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DeepDives

5G

INSIDE:

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From the editor's desk

Amy Kluber, Editor-in-Chief

The Path to Federal 5G

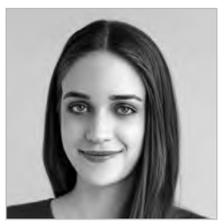
Implementation of 5G has been thriving in private industry. Telecom companies largely control deployment of the capacity, but all that could change as the market expands.

The list of benefits of the next-generation wireless capacity is lengthy, including faster data transmission, better working environments for remote workers and improved logistics. It's only natural for us to expect that same experience with the federal government. But even though it's thriving in the private industry, it's a different story for government where unique challenges exist. Faced with an executive order to improve the customer experience and also implement zero trust architecture, federal agencies have many opportunities to harness 5G's power.

In the path to federal 5G innovation, agencies are working to address security vulnerabilities, edge computing and user experience principles to equip its networks for next-generation connectivity now and beyond.

Table of Contents

Kate Macri, Senior Staff Writer



Katherine MacPhail Staff Writer/ Researcher

CISA Highlights 5G Risks as Federal Agencies Pursue 5G Adoption

Transitioning to 5G is a key strategy for federal agencies' network modernization efforts, but the next generation of communication comes with unique supply chain hazards.

BY KATE MACRI

The U.S. Customs and Border Protection (CBP) is eager to transition to 5G infrastructure to improve mission delivery, but the Cybersecurity and Infrastructure Security Agency (CISA) warned against hasty 5G adoption citing 5G supply chain security concerns during an FCW Network Modernization event this week.

"[The supply chain] is going to be an extremely important piece as we look at 5G security and risk," said Serena Reynolds, CISA Initiative Management Branch chief, "and then looking at deployment leveraging untrusted vendors and really providing an education on cybersecurity, cyber awareness and what do untrusted components really mean [for 5G security]?"

Christopher Wurst, executive director for enterprise networks and technology support at CBP, said his component wants to balance resilience, security and increased mobility through network modernization efforts.

Wurst said CBP will soon require field agents to wear body cameras, which may flood CBP's already busy network with video data.

CBP is America's largest law enforcement agency, Wurst said, "so you can just imagine the quantity and quality of data and video that will be introduced to the network at some point. That's a huge challenge for us to move and collect all that video."

5G could be the key to boosting CBP's network operations, which often languish at the southwest border where connectivity is low.

"The network is now a vital utility that cannot be overlooked," Wurst said during the event. "Your application can be up and running all day long, but if your network is down, it doesn't matter. We do want to increase our mobility position, take advantage of 5G for those edge devices that rely on wireless connectivity — getting the data in real time to our officers out in the field."

Wurst hopes 5G can reduce the load on CBP's network as CBP shifts computing to edge devices. Without 5G, this strategy is imperfect because sometimes field agents can't even get 4G on the southwest border.

"Part of our mobile strategy is to put some of that processing capability out

Photo Credit: xijian/iStock

Christopher Wurst

Executive Director for Enterprise Networks and Technology Support, CBP

on that edge device to minimize some of the traffic," Wurst said. "Our strategy is to move as much of that computing power out to the device itself. It is a challenge on body-worn cameras, we're taking the approach that it's not going to be real time, it'll be stored locally on that person and they'll have to take it to a secure location to get that video uploaded safely. What we can do to move some of that data processing out to the edge is definitely in our roadmap."

Reynolds warned about the increased usage of "internet of things" devices, which rely on edge computing, and the impact on network security as federal agencies prepare for 5G.

"With IoT really growing and the sheer number of devices on the network, [there is] an increased attack surface and new vulnerabilities," she said. "We're working with DOD to talk through all aspects of R&D where 5G will be deployed."

Ryan Orr, a senior risk analyst with CISA, said it will be a while before all 4G infrastructure is ripped out and replaced with 5G infrastructure. The first few years of 5G, he said, will rely on radio access networks (RAN) via 4G infrastructure, which present unique security challenges.

"For the first few years of 5G, only cell phones and the devices they connect to will be 5G," he said during the event. "The backbone or core network will be 4G, so it'll be a few more years before the full backbone is replaced. Edge computing is moving the core infrastructure, like data centers, and physically moving them closer to the end user and incorporating them into the RAN. By moving closer to the end user, they literally reduce the area the data needs to travel and latency."

CISA expects malicious actors to target the RANs during this initial 5G phase.

"By moving the core network closer to the end user, it may allow a malicious actor to insert into a RAN," Orr said.

(ctd.)

“It is a challenge on body-worn cameras, we’re taking the approach that it’s not going to be real time, it’ll be stored locally on that person, and they’ll have to take it to a secure location to get that video uploaded safely. What we can do to move some of that data processing out to the edge is definitely in our roadmap.”

—Christopher Wurst, Executive Director for Enterprise Networks and Technology Support, CBP

Another risk is the security of the 5G supply chain, particularly software.

“There’s still the [potential] introduction of any vulnerabilities or untrusted components into that mobile edge computing and exposing core networking elements to risks introduced by software and hardware vulnerabilities, like counterfeits,” Orr said. “One of the things we’ve noticed with open RAN is software assurance is a high priority.”

Orr and Reynolds stressed working with federal cyber leaders and industry partners to secure software supply chains as federal agencies move computing to the network edge. Securing the supply chain now, they said, will make the transition to 5G more secure.

“[We’re] building on the Prague Proposals to look at policy legal and security frameworks to start building out those best practices,” Reynolds said. “We’re working with industry partners through our security framework and risk products that are extremely timely, also working with ODNI and the NSA. There are important frameworks to move forward and [make] sure there’s an interagency effort.”

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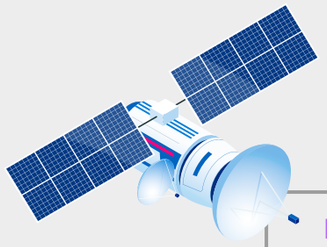


A Federal 5G Snapshot

How agencies are paving the way for large-scale federal 5G deployment.

FCC

- Making additional spectrum available for 5G
- Working on policy to encourage investment in 5G networks, including the 5G Fund for Rural America

DEPARTMENT OF ENERGY

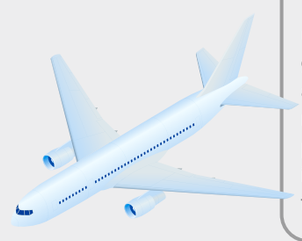
- Working to improve connectivity in scientific infrastructure
- 5G can help model wildfires and storms
- 5G can support remote sensing instrumentation with supercomputing resources

DEFENSE DEPARTMENT

- Enterprise-wide 5G implementation plan
- 5G will support intercontinental communication between combatant commands, mission partners and headquarters to support JADC2 concept

FAA

- Working on guidance for airlines to mitigate potential interference from 5G

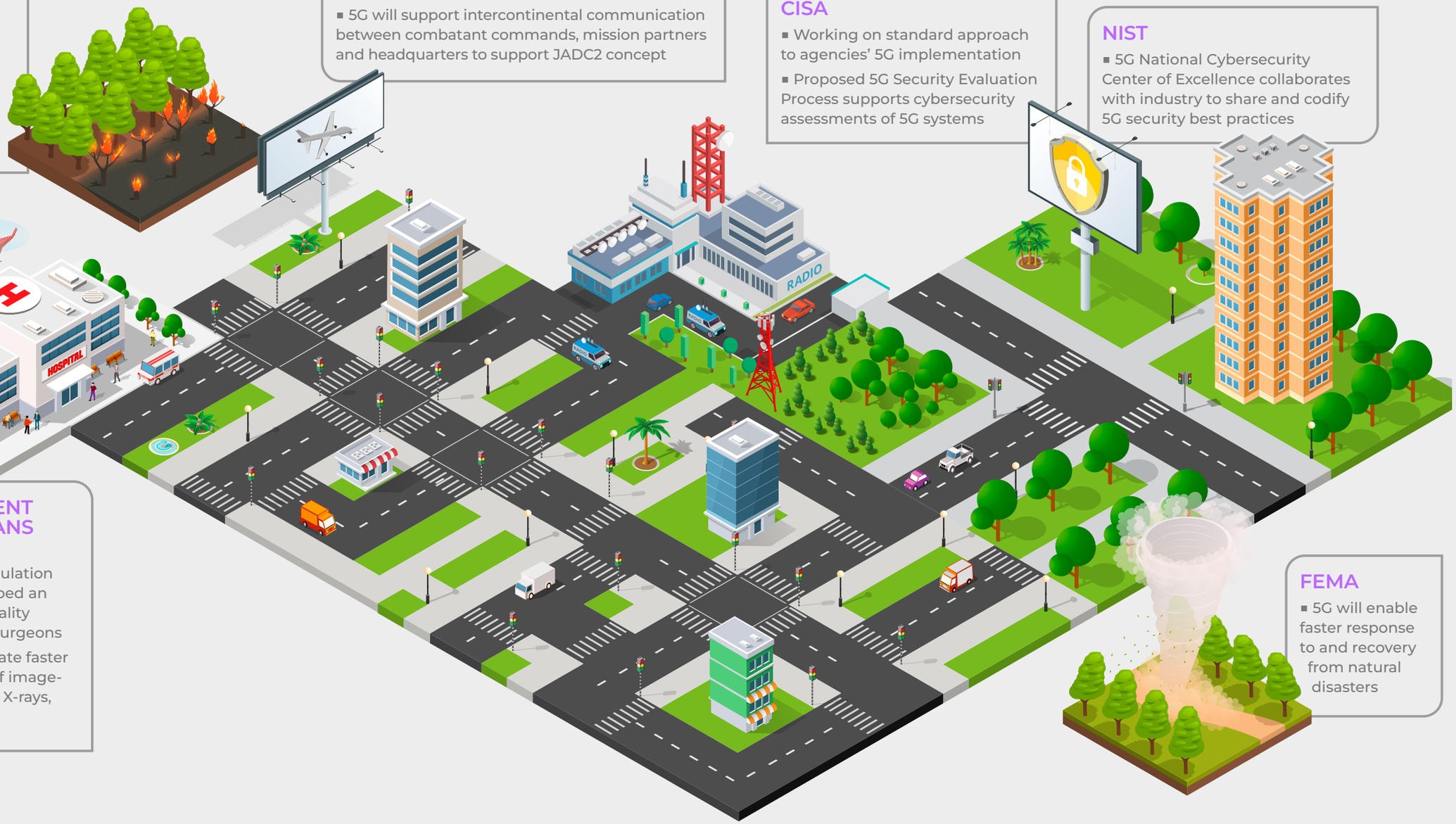


CISA

- Working on standard approach to agencies' 5G implementation
- Proposed 5G Security Evaluation Process supports cybersecurity assessments of 5G systems

NIST

- 5G National Cybersecurity Center of Excellence collaborates with industry to share and codify 5G security best practices



DEPARTMENT OF VETERANS AFFAIRS

- National Simulation Center developed an augmented reality capability for surgeons
- 5G will facilitate faster data sharing of image-heavy files like X-rays, MRIs, etc

FEMA

- 5G will enable faster response to and recovery from natural disasters

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T-MOBILE FOR GOVERNMENT

The Path to Innovation with 5G

With emerging technologies taking hold, 5G has the potential of unlocking new efficiencies that the right partner can help realize.

Christopher Casey, Strategic Advisor, T-Mobile for Business

How is 5G impacting federal agencies?

Casey The next generation of wireless unlocks applications with new capabilities and efficiencies. 5G offers expanded capacity for transfer, analysis and delivery of strategic, real-time data from physical and human assets. For government agencies, 5G enables a transformation of antiquated operations and provides access to unprecedented levels of real-time information from almost any device, anytime and anywhere.

5G also provides the infrastructure to create private networks with a security posture that meets complex, everchanging requirements, as well as create smart, hyperconnected ecosystems. 5G also will better support advances in areas such as artificial intelligence, machine learning and autonomous vehicles. In the military, these 5G-fueled networks could connect communication and information sharing across bases or branches, where many current systems risk becoming obsolete amid the rate of technological change.

For a large entity like the Defense Department, maintaining and

“Logistics management is one of many areas that can realize immediate benefits from 5G connectivity. Using a single 5G network, logistics professionals can track cargo in real time to ensure efficiency and precision in the supply chain.”

—Christopher Casey, Strategic Advisor, T-Mobile for Business

supporting out-of-date systems not only wastes valuable time for our military service members, it also could often become a matter of life and death in the global defense landscape.

We know bandwidth is important to maintaining greater data-sharing capacities that come with more intricate information. But requirements for missions and operations differ wildly, which is why having a wide spectrum is crucial to accommodating the flow of a multitude of different assets. T-Mobile uses multiple frequency bands from low to high to provide the right mix of range, speed and propagation for connectivity.

In what areas can agencies unlock the most benefits of 5G?

Casey 5G has the power to facilitate and bolster other emerging technologies such as artificial intelligence (AI), machine learning (ML), augmented reality (AR), internet of things (IoT) and multi-access edge compute (MEC), a network architecture concept that greatly expands the abilities of cloud computing at the edge or closer to the user.

Logistics management is one of many areas that can realize immediate benefits from 5G connectivity. Using a single 5G network, logistics professionals can track cargo in real time to ensure efficiency and precision in the supply chain.

For maintenance personnel, 5G can use AR to provide detailed step-by-step training environments using 3D models, provide support remotely with reduced latency and use live data to enrich AR experiences wherever the user is located. In health care, 5G networks can unlock the power of telehealth and en-route emergency support.

How can tech teams overcome initial challenges of 5G implementation? (ctd.)

Casey 5G is an infrastructure for innovation. But there are some key steps to overcoming barriers to implementation.

One is to look at your priorities and identify a trusted partner for digital transformation — one who can create an implementation strategy that will help your organization deliver on its mission.

Another is to partner with subject matter experts who bring the experience needed to build, develop, test and deploy new technologies, specifically for federal agencies and DOD.

What is next for 5G implementation in the next year?

Casey With every new technology comes a new way of operating. 5G is no different. It will require industry getting used to the new landscape of allocating budget, identifying high-impact use cases, developing requirements and applications, testing, certifying, implementing and managing solutions that transform operations in the new digital world.

To truly deliver on 5G, innovators need two things:

- First, a transformative 5G network that's available where it is needed. They won't build until the network works for enough people to start seeing benefits of innovation. That's why T-Mobile has blanketed the country with the largest and fastest 5G network.
- Second, they need the carriers to get out of the way. Building on 5G should be easy, but wireless developers run into "carrier barriers" that stand in the way. They are forced to navigate a maze of hoops and hurdles with limited support, inaccessible experts, unclear pricing and compliance certifications that take an eternity. Even if they clear all those hurdles, their solutions can get trapped within the limited coverage of the carriers' 5G networks, making widespread adoption a challenge. T-Mobile for government is committed to being the technology partner of choice and minimizing as many of these hurdles as possible.

Capable device required; coverage not available in some areas. Some uses may require certain plan or feature; see T-Mobile.com. Fastest: Based on median, overall combined 5G speeds according to analysis by Ookla® of Speedtest Intelligence® data 5G download speeds for Q1 2022. Ookla trademarks used under license and reprinted with permission.

Photo Credit: Olga e Alexia

Unlocking the power of digital transformation for government.

With innovative and flexible connectivity solutions, T-Mobile® for Government is committed to keeping vital agencies connected from virtually anywhere, all on the nation's largest and fastest 5G network. As a trusted partner in digital modernization, our tailored approach for government works to reduce costs, improve security, and increase workforce mobility.

To learn more about how T-Mobile for Government is supporting federal agencies, visit **T-Mobile.com/FedGov** or speak with our team of government experts at **1–877–386–4246.**

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5G Investments at Energy Poised to Transform Wireless Communications

The department's national labs are developing new 5G capabilities.

BY KATHERINE MACPHAIL

The Department of Energy (DOE) has a wide-reaching mission spanning scientific innovation, nuclear security and maintaining the national power grid. CIO Ann Dunkin sees endless opportunities for 5G applications across the enterprise.

"5G has the potential to play a key role in every duty mission area because advancing national 5G capabilities will make an important contribution to combating climate change, creating clean energy jobs and promoting energy justice," Dunkin said at the Federal Mobility Group and ATARC's 5G symposium.

The department is driving a whole-of-department approach to take advantage of new wireless communication research and applications.

"Aligned with DOE's participation in interagency working groups and national security efforts, we've launched an effort to establish an enterprise-wide 5G strategy," Dunkin said.

DOE's Office of Science, the single largest supporter of basic research in the physical sciences in the U.S., established its 5G initiative and awarded $6 million to research and development in 2021. Currently there are several 5G efforts underway at national labs, program offices and sites across the department.

"Researchers are applying 5G to our nuclear national security mission space to support advanced remote monitoring capabilities," Dunkin said. "We're actively engaged in research targeting a wide range of 5G applications and security questions across a variety of sectors impacting the lives of every American. From predicting and combating wildfires, to improving urban transportation and shipping infrastructure, to enhancing communications for first responders and environmental monitoring."

Last year, DOE published a 5G catalog showcasing the national labs' current and potential capabilities. At DOE's Lawrence Berkeley National Lab, 5G is being used to enable vehicle infrastructure and infrastructure-to-

Photo Credit: bjdlzx/iStock

infrastructure communications for autonomous vehicles.

The Pacific Northwest National Lab is working to develop a warning system leveraging telecommunication networks in AI/machine-learning analytics for real-time notifications for ferry operators.

The National Nuclear Security Administration, in partnership with the Lawrence Berkeley National Lab, is working to integrate “internet of things” sensors that support urban traffic and safety systems. Meanwhile, the National Renewable Energy Lab researchers have proposed a new service-based network architecture to prevent existing attack methods such as denial of service. And the Idaho National Laboratory has developed a unique communication control channel called wireless spectrum communication that could potentially expand the use of available radio spectrum.

“Scientists across DOE are applying 5G to improve the performance, availability, security and reliability of grid devices and services every day,” Dunkin said. “These applications will become increasingly vital as we transition to the grid in the future, relying on more distributed and renewable energy sources to generate and transmit power across the nation, creating a more complex grid operating environment.”

While the 5G landscape introduces a breadth of capabilities, it also brings new security concerns. Dunkin said DOE is staying on top of technology trends and supply chain risks to understand how the U.S. can most effectively secure its 5G telecommunication infrastructure.

“A major driver of government-wide efforts to advance and secure 5G is the need to mitigate the economic, national security and other risks posed by cyber threats and vulnerabilities to the 5G infrastructure — particularly where the threats and vulnerabilities could disrupt the nation’s critical infrastructure,” Dunkin said. “And while 5G does represent a potential threat vector, DOE and others in the U.S. government are both adopting mitigations, such as supply chain risk management, and innovating through the research and

Photo Credit: metamorworks

“5G has the potential to play a key role in every duty mission area because advancing national 5G capabilities will make an important contribution to combating climate change, creating clean energy jobs and promoting energy justice.”

Ann Dunkin, CIO, Department of Energy

development of secure radio access networks and associated standards to ensure safe adoption of 5G to support our missions. Basically, no new technology comes without risks, and we want to make sure that we limit those risks as much as possible.”

The key to successful 5G development and deployment, Dunkin said, is collaboration. Dunkin began her career at HP and has held technology leadership roles in both the private sector and the federal government. She believes 5G is a critical space for government and industry partnership.

“The speed of innovation and technology requires government and industry to work together to develop, deploy and secure 5G to deliver services to the American people,” Dunkin said. “We must seek opportunities to learn together, partnering in a whole of nation approach. … Our future as a global technology and communications leader depends upon our success in this space.”

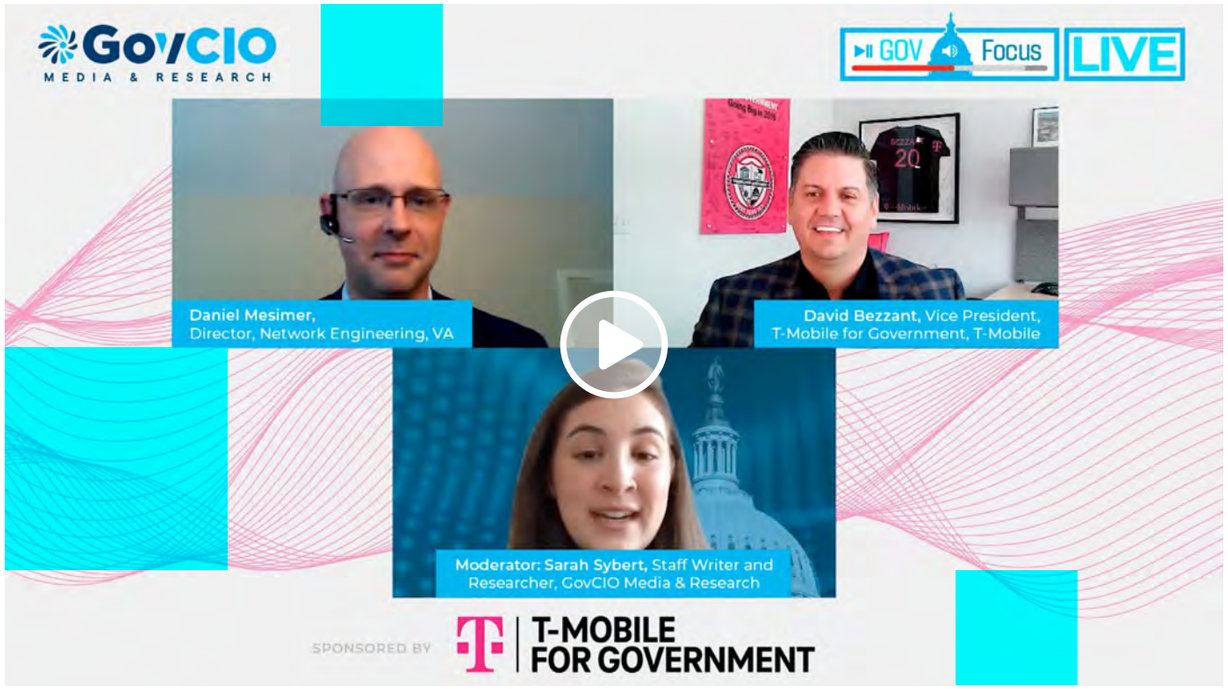
5G is changing the way the world connects and communicates, and Dunkin is excited by the future of DOE’s work in this space.

“I’m really energized by the current opportunity 5G gives us to rethink what’s possible in communications technology,” Dunkin said. “Effective adoption, deployment and development of applications for advanced 5G wireless networks can enable new and enhanced national telecommunications capabilities. These new capabilities can be adaptive or uniquely configured for specific or dynamic applications, or provide the technological backbone that America needs to continue its leadership in this area. By leading next-generation advanced world’s technology, we can build the infrastructure needed to enable a tightly interconnected world.”

INTERVIEW

Leveraging 5G to Improve Access to Veteran Services

Featuring David Bezzant, Vice President, T-Mobile for Government and
Daniel Mesimer, Director, Network Engineering, VA



The Department of Veterans Affairs has begun to leverage 5G to support many of its teleservices, like telehealth, which has seen substantial growth during the COVID-19 pandemic. In collaboration with industry, VA is leading the way in groundbreaking solutions for Veterans. VA Director of Network Engineering Dan Mesimer and T-Mobile for Government Vice President David Bezzant join us to discuss the growth and adoption of 5G, which provides more network capacity and decreased lag time, ultimately enabling organizations to share more information faster.

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“We’re looking to use 5G to increase our user’s experience — we’re seeking a delightful user experience as we roll forward. ...From our perspective our guiding light, our North Star, is mobility first, targeting ubiquitous roaming. We do not want our users to be aware what network they’re actually on, are they on-prem, are they out in the field, are they taking care of our veterans and patients? We want them to have that same delightful user experience no matter where they are and 5G is going to be a key component as we walk forward in that path.”

Daniel Mesimer, Director, Network Engineering, VA