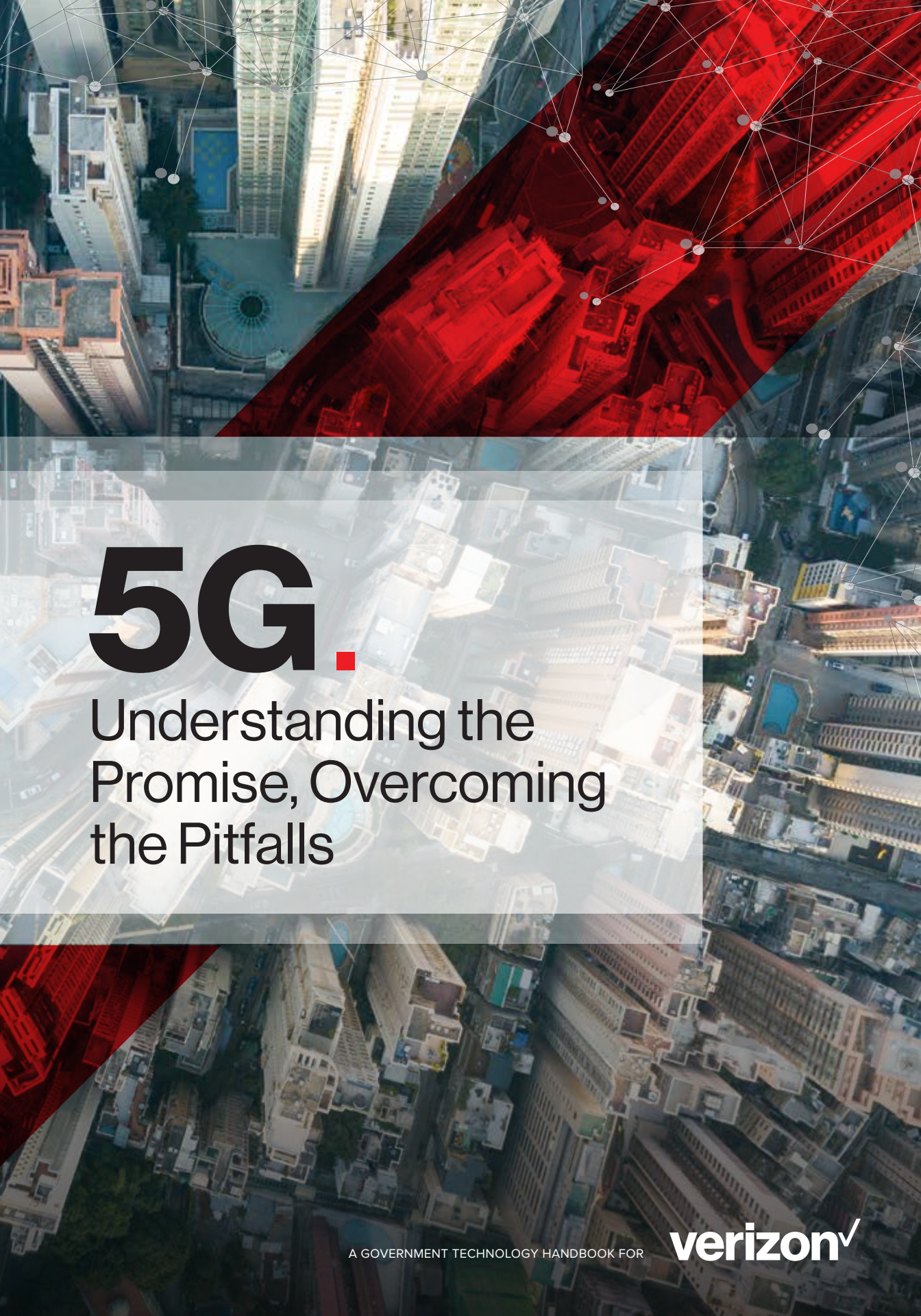


5G.

Understanding the Promise, Overcoming the Pitfalls

A GOVERNMENT TECHNOLOGY HANDBOOK FOR verizon

Contents

Introduction

Imagine a world in which you could notify residents about an impending earthquake or wildfire well in advance of when these natural disasters hit their communities.

Or a world where a fleet of autonomous vehicles safely transports people throughout a city center, easing traffic congestion, reducing harmful emissions and improving traffic safety.

Or one in which a world-class surgeon uses virtual reality and robotics to perform surgery in a public hospital a thousand miles away.

These scenarios may seem like distant dreams for state and local governments, but they're actually possible with 5G connectivity.

5G wireless networks offer cities the promise of better connecting their infrastructure, devices and people. This technology can help municipalities take advantage of the Internet of Things (IoT), artificial intelligence (AI) and cloud-driven technologies. It can transform transportation systems and public safety efforts. And it can help advance economic development and quality of life for residents.

But for cities to realize the promise of 5G, they must first overcome several challenges, including modernizing legacy technologies, addressing regulatory issues that may stifle innovation and fostering better collaboration with the telecom carriers that will implement these networks.

This handbook provides a roadmap for how cities and states across the country can prepare to take advantage of this transformative, next-generation technology.

What is 5G?

5G is a fifth-generation wireless technology that can dramatically improve connectivity. But it's far more than just the next iteration of wireless. It's an entirely new way to build and power network infrastructure, enabling a host of new applications and innovations.

5G leverages radio frequency spectrum in the low-band (below 1 GHz), mid-band (1 to 6 GHz) and high-band (above 6 GHz) to dramatically increase throughput capacity in support of a broad range of end-user applications and use cases. 5G represents an evolution from largely hardware-based cellular technology to one that is increasingly developed on a software basis, which enables more advanced networking capabilities and substantially better system performance.[1]

"5G is designed to operate in all of the previous frequency bands that were available," says Nevin Jones, 5G technical product marketing lead at Verizon. That's a vast improvement over previous Long-Term Evolution (LTE) network technology, he says. "Whereas LTE is standardized and deployed within a specific band, 5G is agnostic. It can operate in the high-band, mid-band and low-band to accommodate a wide spectrum of services."

5G will be able to support a substantially higher device connection density than previous generations. It has a design target of one million devices per square mile, compared to 6,500 devices per square mile for 4G technologies.[2] 5G will employ both macro cells and small cells in its radio network. These radio elements will typically be linked to a fiber footprint to provide user traffic backhaul to the network core.

Because the technology is so new, standards are evolving. The 3rd Generation Partnership Project (3GPP), a consortium of standards organizations that develops protocols for telecom technologies, is in the process of finalizing 5G standards, which should accelerate adoption and ensure 5G technologies speak a common language

and can be easily integrated across systems and devices.

Though 5G isn't yet as ubiquitous as 4G, its presence is growing across the country. 5G was first introduced in 2018, but widespread commercial rollout of the technology began in 2019.[3] Telecom carriers like Verizon have now built 5G Ultra Wideband networks in 31 cities and counting.[4]

5G is especially critical now because of the proliferation of smart technologies and AI- and cloud-based applications. These devices and applications require more bandwidth, more speed and more data compared to technologies even just five or 10 years ago. And as technology advances, so must connectivity.

"LTE connections still run into limitations in speed and capacity," says Amelia Powell, a 5G product marketing manager at Verizon. "With 5G, you have incredibly low latency. You've got high speeds like we've never seen in connectivity before. Probably most critically, you've got huge increases in the capacity of data that you can move over the network."

"It's the difference between driving your data in a truck down a country road and being able to get into a semi on a 16-lane highway," she says.

Dolan Beckel, director of the Office of Civic Innovation and Digital Strategy for the city of San José, Calif., agrees that 5G is transformative and has unlimited potential to drive game-changing applications that don't even yet exist.

"Every generation of wireless technology has brought a huge and largely unseen step forward in innovation. 2G brought us two-way texting. 3G brought us high-quality digital voicemail. 4G bought us Waze, Uber and DoorDash, none of which were envisioned when 4G was rolled out," Beckel says. "So 5G is really going to bring us things that we haven't even imagined yet."

Technology companies like Verizon have now built 5G Ultra Wideband networks in 31 cities and counting.

Leveraging 5G for the Public Sector

As Powell mentions, 5G has several benefits, including lower latency, higher speeds, greater mobility, increased data capacity and faster deployment of new technologies.[5]

"What makes it so transformative is that you have an ultra high-speed communication network that's wireless so you can take it anywhere. As long as you've got reception, you're ultra connected. That's something we haven't experienced yet," says Ted Ross, chief information officer for the city of Los Angeles.

"4G networks have been getting up to 80, 90 and even 100 megabits per second, which was unimaginable before, but converting that to gigabit is something that the world can't even quite grasp," he adds. "The idea of it being ultra low latency — the concept that I can have something happen in the physical world that then gets translated to the digital world in milliseconds — it's also something we've never seen before. There are products and solutions already out there that will be absolutely transformed."

5G BENEFITS: Faster service deployment and enhanced workforce mobility

As state and local governments increasingly focus on digital transformation, 5G connectivity means faster service deployment and increased workforce mobility.

Virtualization is allowing more government organizations to transition away from a hardware-based IT infrastructure to a more software-based IT environment where software-as-a-service (SaaS) applications enable them to be more agile and advance their digital capabilities. As government agencies

5G ENABLES LIGHTNING-FAST DATA TRANSFERS THAT CAN TRANSFORM EMERGENCY RESPONSE OPERATIONS.

transform their IT ecosystems, increased connectivity will be critical to facilitate things like remote work, better workforce management and timely delivery of social service benefits. It will enable citizen self-service through digital applications. And it will create more intelligent transportation networks that encompass smart parking, streetlights and railway systems that rely on huge volumes of data to resolve congestion and traffic issues in both major city centers and outlying suburban areas.

"The need for ubiquitous connectivity is only going to become more and more critical to quality of life," says San José's Beckel. "I view a certain level of connectivity — a certain safety net — as like the fifth essential service. Behind water, behind electricity, behind gas and behind sewer, it's internet connectivity."

5G has already been put to work for several key use cases in government. During the coronavirus pandemic, for example, the technology helped San José pivot its emergency operations center to become a nearly 100 percent virtual organization.

"It's an extraordinarily interconnected and complex piece [of the city's operations], but I've been able to do this because I have good connectivity in my home," says Kip Harkness, deputy city manager for innovation and emergency operations. "It's a fundamental shift in the way we work."

That shift also plays a key role in other parts of government, as more places engage in true digital transformation of government services.

"Being able to deliver citizen services faster is going to be tremendous for agencies,"

Virtualization is allowing more government organizations to transition away from a hardware-based IT infrastructure to a more software-based IT environment.

says Caitlin Clark-Zigmond, Verizon's director of public sector marketing. "Especially with the need to work remotely, 5G can facilitate more real-time information and data, as well as primary connectivity to places and people in ways that haven't been available in the past."

5G BENEFITS: Empowering first responders

Compared to previous generations of wireless technology, 5G enables lightning-fast data transfers that can transform emergency response operations. For example, a police department using 5G can download video surveillance footage at a rate of 10 gigabits per second, compared to 150 megabits per second for 4G technology or 8 megabits per second for 3G technology, which was first introduced 22 years ago.[6] In other words, what used to take nearly two minutes can now be transferred in just one second. For police, that distinction could make a crucial difference in apprehending a suspect more quickly or progressing in an investigation.

5G also can be beneficial for other emergency responders when it comes to critical communications, real-time medical monitoring and collaboration, and simulation and training exercises. Mike Goetz, the former CIO and director of information technology for the city of Lynchburg, Va., says greater connectivity could help municipalities reduce response times for emergency services.

"If you look inside of an ambulance or police car these days, they're mobile technology spots — they're just one big mobile device," Goetz says. "So the idea of having extremely fast, highly available broadband in a mobile capacity in a vehicle like that opens up a lot of possibilities for medical care."

For example, EMS workers in an ambulance could send patient data ahead to the emergency room in near real-time, providing doctors with better information and saving valuable time in critical medical situations.

Some telecom carriers already are exploring what 5G could mean for public safety. In 2018, Verizon launched its 5G First Responders Lab,[7] an incubator program that enables Verizon to collaborate with different public safety agencies and innovative technology companies to deploy 5G to address different challenges first responders face.

"It's really an opportunity to look at public safety use cases in a new light," says Nick Nilan, director of public sector product development at Verizon Business. "First responders can take advantage of many different capabilities in 5G to focus on solutions that include better computer vision on video surveillance, augmented reality for training environments or on-the-job support."

Projects in the incubator program so far have included autonomous drones that improve situational awareness and enhance security for first responders in the field, virtual reality training for police officers and EMTs, and computer vision technology that increases firefighters' visibility in smoke-filled rooms.[8] Efforts like these will enable first responders to do their jobs more efficiently — and more safely.

5G could even improve the effectiveness of alert systems such as California's Early Earthquake Warning System, which the state introduced in late 2019. The system can detect seismic activity before an earthquake begins and alert residents via a mobile app.[9]

"When we think about L.A.'s unique Earthquake Early Warning System, we think about sensors deployed across Southern California," says Los Angeles' Ross. "They identify the shaking and then have to transmit that message from the sensor to the cloud and then to people's smartphones." Reducing latency is critical, he says. "As it exists today, we're already operating at about 1 to 2.5 seconds latency: Once the shaking is identified, it takes a couple seconds to transmit the messages. I would expect 5G to move that to milliseconds or fractions of a second, allowing even greater machine-to-machine (M2M) integration for something as devastating as an earthquake."

Those precious few moments will give residents near the earthquake's epicenter more time to prepare and seek safety, which could reduce injuries and even save lives.

5G BENEFITS: Increasing government efficiency and resiliency

5G can greatly improve day-to-day government operations. As more organizations transition to a hybrid work environment, with employees splitting time between home and the office, 5G can facilitate the connectivity and performance required for government to stay productive and efficient.

For governments investing in digital workspace platforms, SD-WAN solutions or security tools to combat cyber threats, 5G can ensure these solutions work optimally. For example, if an agency suspects malware in its network, 5G enables its intrusion detection and prevention system to transmit data faster, allowing IT staff to quickly pinpoint the source of the threat and temporarily isolate parts of the network that have been compromised. That could help the agency avoid sizeable remediation and recovery costs.

5G also can aid in capital planning. Governments must store large amounts of data on their capital assets, and many rely on enterprise asset management systems to keep track of all that information. But current connectivity technology can prevent agencies from maximizing that data to drive decision-making about capital projects. At a time when four in 10 of the country's bridges are at least 50 years old, and deteriorating roadways are causing increased traffic congestion and safety issues in many cities, those investments are crucial.[10]

Better use of data means states and localities can more efficiently manage their infrastructure, such as prioritizing which roads are in need of repair, determining where to add smart lighting or traffic signals to improve safety, or mapping public transportation routes to increase efficiency and help residents get to where they're going faster. With lower latency, faster speeds and the ability to transmit large volumes of data, 5G enables the technologies and systems that state and local governments rely on to perform more effectively and deliver the insights necessary to improve service delivery.

Put simply, 5G is a transformative technology that can empower state and local governments to achieve their mission and serve their constituents.

As more organizations transition to a hybrid work environment, with employees splitting time between home and the office, 5G can facilitate the connectivity and performance required for government to stay productive and efficient.

Laying the Foundation

For all the promise of 5G networks, there are still challenges that must be addressed, namely around legacy technologies, regulatory issues, and concerns about accessibility and digital equity.

LEGACY CHALLENGES

Though technology companies will bear much of the infrastructure and operational costs for building out 5G networks, state and local governments may incur some costs for upgrading legacy technologies.

To take full advantage of 5G, they will need to modernize their technology infrastructure. Virtualization and edge computing architecture may be necessary to support 5G and to manage software licensing and other technology costs, especially as more devices are connected to these networks.

Another challenge is that compared to other wireless technologies, 5G is still in its infancy and not every device is 5G-ready. Right now there are only a few dozen 5G-enabled smartphones on the market,[11] which means that only residents who can afford to pay more for these costly devices can take advantage of this level of connectivity. That's an issue that should eventually resolve itself as 5G becomes more widespread and the technology becomes more affordable. Similarly, states and cities will have to weigh the benefits of upgrading now versus waiting for it to become more economical.

"For existing solutions that will take advantage of 5G, there will be infrastructure and legacy technology updates that need to happen," says Ross, the Los Angeles CIO. "In things like traffic management systems or some of the public safety systems, there's going to be areas in which upgrades are going to be necessary."

The challenge, he says, is deciding when to do it.

"If you try to upgrade at first, you're going to be spending the most money. So you need to have the technology and some of the devices drop in price. With a little time, you're going to find that everything is 5G-enabled and then prices will start to drop."

REGULATORY ISSUES

Regulatory challenges are another hurdle. There have been ongoing debates in some places over who in government controls 5G antennas and what to charge telecom providers for access to them. In Texas, for example, a group of nearly 60 municipalities has sued the state over a pair of laws that set statewide regulations for where and how the cell nodes could be erected.

One sticking point is aesthetics. High-band 5G will provide much faster connectivity over ranges that are somewhat reduced compared to 4G. So while these networks rely on transmitters that are much smaller than traditional cell towers, they require exponentially more of the transmitters to work. Rather than negotiate with hundreds of private property owners, technology companies have sought to install the nodes on streetlights and other public right-of-way infrastructure.

"The more advanced the technology that comes with 5G, the more tower sites you have to get. Some people feel this is invasive," says Bruce High, the former CIO for Harris County, Texas. "The antennas aren't really pretty, so we have to work with the carriers installing or leasing these antennas to be able to get them where they need to go. Otherwise, capacity just isn't going to work."

Despite those concerns, High says, people understand the importance of building 5G infrastructure.

"The whole cellular technology is based on the availability of the throughput," he says. "So there is some impact [on

5G transmitters are much smaller than traditional cell towers, but networks require exponentially more of them to stay connected.

aesthetics and infrastructure], but I think people see the value, especially when it comes to public safety."

While states and cities navigate these regulatory issues, the federal government has taken steps to support implementation. The FCC's 5G FAST plan aims to update laws that would slow the development of the infrastructure, such as towers and base stations, necessary for 5G networks. As of January 2020, the FCC now requires state and local governments to establish permitting programs and allow the small cell facilities required for 5G deployment. The ruling also requires governments to make approval decisions within 90 days and limits the amount they can charge telecom companies for permitting fees. Many state and local governments are challenging the FCC's ruling in court.[12]

While these negotiations continue, some government officials say it's critical for state and local governments to foster a more collaborative relationship with telecom carriers, especially considering the long-term benefits 5G networks offer for their communities. Ross says the city of Los Angeles has made an effort to do this by expediting its permitting processes.

"We used to be a city where several years ago, we were processing about four to five permits per week. We're now doing 30 to 60. We've dramatically expedited the process so that we can deploy not just a 5G, but even expedite more 4G deployment so that it has better coverage," Ross says.

Goetz, the former Lynchburg CIO, echoes Ross' point that collaboration is critical for governments to fully realize the benefits of 5G.

"There are clearly scenarios where collaboration makes sense. If a collaboration can be developed where the locality can discuss with the carrier their specific deployment plan — talk about cost sharing and about ways to share some of the common infrastructure that is required — in the best case scenario the locality will be a customer and be able to take advantage of the build-out for its own public service use," Goetz says.

"It's incumbent on localities to reach out to carriers and try to drive collaboration. Carriers tell me they want to work with localities to understand plan review and permitting and to work side-by-side to make that process as painless as possible," he says. "So if we as localities find carriers that are willing to discuss their plans and to collaborate on plan review and permitting, everybody wins."

ENSURING DIGITAL EQUITY

Because of the inherent infrastructure challenges of building these networks, people in cities may benefit more from this technology than residents in rural areas. Even within cities and suburbs, residents of greater economic means who have access to 5G-enabled devices and smart technologies will benefit more from this connectivity, at least in the near term. That raises questions about digital equity and a new digital divide.

Ross says that while 5G can actually increase equity in some cases — by, for example, allowing the city to leverage technology that enhances reporting of sanitation problems or public safety issues in disadvantaged neighborhoods

"It's incumbent on localities to reach out to carriers and try to drive collaboration." *— Former Lynchburg, Va., CIO Mike Goetz*

— it also can lead to new inequalities if municipalities aren't mindful about how they deploy the technology.

"In this digital age — and in the age of racial justice and social justice — we cannot allow 5G to show up in wealthy neighborhoods and be omitted from disadvantaged neighborhoods. That is unacceptable," Ross says.

"We've been working with all the different carriers — and they often will rally around it, too, once they understand our intentions — in coming up with mechanisms for us to establish equity," Ross says, adding that the city has helped identify disadvantaged neighborhoods that could benefit from 5G, so that carriers are deploying the technology in these areas at the same time they are going into wealthier neighborhoods.

"The key question is ensuring that all our residents can take advantage of these kinds of tools so that an enterprising young person in South Los Angeles could, as they say, be the next Bill Gates and could do this thanks in part to access to 5G technology," Ross adds.

Meanwhile, the city of San José has tried to address equity issues with a broadband inclusion strategy and a $24 million Digital Inclusion Fund paid for by infrastructure fees charged to telecom carriers. The fund will be used to bring internet access to 95,000 San José residents and aims to close the city's digital divide within the next 10 years.[13] With the increased need for remote learning, remote work, telehealth and other virtual services, the city is now working to identify more potential revenue sources to increase the size of the fund.

Ensuring equity is "why we've pushed so hard to make sure we have ubiquitous connectivity, so there aren't digital deserts and people aren't left out," says San José's Harkness. "But without intentionally bringing people in, there is a danger that 5G can exacerbate some of the privilege and inequities that are inherent in our society."

As municipalities develop their own strategy for ensuring equity, the federal government has sought to combat potential equity issues by allocating funding for 5G deployment in rural communities. In April 2020, the FCC proposed the 5G Fund for Rural America, which would allocate $9 billion in funding to bring broadband and wireless connectivity to these communities.[14] Rural areas where carriers have deployed 5G are already benefiting from the technology. High, the former Harris County CIO, says farmers have been able to leverage sensor technology that monitors rainfall so they can manage their crops more effectively or evacuate quickly when flooding occurs.

"Different things like this that we weren't capable of doing because of the bandwidth and throughput issues have all been resolved because of 5G," High says. "It really gives us the capability to gather data that we never were able to capture before."

City Spotlights: How 5G is Already Transforming Communities

More than 30 U.S. cities already have adopted 5G, providing a model for the promise and potential of this technology.

CHICAGO

5G was rolled out in the city of Chicago in 2019. Residents have been impressed by the lightning-fast speed: Standing on a street corner, one news reporter was able to download an entire two-hour movie to his phone in less than nine seconds. But coverage can be spotty and inconsistent.[15] Many carriers have rolled out 5G-enabled devices to increase adoption, but these coverage challenges may simply speak to how the two-year-old technology is still evolving and how carriers continue to test and learn as they build out the infrastructure.

Experts say 5G has the biggest potential for Chicago's business community. One Accenture survey of Chicago business leaders found that

LAKE NONA, FLA

46 percent of the executives surveyed expect 5G to have a significant effect on their business in one to three years.[16] A separate global survey the company also conducted found that 57 percent of business leaders believe 5G will be revolutionary.[17]

With more than 291,000 businesses within its city limits and a growing tech community,[18] Chicago could be an important test case for how 5G could impact other large urban corridors. With increased connectivity and lower latency, 5G could make the city a more attractive place to do business, especially for companies in the city's industrial manufacturing community and startups in AI and smart tech.[19] That could increase local employment opportunities for Chicago residents and enable greater workforce mobility and productivity — a precious commodity for businesses that are

In one survey of Chicago business leaders, 46 percent said 5G will have a significant impact on their business within one to three years.

trying to innovate and maintain their competitive advantage.

"The intention of technology is to create near real-time access to data and information to help humans make better decisions," Powell of Verizon says. "So when you think about technology as an enabler in that way, you can see how it will certainly inform the way people work in more hardy ways going forward."

LAKE NONA, FLA.

Some places are serving as "living labs" to explore the possibilities of 5G. Lake Nona, a 17-square-mile planned community in Orlando, Fla., is part of a pilot program where 5G is being deployed in its town center to get residents familiar with the technology and to monitor how well it works in the community.

> "This is our bet on being very attractive to entrepreneurs."
>
> *— Juan Santos, Senior Vice President of Innovation at Tavistock, the private company that developed Lake Nona*

So far, Lake Nona only has one cell site, but the city is testing smart lighting as well as other uses in public safety, retail and healthcare. The community is already home to another cutting-edge technology — a self-driving shuttle service that operates on a designated route – that relies on sensor-based collision detection technology.[20] It, too, will likely benefit from 5G. Officials hope better connectivity will attract more businesses and startups to Lake Nona, which is part of the greater Orlando area's growing hub for biomedical research and innovation.

"It's a field where if we deploy the right ingredients, we provide the right infrastructure, coworking space, accelerator program and venture capital, we start to create the environment that fosters those entrepreneurs to look at us," Juan Santos, senior vice president of innovation at Tavistock, the private investment company that developed the community, said in an *Orlando Sentinel* interview.[21] "This is our bet on being very attractive to entrepreneurs. When people think of innovation in the U.S. right now, they are not thinking Central Florida."

ATLANTA

Atlanta is already home to a rapidly growing tech community and some of the world's biggest companies and organizations, including Coca-Cola, Home Depot, CNN and the Centers for Disease Control and Prevention. 5G could draw even more businesses to the Georgia capital.

5G was deployed in 2019 in downtown Atlanta and at other high-density locations throughout the city, including Emory University Hospital Midtown, Mercedes-Benz Stadium, Centennial Olympic Park and the Georgia Aquarium.[22] Within the next year, residents also will benefit from 5G home internet service — a huge advantage as remote work becomes a mainstay for businesses.

The city may benefit from 5G in several other ways. Traffic congestion is a major problem: Atlanta recently ranked 9th on a list of the top 10 most congested cities in the world.[23] 5G could enable

transportation leaders to help ease congestion, and greater residential connectivity could reduce the number of drivers on the road during rush hour. Additionally, bringing in new companies attracted by 5G access could enable the local government to provide better public services and amenities in an area that's already the fourth fastest-growing metro in the country.[24]

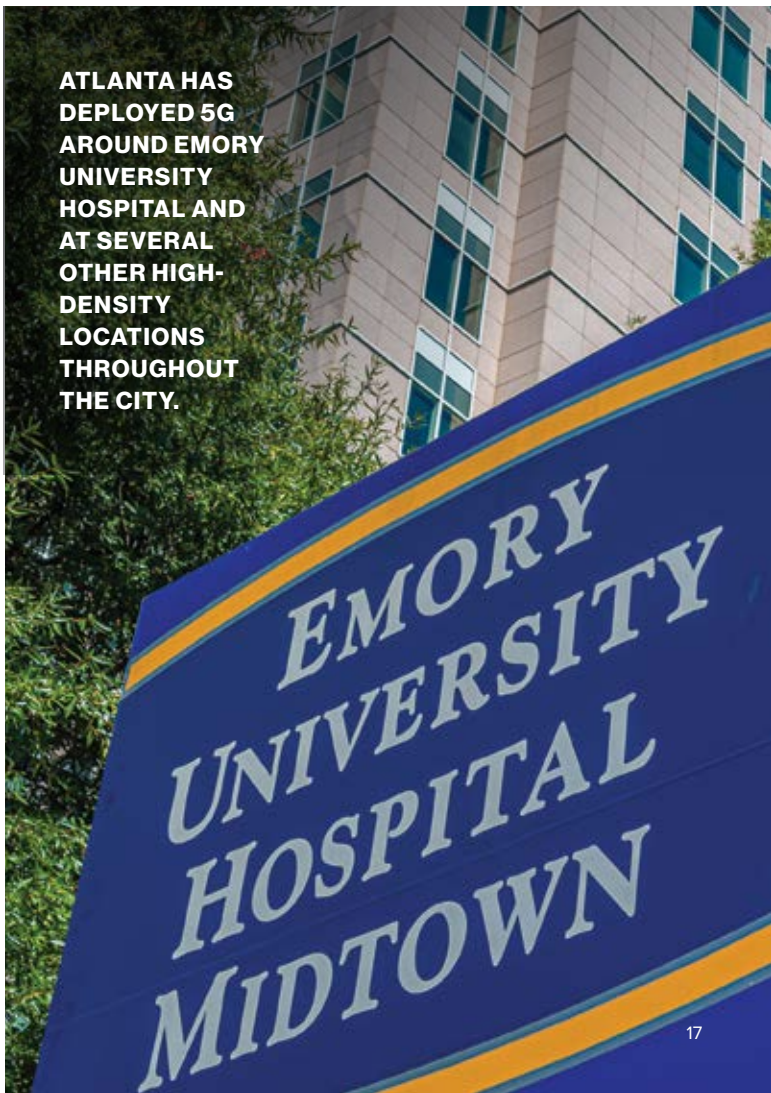
"If you have an extremely robust high-speed mobile network available to you," says Goetz, "it's going to make it even more attractive for people to live in and for businesses to come to your community."

BOSTON

As more people work from home and as cities try to attract more businesses to their communities, better network performance will be critical to helping them leverage cloud-based and software-as-a-service applications to increase productivity and efficiency.

Verizon partnered with Amazon Web Services (AWS) to roll out a new 5G Edge platform in Boston and San Francisco that allows developers to take advantage of cloud storage and compute resources from AWS Wavelength to build applications at the edge of Verizon's 5G networks. That means developers can create applications, such as IoT and VR-based technologies and autonomous industrial equipment — with very low latency. Data can be transferred in milliseconds, allowing, say, a medical manufacturer to fabricate materials even faster for much-needed personal protective equipment. It could optimize data transfer for a sensor-based smart parking solution, enabling motorists to find a parking spot in a crowded downtown area in less time. And it could allow a business to hold a company-wide meeting with hundreds of employees via a video livestream without service interruptions or performance issues.

Creating applications at the edge could help Boston and other cities around the country increase quality of life for residents and make their communities more attractive to data-driven businesses of all sizes that can most benefit from next-generation wireless connectivity.



ATLANTA HAS DEPLOYED 5G AROUND EMORY UNIVERSITY HOSPITAL AND AT SEVERAL OTHER HIGH-DENSITY LOCATIONS THROUGHOUT THE CITY.

A Game Plan for the Public Sector: Best Practices and Strategies to Implement 5G

5G represents a huge opportunity for states and cities to build better government and better communities. But before deploying this technology, they should keep the following things in mind:

EMBRACE COLLABORATION

Despite some of the regulatory issues involved with 5G deployment, cities and states must identify ways to work more collaboratively with telecom carriers. Los Angeles already has done this. Ross says that in addition to expediting its permitting processes, the city has been allowing microtrenching — which involves digging trenches near sidewalks to install small conduits and the fiber cables necessary to increase the bandwidth and performance of 5G technology — and has established deployment standards to streamline the build-out process as much as possible for carriers.

Collaboration will take shape in different ways in different places — consider the distinct models in Los Angeles and Lake Nona. But it's critical for municipalities to at least be open to exploring collaborating with telecom providers, while balancing this innovation with the needs of residents and businesses and their own financial and operating interests.

"The government is the consumer," Ross says, along with residents and the business community. "We, as a city, feel it's extremely important to help facilitate 5G for the benefit of our residents and businesses, and even ourselves."

Harkness of San José echoes that point.

"Any new technology or approach that emerges, we are open to working with [telecom carriers] as partners," he says. "We shifted from kind of a permit-by-permit model to an open partnerships model: If they're willing to make the investments in the staff and infrastructure that are needed to respond at the speed of business, we are willing to consider a wide range of approaches as long as they're safe and they make sense for our community."

DEVELOP A STRATEGY AND PREPAREDNESS PLAN

State and local governments must consider several questions that go beyond installing infrastructure, says Verizon's Nilan.

"How are they going to use 5G? How are they ready for 5G? What do the building requirements look like?" he says. "And then the other aspect is, are they ready to use it?"

Governments need to ask those questions before they even begin to collaborate with a telecom carrier. It's critical that these organizations consider what legacy technology or infrastructure upgrades will be necessary to maximize this technology and how to deploy 5G equitably throughout their communities in rural areas and lower-income neighborhoods, and how best to leverage this technology within their operations to generate cost savings or potential revenue opportunities.

TAKE A SECURITY-FIRST APPROACH

As states and cities adopt 5G, more and more devices and applications will be connected to these networks, which makes security even more critical. Governments collect and store a wealth of constituent data, and they will need to develop a holistic cybersecurity strategy. This strategy should encompass ongoing employee training, robust vendor management and a zero-trust approach. That's even more crucial as more data is pushed across these networks, as more employees work remotely and as this distributed workforce presents more challenges for combating shadow IT.

Nilan says state and local governments need to "think about things like zero trust, software-defined networking, network function virtualization and all of these tools to better manage data and data traffic over their networks. They have to think about this before they move into the 5G world."

Conclusion

Like the cloud and AI before it, 5G is a transformative technology that will impact every part of society, from how people work to how businesses function and how governments serve.

The technology is still nascent and 3GPP standards likely won't be finalized until 2021, which means America hasn't even begun to tap into the full power of 5G. But the promise and potential for the public sector is clear. This next-generation technology can help government agencies improve traffic management, public safety, social service delivery, disaster response and more. Recent research indicates governments will be the biggest spenders on 5G infrastructure and that long-term cost optimization will be the biggest underlying driver of 5G adoption for organizations.[25] As state and local governments face significant budget shortfalls due to the coronavirus pandemic, both cost and IT optimization will be critical for them to achieve what has become an all too common refrain in the public sector: doing more with less.

As states and cities move toward 5G adoption, the possibilities are almost limitless, says Ross, the Los Angeles CIO.

"The whole point of this technology is to really improve the lives of the people who live in your community and the businesses that operate there," he says. "5G will enable governments to deliver services that were previously unimaginable with other generations of technology."

This handbook was created by the Government Technology Content Studio, with input from Verizon.

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