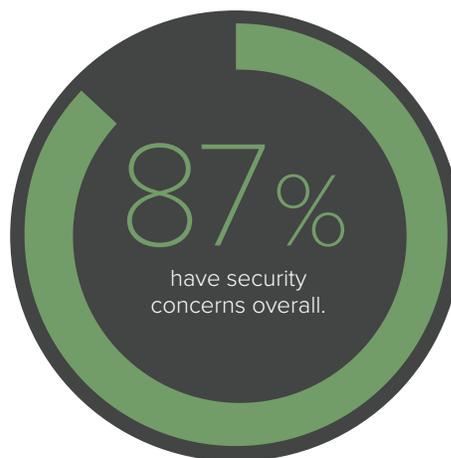
26%
of government leaders believe connected technologies will make their agencies less secure.

87%
have security concerns overall.

Connected communities will need sophisticated security to safeguard massive numbers of smart devices and IoT sensors, and the data they generate. Security solutions must deliver comprehensive protection, from threat analysis and VPNs for secure access across wide service areas, to endpoint protection for government computers, mobile devices and sensors.

6. Implement end-to-end security. In many cases, government agencies are still unclear about the impact IoT technologies will have on security. Twenty-six percent of respondents to the CDG survey believe connected technologies will make their agencies less secure and 87 percent have security concerns overall.

Connected communities will need sophisticated security to safeguard massive numbers of smart devices and IoT sensors, and the data they generate. Security solutions must deliver comprehensive protection, from threat analysis and VPNs for secure access across wide service areas, to endpoint protection for government computers, mobile devices and sensors. And these capabilities must be easily managed and automated where possible. For instance, cloud-managed network security offers automatic firmware updates, which is a simple way to help safeguard government networks from the latest security threats.

In Opelika, two layers of security are enforced at both the access point and switch level. IT staff can create separate virtual networks for different city departments to meet varying security requirements and to prevent public users from seeing internal network traffic. Meanwhile, in New Haven, the IT team provides government employees with cell phones installed with an endpoint management

solution. This allows the IT teams to remotely wipe data from city mobile devices that are lost or stolen.

CONCLUSION: CONNECTED COMMUNITIES SHAPE THE FUTURE

IoT-powered smart technologies promise huge opportunities for future economic growth, next-generation services, enhanced public safety and improved citizen experiences. But scalable, manageable and secure networks must be the foundation for connected community initiatives.

New cloud-managed network technologies enable governments to support the exponential growth of sensors, cameras and other IoT-enabled devices without dramatic increases in network support staff and expenses. What's more, these solutions provide built-in analytics support and security features that enable governments to operationalize and protect data collected by smart devices.

Rapidly maturing smart technologies, combined with sophisticated network solutions, position governments to innovate and shape connected communities in ways that will help their citizens for years to come.

This piece was developed and written by the Center for Digital Government Content Studio, with information and input from Cisco Meraki.

Endnotes
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