

5G RESEARCH REPORT

Enterprise to the Edge: Agency Guide to 5G

Moving processing out to the edge demands a different kind of communications technology. 5G enables a superhighway of connectivity with immense potential for federal agencies. Its low latency, device-to-device communications, high speed, and high capacity open the door for better applications in augmented reality, virtual reality, remote telemedicine, flight-line of the future, command and control, smart campuses, and more. Federal agencies are already on the road to 5G adoption, realizing the benefits and addressing the challenges.



Foreword

A generation ago, Wi-Fi revolutionized workforce mobility. 4G gave birth to innovative applications such as Uber and FaceTime. And we know 5G – the fifth-generation technology standard for broadband cellular networks – will bring disruption as well as significant opportunities for the public sector. We also know that moving forward, 5G will be augmented with Wi-Fi in specific use cases and fully replace 4G in others. In doing so, it will transform enterprises, so they are aligned for high-speed, high-performance compute demands, providing gigabit speeds at the point of need previously only available via ethernet and fiber.

In short, 5G enables the development of new, or enhancements of existing, tools that will improve user experience and mission outcomes.

This report is an analysis of progress the federal government is making to implement and take advantage of 5G. As agencies begin and continue their 5G journey, this report is designed to highlight important considerations and potential challenges with adoption as 5G becomes mainstream. When will this be? Some argue that it already is. But the consensus of 69% of the federal IT decision makers surveyed for this report see 5G technology as very impactful or critical in helping their agency meet their mission objectives in the next 5 years.

In addition, this report shines a light on the significant progress that agencies have made with their 5G strategies and captures some of the benefits agencies are already seeing from 5G adoption.

As federal agencies continue to adopt 5G and determine the use cases that will support their mission, this report is designed to help better inform their approach and further accelerate their efforts.

Rob Smallwood

Vice President, Digital Modernization
General Dynamics Information Technology

Executive Summary

5G networks will enable the connection for billions of new devices, sensors, and systems that will intelligently connect to the network and each other based on their time sensitivity and computational needs. The opportunities for government are endless. Today, for example, the Department of Veterans Affairs is using 5G to access and examine MRI images, and then is overlaying those images with patients to perform safer surgeries. And the Department of Defense is finding 5G, with its focus of gathering all edge sensor information and connecting all commands across all services, foundational to the Joint All-Domain Command and Control's strategic goals.

How are federal agencies progressing with 5G adoption? GDIT's Digital Consulting Practice partnered with Market Connections, an independent research firm, to learn where federal agencies are in their 5G adoption, the benefits and challenges they are facing, and the impact this has on the mission. The results of this survey yielded many key takeaways.

1 JOURNEY

Nearly all agencies are evaluating or piloting or have deployed 5G

Agencies don't need convincing about the future of 5G — they're already on their way. 89% of respondents said they're already studying or using commercial or private 5G capabilities within their agency.

2 IMPACT

5G impact will triple over next five years

Agencies see 5G becoming mainstream in the coming years. As this happens and use cases are pursued, they envision an increased mission impact.

3 INVESTMENTS

More than half are making 5G a budget priority in 2023

While some agencies are implementing 5G now, they will increase investments over the next three years. With investment, they will begin to see the impact in action.

4 USE CASES

Agencies are focused on infrastructure first to support future innovations and applications

As agencies explore how 5G will best serve their environments, they are focused on connectivity and speed more than mission applications. This focus is likely to shift as they explore use cases and plan for implementation.

5 CHALLENGES

Costs and cybersecurity are challenges

5G means expanding the attack surface with more devices at the edge wirelessly transmitting back to the network.

5G requires new 5G-enabled devices, edge computing infrastructure, and upgrades to existing networks. Budgeting requires looking at it from the perspective of mission outcomes rather than a technical perspective.

6 BENEFITS

Speed and reliable connectivity are top benefits

Similar to the use cases, agencies see the biggest benefits tied to speed, network, and capacity — all of which are important promises of 5G. As use cases diversify, the list of benefits is likely to shift as well.

Who We Surveyed

GDIT's Digital Consulting Practice partnered with an independent research firm to design an online survey of 500 federal government employees — 200 each at defense and civilian agencies and 100 at intelligence and homeland security agencies. Respondents were GS-12 and above and involved in either the selection or management of firms that provide 5G and advanced communication services. All respondents were familiar with 5G. These respondents represent a cross section of the individuals and roles that are responsible for driving their agency's technology and mission decisions.

FEDERAL CIVILIAN AGENCIES



40%

DEFENSE AGENCIES



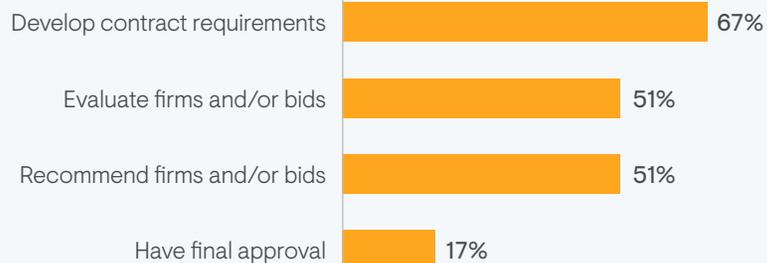
40%

INTELLIGENCE AND HOMELAND SECURITY AGENCIES

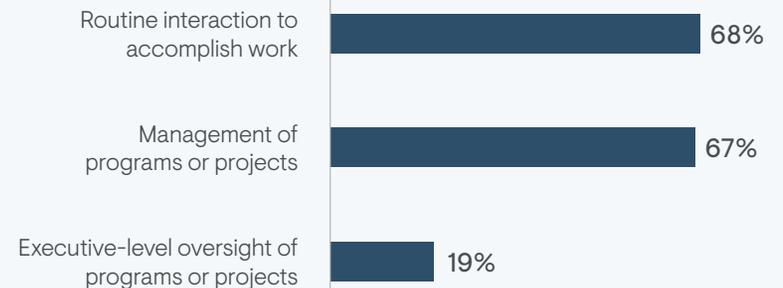


20%

Selection



Management



Where Are Agencies In 5G Adoption?

Federal agencies have begun the 5G journey: 89% are evaluating, are piloting, or have deployed 5G, whether it is private or commercial 5G service. Nearly half (44%) are piloting or have deployed either private or commercial 5G. Only 5% of the respondents say they're not planning or evaluating any 5G. Civilian respondents are more likely to be piloting private 5G than intelligence or homeland security respondents. In terms of commercial 5G services, defense agencies are most likely to be evaluating or planning with mobile network operators (MNOs) and commercially available services.

Private 5G Technology

	TOTAL	CIVILIAN	DEFENSE	INTEL
Have deployed	15%	14%	15%	19%
Are piloting	14%	18%	13%	9%
Evaluating or planning to pilot	45%	44%	47%	43%
Not planning or evaluating to pilot	5%	6%	6%	4%
Don't know/Not Sure	21%	20%	20%	25%

Commercially Available 5G Technology

	TOTAL	CIVILIAN	DEFENSE	INTEL
Have deployed	12%	11%	10%	17%
Are piloting	21%	21%	20%	23%
Evaluating or planning to pilot	47%	44%	54%	39%
Not planning or evaluating to pilot	1%	0%	0%	1%
Don't know/Not Sure	21%	24%	18%	20%

Statistically significant difference between segments

WHAT THIS MEANS

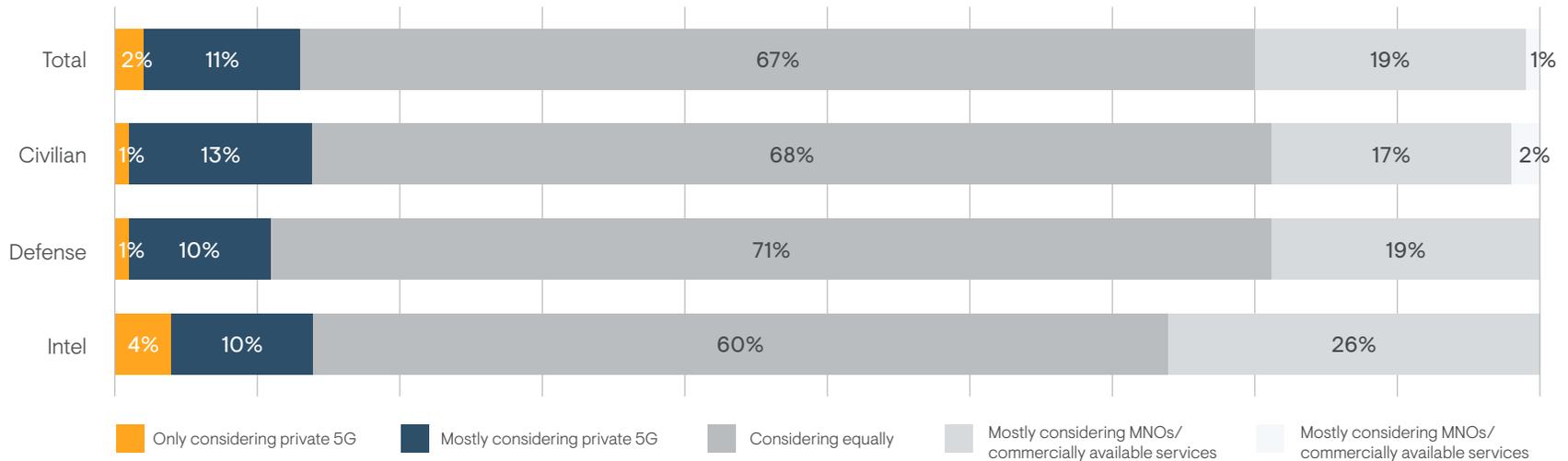
The data indicates that agencies are evaluating, piloting, and deploying all types of 5G to diversify risk or to see what works best within their agency. Many agencies are still developing the use cases and identifying the enabling technology that will make 5G transformative for them — but they know their 5G future is coming and they need to invest in the capabilities now so they're ready.



Commercial vs. Private 5G

Almost two-thirds of agencies are equally considering private and commercial 5G capabilities, likely looking to understand the pros and cons of each as they develop their adoption plans.

Consideration of Private vs. Commercially Available 5G



WHAT THIS MEANS

Whether private or commercial 5G is right for agencies depends heavily on the use cases. As those plans emerge, agencies will need to narrow their focus or integrate capabilities based on what's right for them.

MNOs have invested heavily in building out 5G networks across the United States, and they still have a lot more to do. The costs associated with this will be passed on to customers — whether individual people, businesses, or government agencies. MNO services are designed primarily for the general population, which may limit the opportunities for some agencies to tailor capabilities to their needs. In addition, the level of network visibility required by some agencies may not be available.

Agencies that decide to build private 5G networks can learn from the MNOs: This will be a large-scale investment because it relies on designing and building the capability from scratch, rather than leveraging the investment made in existing infrastructure. But commercial networks may not be available in some places — like at a military base or following a natural disaster — and there are also security considerations. Maintenance of private networks will also add to the cost. That may seem like a reason to adopt commercial networks, but private 5G provides benefits agencies won't get from commercial networks, such as improved security and data privacy. In fact, many commercial offerings will not be able to support government use cases.

Mission Impact

Respondents believe 5G will become mainstream – if not already, then within the next five years. And it will impact the mission: When looking at the next 12 months, a quarter say it will be either very impactful or critical. That number climbs in the next three years with 56% saying it’s going to be very impactful or critical, and rises to 69% in five years.

OVER THE NEXT 12 MONTHS



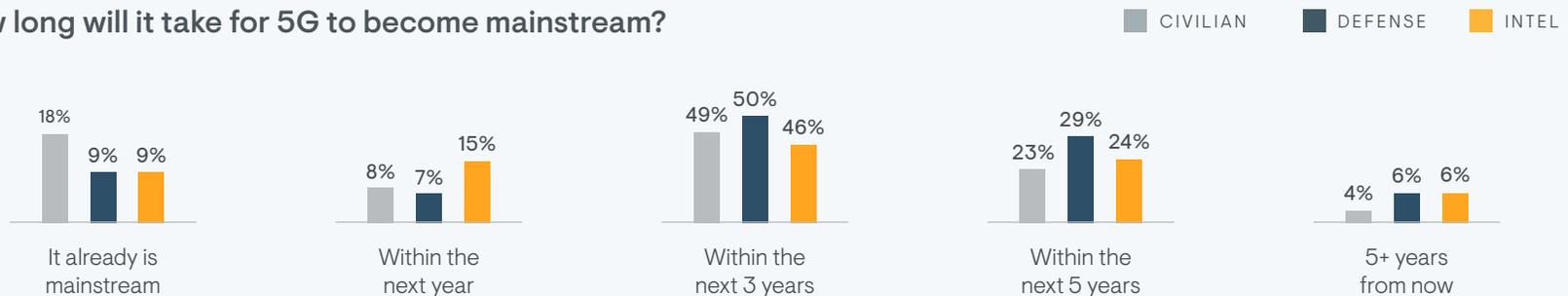
OVER THE NEXT 3 YEARS



OVER THE NEXT 5 YEARS



How long will it take for 5G to become mainstream?



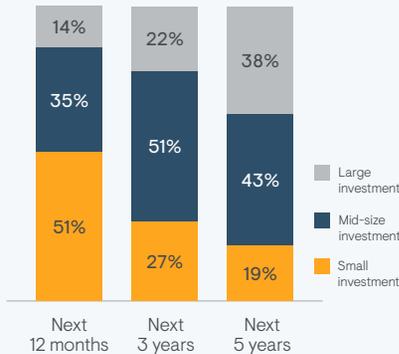
WHAT THIS MEANS

Many agencies are already investing in 5G infrastructure. Knowing that 5G will impact the mission, it is imperative to at least start planning and piloting capabilities now. While 5G is still in its infancy and not every device is 5G ready, it will be around for a long time as demonstrated by the continued existence of 3G and 4G.

Priorities and Investment Levels

5G Investments

Agencies making smaller investments in 2023, but that flips looking three and five years out.



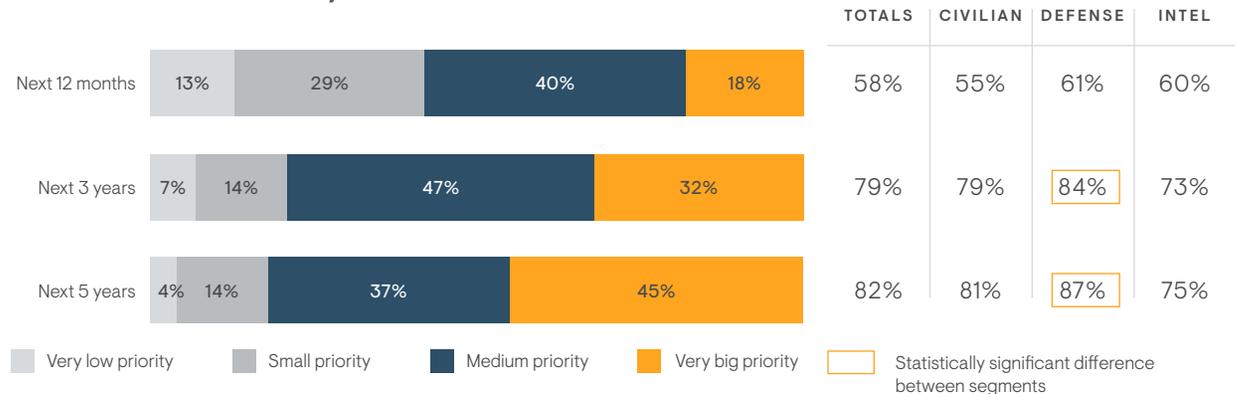
LARGE INVESTMENTS

	Next 12 months	Next 3 years	Next 5 years
Civilian	10%	25%	41%
Defense	19%	22%	37%
Intel	14%	19%	33%

Statistically significant difference between segments

Regardless of how impactful respondents think 5G will be, agencies are already starting to make it an investment priority. Nearly six in ten agencies see 5G as a top investment priority over the next twelve months. This number jumps to 79% in the next three years.

5G Investment Priority



WHAT THIS MEANS

This data demonstrates an increase in importance over time and investments agencies are going to make over the next five years, which is consistent with the perceived mission impact. The data suggests that agencies understand the “chicken and egg” situation with 5G. In many cases, 5G enabled devices and related applications don’t exist yet. Other mission enabling technologies that make 5G work, like AI processing at the edge, need to be adapted to each mission, which requires planning, takes time, and requires investment.

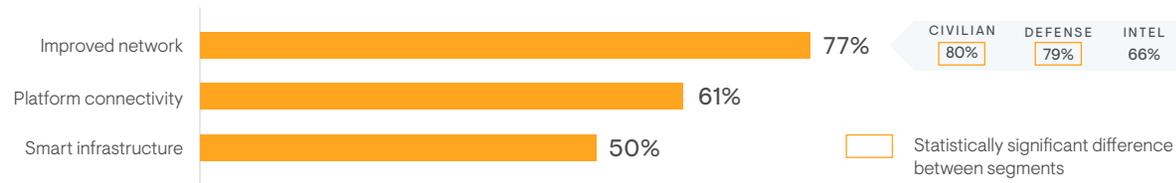
Use Cases for 5G

Knowing that a 5G journey is a significant investment, what use cases are federal agencies most interested in right now? The data show they can be broken down into two general categories: (1) foundational networking and connectivity and (2) mission-enabling innovations and applications.

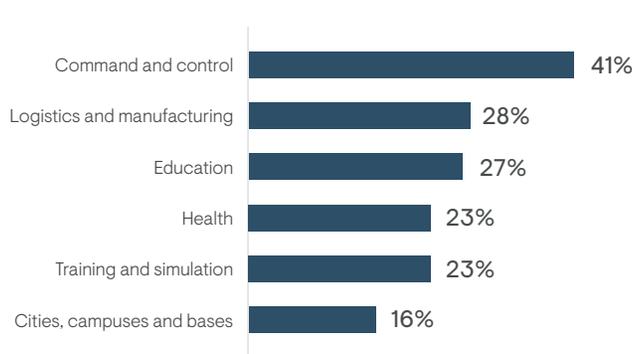
Respondents ranked the foundational use cases higher overall than the mission enablement use cases. Improved network capability (77%) is the top, with platform connectivity (61%) and smart infrastructure (50%) following.

The top-ranking mission enablement use case by a large margin is command and control (41%). After that, logistics and manufacturing is second with 28%.

Connections



Innovations and Applications



WHAT THIS MEANS

There is no shortage of 5G use cases, but many of them are still in their infancy. It's easy to think about connecting devices and the network as immediate use cases for 5G, but there's much more to it.

As the use cases mature, agencies that are investing in the 5G infrastructure now – the foundational aspects of 5G – will be better positioned over time to deploy technologies that address those use cases. As noted earlier in the report, it is important to consider all of the potential use cases in order to design the optimal 5G solution that will enable each agency's unique mission.

Beyond networking and connectivity, 5G and edge computing will impact agency missions more directly – especially as 5G will often be used in conjunction with other capabilities like Wi-Fi and satellite.

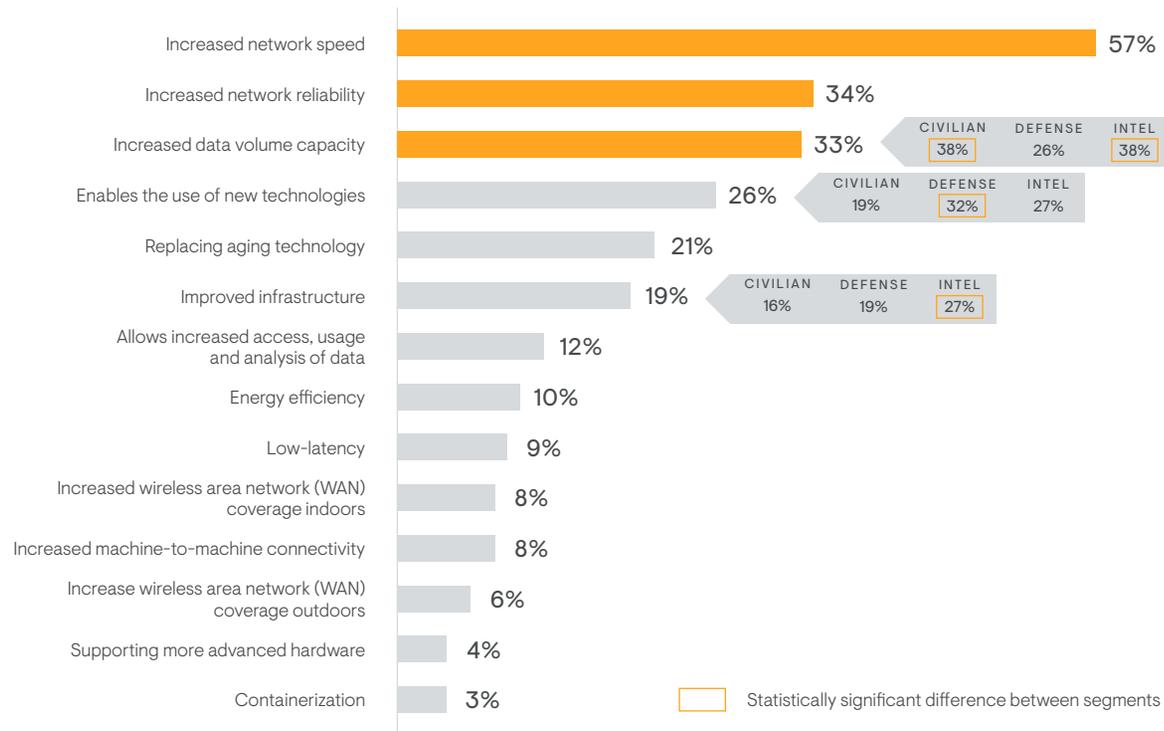
- 
PLATFORM CONNECTIVITY
 Connecting internet of things (IoT) devices to the enterprise
- 
COMMAND AND CONTROL
 Taking an action quickly with low-latency data processing
- 
LOGISTICS AND MANUFACTURING
 Managing supply chain processes
- 
IMPROVED NETWORK
 Providing faster connectivity with much lower latency
- 
TRAINING AND SIMULATION
 Realistic training and simulation activities using augmented reality (AR) and virtual reality (VR)
- 
SMART INFRASTRUCTURE
 Enabling intelligent decisions at the edge, including smart cities and smart warehouses
- 
HEALTH
 Telemedicine, including telehealth visits, enhanced contact tracing, and remote surgical procedures
- 
EDUCATION
 Broadcasting and improved online learning

Benefits of 5G

As with use cases, the benefits break down into two general categories: (1) networking and connectivity and (2) mission outcomes. And like the use cases, the top benefits are networking and connectivity oriented: More than half (57%) of respondents cited increased network speed as the biggest benefit of 5G. Increased network reliability (34%) and increased data volume capacity (33%) follow.

In terms of mission outcomes, overall these benefits ranked much lower. Only 12% said allowing increased access, usage, and analysis of data is a top benefit, and 3% saw containerization (helping to quickly move applications into the cloud) as a top benefit. Low latency, which is commonly cited as a 5G benefit, was ranked as such by only 9%. Defense respondents were more likely to say that it enables the use of new technologies (32%).

5G Technology Benefits



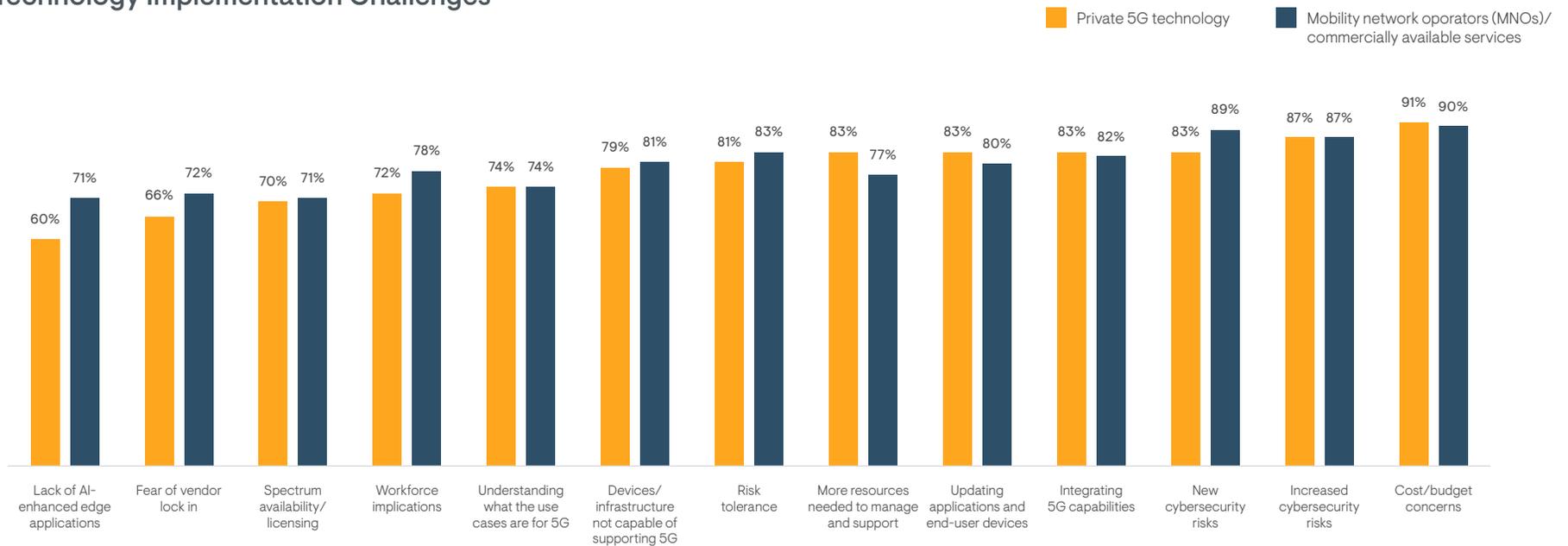
WHAT THIS MEANS

While 5G promises many benefits, speed, networking, and data capacity are the top ones respondents are looking forward to. As with the use cases, these benefits do not necessarily connect 5G to mission outcomes. However, as agencies continue to understand this emerging capability and develop their own adoption plans, the ranking of benefits will likely realign. For example, as using and managing data becomes more critical, 5G enables the artificial intelligence and machine learning that make data actionable. Without 5G, these mission-impacting benefits are nearly impossible to achieve.

Challenges of 5G

The data demonstrates agencies face myriad challenges with 5G, regardless of whether looking at private or commercial 5G services. Not surprising, nine in ten cite budget as the top challenge, followed by both new cybersecurity risks and increased cybersecurity risks. That said, out of the challenges surveyed, nothing ranked lower than 60%, indicating agencies see an uphill climb in their adoption of 5G.

5G Technology Implementation Challenges



WHAT THIS MEANS

Unsurprisingly cybersecurity is top of mind. 5G means expanding the attack surface with more devices at the edge wirelessly transmitting back to the network. Integrating 5G with the enterprise requires embedding security from the outset of solution design.

Of course, the biggest challenge is paying for it. 5G requires new 5G-enabled devices, edge computing infrastructure, and upgrades to existing networks to make everything work. There are not many 5G-enabled devices available, yet, and the ones out there today are expensive.

Long term, adopting 5G requires a different approach to thinking about budget. Budgeting for 5G capabilities requires looking at it from the perspective of mission outcomes rather than a technical perspective. Even if agencies don't plan to deploy 5G devices now, understanding the use cases and developing a plan will allow infrastructure to be updated over time so it's ready for the future use cases agencies want to realize.

Next Steps

As agencies embark on the 5G journey, where should they start? What is most important to keep in mind? The GDIT Digital Consulting Practice and experience from our 5G Emerge Lab have identified four focus areas that will help set agencies up for success.

1

Secure devices and communication on the edge and in the air, not only at the data center.

The opportunities 5G offers come with an expanded threat landscape. Devices and networks on the edge that are capable of incredible analytical and computing power also need to have security integrated into every layer. In addition, as some components are manufactured in foreign nations, there are supply chain risks that need to be considered and could impact an agency's speed of adoption.

Most agencies have developed their zero-trust strategy, a resilience architecture model that will prepare them well to harness the opportunities 5G presents. Focusing on securing not only the home base but each and every one of the devices connecting to the network — and every interaction in between — is critical to both a successful 5G leap and a zero trust strategy.

2

Plan the budget now, based on mission-focused use cases.

The move to 5G is significant with enormous potential, and it is crucial to keep the bigger picture in mind. Focusing on the outcomes — the mission-focused use cases that will transform what is possible — can allow agencies to step back and look at the holistic needs of their mission, rather than focusing on individual technologies. What is the agency vision that needs to be budgeted for over several years, rather than ad hoc funding along the way? How can 5G be harnessed to serve larger mission goals, potentially woven together with other technologies depending on the specific use case? How can 5G work in conjunction with Wi-Fi and satellite to enhance the mission? What else is possible that nobody has even thought about?

The expanse of opportunities that 5G offers prompts a rethinking of how to plan for such opportunities. Planning now is the best way to position an agency to maximize the possibilities of 5G. As budget is always top of mind, it is crucial to have a clear picture of what the overall project will cost, establishing 12- or 18-month budget plans and beyond that prepare agencies to take that 5G leap and maximize value. Partnering with a systems integrator who is working on 5G solutions across the federal government can provide strategic roadmaps and best practices that will help agencies avoid pitfalls and reduce costs.

3

Innovate and standardize.

5G will enable a future we can't imagine right now — one that might even seem a little like science fiction. Remote surgery on the battlefield, drones that could prevent forest fires, and trainings conducted through hologram-enhanced virtual reality are all possibilities that are already being piloted. Before 4G, applications like Uber and Facetime were impossible, and now we can't imagine living without them. What will be the government game-changer with 5G and 6G, and every iteration that comes after?

Understanding the speed at which transformation is possible also means structuring investments accordingly, standardizing in such a way that agencies can expand to add capabilities when they become available. Agencies looking to modernize are still sifting through the legacies of siloed and stovepipe structures and confronting the consequences of proprietary solutions that solve only one problem. Thinking strategically about how standards can scale, adapt, and enable evolution will ensure that this investment continues to pay dividends as capabilities grow. And consider that in the future, there may be ways for agencies to share some of the common infrastructure required to support 5G.

4

Lean forward and look ahead.

Investing in 5G is not only an imperative for today, as previous networks like 3G are decommissioned, but it is also an investment in the technology of the future. 6G is not far behind 5G, and the sooner agencies can position themselves to take advantage of those opportunities, the more effective they will be. Establishing a flexible and secure 5G architecture will make it easier for your agency to move to these next generations of what's possible. Looking ahead to the future is not just about improving the network itself, but understanding that these investments are investments in the future of the missions you serve as well.

Conclusion

There is no argument that 5G – and all future generations of this technology – will impact mission outcomes for years to come. Even though it is still in its infancy, agencies are evaluating, piloting, and deploying all types of 5G. This is important because planning now is imperative for future success.

5G is a multi-year journey, starting with adopting the basic capability and moving on to the mission-impacting use cases. While 5G promises many benefits beyond speed and capacity, there are more that we can not yet conceive. Many agencies are still developing the use cases and identifying the enabling technology that will make 5G transformative for them – but they know their 5G future is coming and they need to invest in the capabilities now so they're ready.

Thinking about how you will work with different use cases in ways that resonate in your environment is critical to ensure the most cost-efficient implementation and use of this resource.



5G Research Study Partners



About GDIT

As a trusted systems integrator for more than 50 years, General Dynamics Information Technology is a leader in 5G and advanced wireless communications, spanning all use cases in defense, intelligence, and civilian agencies from the enterprise to the edge. GDIT supports the most sensitive missions applying 5G, cyber, artificial intelligence, cloud, and high performance computing, to solve technical challenges. GDIT collaborates and co-creates with industry leaders and emerging-technology companies to design and deliver tomorrow's innovative and transformative solutions and services. For more information, visit: www.gdit.com/5G

CONTACT

GENERAL INQUIRIES

Christopher Aiello

Senior Marketing Manager

GDIT

Email: christopher.aiello@gdit.com

MEDIA INQUIRIES

Jay Srinivasan

Senior Public Relations Manager

GDIT

Email: jayendran.srinivasan@gdit.com



About Market Connections

Market Connections delivers actionable intelligence and insights that enable improved business performance and positioning for leading businesses, trade associations, and the public sector. The custom market research firm is a sought-after authority on preferences, perceptions, and trends among the public sector and the contractors who serve them, offering deep domain expertise in information technology and telecommunications; healthcare; and education.

For more information, visit: www.marketconnectionsinc.com

CONTACT

Jared Shellaway

Assistant Vice President, Research Services

Market Connections

Email: jshellaway@govexec.com

