

WHITE PAPER

# Leveraging 5G to Enable IoT

Enabling Next-generation Digital Transformation in the  
Utility Industry

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# Contents

Overview.....	3
IoT Is Expanding.....	3
5G Changes Everything.....	4
Top IoT Priorities for Next-generation Deployments.....	5
Key Challenges of 5G IoT Deployments .....	6
Verizon 5G Services Are Ideal for IoT Deployments in the Utility Industry.....	7
Conclusion.....	7

## Overview

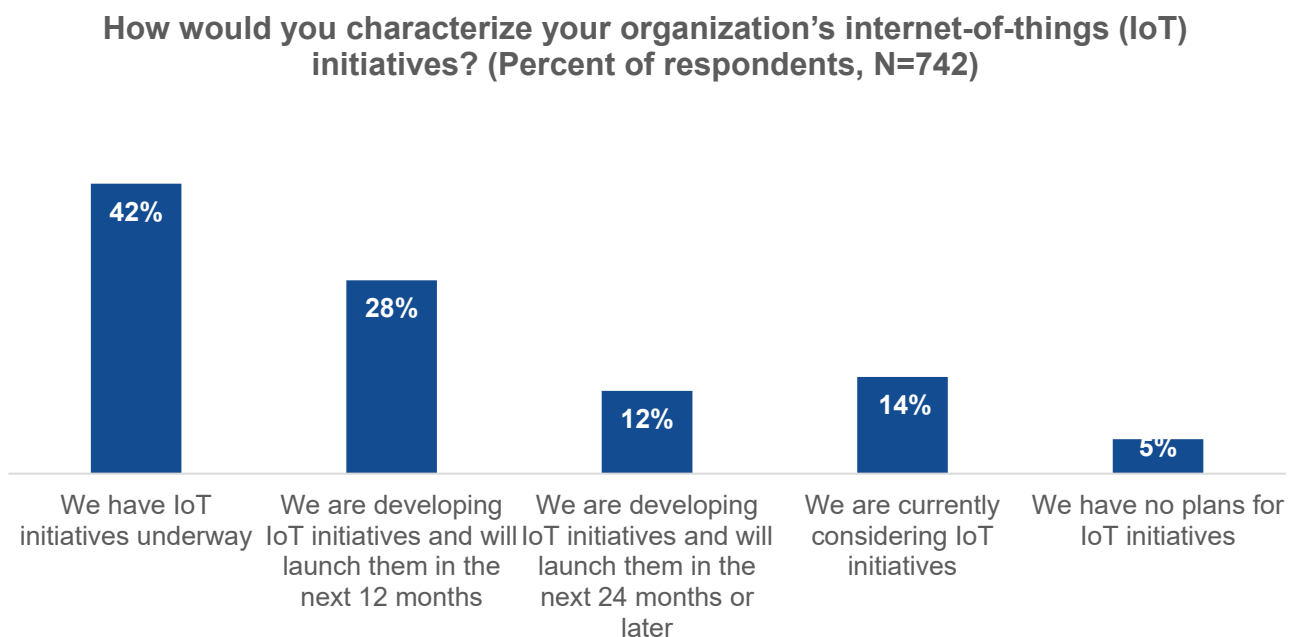
There is no internet of things (IoT) if those things aren't connected. But wired connections restrict potential use cases and hinder deploying devices, such as sensors on the grid, power generation, gas pipeline operations, or any of a thousand other use cases. When a connection is dependent upon a wire, many of the most attractive and promising solutions aren't possible. Wireless is the only way to support these innovative IoT use cases, and that wireless connection must deliver elevated levels of scale, performance, and bandwidth. This is why 5G is a foundational technology for next-generation IoT deployments that embody hyper-automation.

For utilities, IoT is used to increase the automation of business processes, such as grid management, production workflows, resource scheduling, and even marketing processes. Many of these processes use artificial intelligence (AI), machine learning (ML), and robotic process automation (RPA). The result of the automation is unprecedented levels of efficiency, heightened customer service, and operational simplicity.

## IoT Is Expanding

Overall, IoT investments are growing rapidly and appearing in many different scenarios. According to Tech Target's Enterprise Strategy Group research, 42% of organizations already have IoT initiatives underway (see Figure 1), and for those organizations that have more mature digital transformation initiatives, 70% reported having IoT initiatives underway.<sup>1</sup>

Figure 1. IOT Launches Will Expand Significantly in the Next Two Years



Source: Enterprise Strategy Group, a division of TechTarget, Inc.

IoT initiatives are already in place for a limited number of use cases, and some have achieved "production" status. In fact, Enterprise Strategy Group research highlights that more than half (58%) of organizations have more than

<sup>1</sup> Source: Enterprise Strategy Group Complete Survey Results, [2023 Technology Spending Intentions Survey](#), November 2022.

1,000 IoT devices deployed, with 23% reporting they have more than 10,000.<sup>2</sup> And these numbers should grow quickly as new types and categories of devices are released and as the ability to connect them wirelessly expands the number of applications they can be used in. One rapidly growing use case is the support of digital twins, or virtual environments that fully mimic physical facilities, processes, or activities.

There is a reason that the more mature an organization's digital transformation initiatives, the more likely it is to also have IoT initiatives. IoT and digital transformation are intimately linked. In a recent Enterprise Strategy Group research survey, 47% of respondents reported that developing new data-centric products and services is the focus of their digital transformation, making it the second most common response.<sup>3</sup> IoT environments are going to be a primary source of the data that supports these new products and services.

**Figure 2.** The Number Two Digital Transformation Goal Is to Develop Data-centric Products and Services

**What are your organization's most important objectives for its digital transformation initiatives? (Percent of respondents, N=730, three responses accepted)**



Source: Enterprise Strategy Group, a division of TechTarget, Inc.

Wireless connectivity is essential to increasing the use of IoT by supporting new use cases. Being able to connect devices without a physical tether can make IoT deployment more prevalent, particularly in an industry, such as the utility industry, where distribution networks and pipelines are spread across vast geographic areas and into remote locations. Having AI- and ML-enabled IoT devices in such areas can represent a huge savings by replacing or enhancing human resources and other equipment.

## 5G Changes Everything

Until now, utilities could only leverage a limited number of use cases, as they were restricted by wireless connections that didn't have the necessary scale, persistence, or enhanced performance necessary for more advanced implementations. The delivery of mid- and high-band (mmWave) 5G networks ensures that the scale and performance of wireless networks now matches that of wired alternatives. Now, wireless networks can support the most demanding and highly interactive IoT projects, such as grid or plant monitoring and digital twins. In many

<sup>2</sup> Source: Enterprise Strategy Group Complete Survey Results, [Distributed Cloud Series: Digital Ecosystems](#), August 2022.

<sup>3</sup> Source: Enterprise Strategy Group Complete Survey Results, [2023 Technology Spending Intentions Survey](#), November 2022.

instances, such use cases are becoming available to utilities for the first time since wired deployments were not feasible because of the need for broad geographic coverage or operations in harsh conditions.

In the future, the utility industry will need to securely connect huge numbers of IoT devices. For this, they can turn to 5G network slicing, which allows multiple networks (both virtual and independent) to be created on top of a common 5G infrastructure.

Security has been perceived to be a weakness for IoT networks, but that is changing thanks to enhanced security services from network providers such as Verizon. These networks can provide near-real-time notification of intrusions, be designed with stringent security already in place, and even help to prevent reconnaissance or ransomware attacks. That moves IoT from being a security pariah to a key security component.

There are also other technologies that “surround” 5G and complement its use. This includes the use of mature cloud infrastructure offerings, including edge computing and near-real-time storage options. Advances in software development practices that make the production of code faster and more secure (CI/CD, DevSecOps, etc.) are also important because those practices reduce the time to solution, a key metric for IoT projects.

## Top IoT Priorities for Next-generation Deployments

Today’s highly competitive business environment makes organizations more open to new technologies that can give them a competitive edge, including committing to next-generation IoT projects. The ability to dramatically enhance business operations, efficiency, and speed appeals to executive management, and 5G networks are seen as a critical technology platform for moving forward.

With 5G, wireless speeds and throughput can match those of wired networks, making it possible to eliminate the limitations of physical connections and embrace the agility and ubiquity of wireless networks. Another important factor is the near universal adoption of 5G by vendors of IoT devices and infrastructure. They are constantly delivering new and innovative 5G-enabled products and services to support wireless IoT projects in the utility industry. For example, Verizon’s Grid Wide offerings help manage and balance energy loads, 75 Fahrenheit provides tools using wireless technology to optimize utility usage in intelligent buildings, and Perenio is delivering smart 5G routers and hubs to support more capable wireless network infrastructure.

Boardrooms also are recognizing that enhancing IoT deployments can support broader corporate goals, such as environmental, social, and governance (ESG) initiatives. 5G networks use much less energy than 4G networks. One 5G cell can support 50,000 devices, reducing the number of active network hardware components. 5G-enabled IoT’s ability to dramatically improve grid efficiency, reduce and manage power consumption, optimize the use of energy, and integrate new energy sources can contribute to meeting ESG goals or initiatives. In addition, IoT and 5G are ideal for supporting virtual and hybrid work in the utility industry. Virtual walkthroughs, digital twins, and telework for workers that typically had to be on site will become possible, as IoT provides more digital interactions for employees—and 5G provides the bandwidth to make it all work seamlessly.

A recent research survey from Enterprise Strategy Group showcases the alignment between 5G IoT and current strategic demands on a business. The following data points reinforce how 5G IoT projects support priorities for improving an organization’s digital systems and capabilities in the utility industry. The research shows that:<sup>4</sup>

- Wireless networks are becoming the standard for connecting new IoT devices. Enterprise Strategy Group found that 42% of organizations are increasing their wireless connectivity to support new devices.
- The level of IoT project activity is quite notable. More than two in five of the respondents (41%) reported that they are expanding the scope of their IoT deployments.

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<sup>4</sup> Ibid.

- IT teams are much more involved with operations technology (OT) than they were in the past. 41% of firms are improving the alignment of OT and IT staff.
- The rate of innovation for IoT devices and actuators continues to increase. 40% of firms are improving their ability to rapidly onboard new IoT devices.
- Security is always an IoT priority. To protect their IoT deployments, 40% of firms are increasing secure WAN bandwidth to facilitate movement of data from devices to aggregation points.

Another priority that must be included in the plans for IoT deployments is to ensure organizations can scale up (add more resources easily) and out (add performance capabilities to existing resources). Both result in greater demands on network performance. 5G networks are up to this challenge. That means IoT designs that can support not only greater data flow from existing devices and infrastructure, but also the additional demands as new sensors, actuators, and devices, are added. These two growth vectors will also demand better facilitation of two-way data flows, a capability that high-performance 5G networks support.

And, of course, the network must support the enormous data needs of AI/ML algorithms. Such algorithms will be used by the utility industry to automate processes, responses, and reporting, but the huge amounts of data involved can swamp older wireless network standards. 5G, particularly mid- and high-band services, are up to the job, and the consistency of the 5G backbone makes connections to new or existing data sources simpler for the team.

## Key Challenges of 5G IoT Deployments

For utility companies, some challenges still need to be addressed as they move to production use of 5G IoT. It is essential to choose the right vendor partners, ones that can simplify and streamline the project and have the experience and knowledge to ensure success. The vendor should have experience not just with providing basic 5G service, but they should also have complementary solutions for edge, security, and even utility industry-specific use cases. A good vendor partner should also have professional staff and documented processes to help customers implement solutions quickly. Utility companies stand to reap substantial benefits from these projects with significant bottom-line impact.

Key capabilities that must be included during the planning and design phase of any 5G IoT project include the following:

- **The ability to collect and utilize all types of IoT data:** IoT systems cannot be closed off due to data ingestion or network management limitations, as can happen in some cases. Advanced 5G technologies, such as network slicing, can improve data ingress/egress and even enable private 5G networks to ensure performance. Robust 5G networks are needed to support many new use cases, such as advanced predictive maintenance, autonomous robots and vehicles, inspection by drone, computer vision, and digital twins. The 5G network must be able to cope with broad data sets necessary for supporting flexible and modular processes and to transport data from geographically distant devices, as is common in the utility and energy sectors. The 5G network will become even more important as renewable energy resources and electric vehicles are added to the grid.
- **Support for real-time systems:** Real-time systems can play a big role in averting plant shutdowns and managing severe weather events that impact a utility's grid or transmission systems. Utilities need the current status of networks or pipelines and certain customer-facing services. Collecting data in real time is one thing, but utilities are also going to need the infrastructure to support real-time systems, such as edge computing. Ideally, the business should choose a well-integrated and seamless 5G network that offers an edge computing service.
- **Requisite performance:** It's important to realize that different use cases will have different performance profiles. It's best to work with a partner that can deliver performant solutions and can provide the key complementary technologies, such as edge computing, network slicing, and security enhancements. It can

also be wise to deploy a higher performance 5G network than the pilot or POC might indicate because the implementation will scale and changes could happen quickly and result in the demand for more network performance. With this in mind, many companies are using private 5G networks. As for security, it should be an integral part of the plan since bolting on security after the fact invariably costs more and is more complex. Finally, resiliency must be a primary consideration. For many use cases, any network outage or interruption can have a catastrophic impact on the industrial processes that support business operations.

## Verizon 5G Services Are Ideal for IoT Deployments in the Utility Industry

As a market and technology leader, Verizon can provide a wide array of key technologies and the supporting processes required to deliver leading-edge 5G IoT solutions. And based on Enterprise Strategy Group research, many organizations agree that using a strong partner is the optimal approach. Enterprise Strategy Group found that 62% of respondents want to take advantage of telecommunications service providers' connectivity and distributed locations to host their edge computing environments, and 61% want to use these same service providers for private 5G/LTE.<sup>5</sup>

Verizon is delivering the requisite services and products that simplify the deployment and operation of IoT environments that leverage 5G for utility companies. It has documented use cases for massive 5G-powered IoT, frameworks for quantifying business value, and credentialing services that uplevel security. Verizon has experience managing private field networks for utilities with nationwide coverage. One of Verizon's most compelling offerings for utility firms is Grid Wide: Intelligent Energy Solutions. Grid Wide simplifies the path to a smarter electric grid and helps utilities modernize their grids based on their specific needs.

Verizon has important differentiators that make it an excellent partner for any organization. These include:

- **The option to deploy either a private or public 5G network:** Verizon can provide spectrum and services for private networks or organizations can leverage its public network. This allows an organization to choose the optimal approach, depending on location, privacy needs, or other critical attributes.
- **The ability to deliver grid-wide solutions and analytics:** Verizon's analytics provide new and compelling operational insights from IoT data using the latest software tools and big data technologies to address specific industry needs.
- **Enhanced security capabilities to protect 5G IoT networks:** Verizon can provide details on common attack vectors and how to protect against breaches, threat intelligence, and managed security services.
- **Broad geographic coverage:** Perhaps the biggest limitation for 5G IoT deployments is gaps in the 5G coverage area. Verizon's large and growing 5G footprint is a notable advantage.
- **Support for OT/IT convergence:** Verizon recognizes that IT and OT are aligned technologies and can provide proven frameworks and suggestions for how to best support a convergence of the two.

## Conclusion

Wireless network technology based on 5G will dramatically enhance the use of sensors, actuators, and other IoT devices at scale, enabling substantial improvement in the management, efficiency, and optimization of daily operations for utility companies. Not only does 5G enable new and existing types of IoT devices, but it also makes it possible to easily integrate them into new solutions. However, IoT devices by themselves will not solve the problem.

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<sup>5</sup> Source: Enterprise Strategy Group Complete Survey Results, [Distributed Cloud Series: Digital Ecosystems](#), August 2022.

A complete solution requires edge infrastructure, software, and the processes and frameworks needed to make them a fully functioning system.

Verizon is a leader in providing 5G IoT solutions for the utility industry. The combination of technologies and proven processes for 5G IoT networks, coupled with industry-specific solutions, such as Grid Wide, positions the firm as an ideal partner for next-generation IoT deployments.



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