



# 5G Enables Innovation For Human And Machine-Focused Applications

Whitepaper



## **One Of The Primary Reasons 5G Is Viewed As A Transformational Technology Is That It Will Benefit Both Humans And The Machines That Need To Be Connected On The Network.**

Human productivity will improve with a wide range of new applications enabled by 5G. But increasingly, machines and the various devices that comprise the Internet of Things (IoT) and contribute to Industry 4.0 are accessing networks and connecting without any human intervention, and 5G is going to make that work much more smooth. To fully leverage 5G, organizations need to evaluate both types of use cases—human and non-human—and build innovation plans for each.

It makes sense for organizations to create separate teams to focus on these two different strategic options. This is partly because the skills and expertise for human- and machine-based digital innovations are likely to reside on different teams. While there may be some overlap in areas such as building the underlying infrastructure, the specifics of the use cases for each will benefit from bringing in people from the disciplines that know them best.

For many organizations, the best path forward is to develop a good understanding of broad categories of use cases that are currently or will shortly become possible. Starting with a broad perspective supports drilling down into the most valuable options and avoids overlooking impactful solutions that might be outside the current perspective.

## 5G Enables Innovative Solutions For Both Machines And Humans

The new functionality provided by 5G goes far beyond what businesses have seen in the past. Detailing some of the evolving use cases that are going to emerge will help spur thinking. When evaluating 5G, it is critical to understand and plan for use cases that empower both types of deployments.

### 5G Innovation For Human-Centric Apps

5G will also enable game-changing new use cases and apps that will directly benefit employees and customers. Early on, the performance benefits of 5G will substantially improve the user experience for many apps that performed poorly on 4G. In addition, artificial intelligence (AI) at the edge and other emerging apps that are more demanding and require a lot of data will become possible. As the 5G rollout continues, brand-new apps or services will be released.

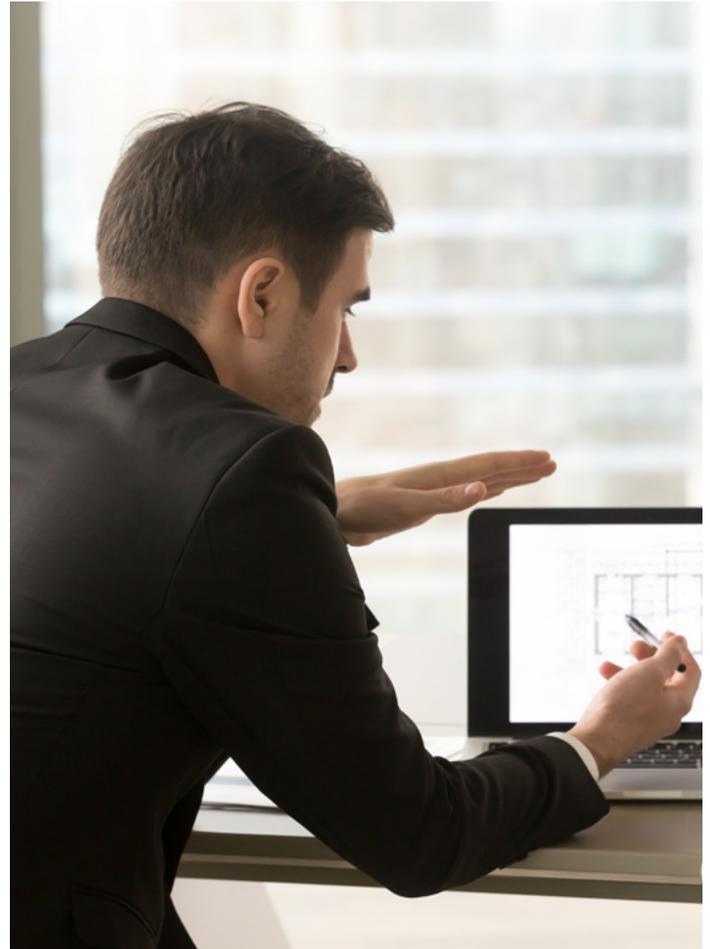
Examples of these include:

#### Delivering Immersive Experiences

One example of what is possible with this is online shopping. Today, online shoppers must make their choices relying on tiny pictures or video clips. 5G-enabled immersive experiences will make it seem as if you are physically present and using the item being offered. In real estate, some agents have deployed technology that allows prospective buyers to “fly through” a home. And that is just the start. Eventually we’ll be able to virtually walk through a property, examining every corner, looking in the closets, opening cabinets, and simulating cooking a meal. On the job, collaboration tools will soon make it seem as if we are sitting with our peers in an actual conference room, complete with the ability to turn and look at one another. These immersive experiences will change e-commerce, collaboration, and design.

#### Removing The Mobility Penalty

Too often, the performance, interface, and functionality of an app or service changes if you are mobile or using a wireless network. 5G will eliminate this mobile penalty, because 5G network speeds will deliver a broadband-like experience and bandwidth will increase to support even the most data-intensive app. For many businesses, this will make it possible to deliver a universal employee or customer interface that is location-and device-agnostic.



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<sup>1</sup> “Mobile Workers Will Be 60% of the Total U.S. Workforce by 2024, According to IDC,” IDC, Sept. 1, 2020

### Enabling Next-Generation Personal Monitoring

5G's improved LAN and WAN capabilities will support a new generation of apps that provide information about our health and well-being. This will support better monitoring, reporting and treatment. One example is a 5G-enabled ambulance that will interact with the hospital in real time and provide a steady stream of patient data while en route. Sensors and monitors that can communicate using high bandwidth will be much more effective than a paramedic trying to verbally communicate information as it becomes available. 5G will also provide the ability to stream information about ourselves and our environment to other apps, healthcare professionals, or other parties that we allow to see the data. In addition, wearables and smart medical devices will benefit from 5G, enabling them to communicate outward in real time.

### Innovative M2M Solutions

Machine-to-machine (M2M) communication—connecting devices, sensors, machines, and other inanimate objects—will quickly grow into a tidal wave of integration. Long-term megatrends such as Industry 4.0 are on the cusp of coming to fruition. Many companies will start with pilot projects using current 5G technology, but when ultra-reliable, low-latency communications (URLLC) capability becomes widely available in 5G, the network necessary to enable connected, intelligent “things” will make more futuristic solutions possible.

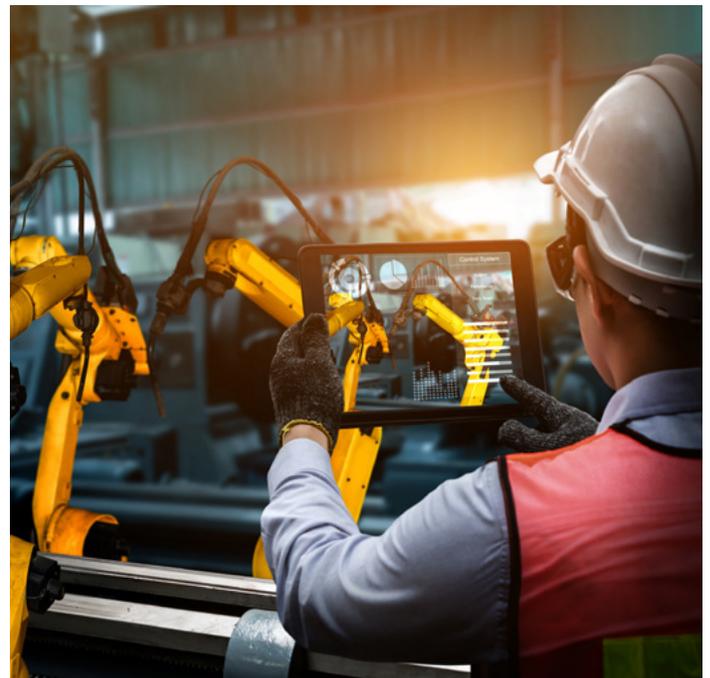
Potential use cases include:

#### Visual Intelligence

This is the capability of a machine to see and understand visual images in a way that is similar to human cognition. Computers have long been able to “see” by being connected to cameras, but AI and machine learning technologies will let them evaluate images subjectively, as humans do, and better interpret the images. Smart cameras, having learned from hundreds or thousands of visual examples, will require no human intervention. One possible use case is in factories where smart cameras will know to a certainty that the object that enters an area populated by robots is in fact human and then make sure the human isn't struck by one of the robots. Organizations will be able to identify countless other use cases by starting with assumptions such as, “If machines could see...”

### Enhancing Apps For The Wireless Workforce

According to IDC, the U.S. has more than 78 million mobile workers, a substantial portion of whom are always mobile.<sup>1</sup> This includes field service technicians, agricultural workers, and workers in similar jobs that aren't tied to an office or wired access. Until 5G, providing enhanced apps or services was frustrated by both poor coverage and the speed and bandwidth limitations of the network. 5G-enhanced mobile broadband (eMBB) provides both performance and better coverage. This makes it possible to deploy apps that have much more capability for non-office workers. Using analytics or AI will become possible for wireless workers, and more visually powerful services are coming. This could include real-time video for field service technicians to ensure accurate repairs.



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<sup>1</sup>“Unlocking Industry 4.0: Understanding IoT in the Age of 5G,” Forbes, Aug. 6, 2020

### Autonomous Devices

These may be the quintessential use case of 5G-enabled machine-centric solutions. Autonomous devices could range from large objects such as automobiles to very small precision devices used in medicine or manufacturing, such as nanobots. Some pilot programs with autonomous devices are likely to start with existing 5G infrastructure, but the most compelling implementations will require still-to-come 5G networks that can provide URLLC to support real-time and immediate connections between devices and sensors and the servers that control them.

### Intelligent Robotics

5G's greater real-time connectivity and higher bandwidth will open the way for new robotics use cases. 5G-connected robots will have better sensing, the ability to "think" based on a broader set of inputs, fuller mobility, and sufficient autonomy to act without substantial (or any) human intervention. Truly humanoid robots with tremendous mobility will become possible, and intelligent, connected drones will improve public safety and traffic management.

<sup>1</sup>"Unlocking Industry 4.0: Understanding IoT in the Age of 5G," Forbes, Aug. 6, 2020

### Intelligent Manufacturing

The rise of intelligent manufacturing is less about specific devices and more about building an intelligent and highly connected ecosystem that supports an entire plant or specific manufacturing line. 5G will enable the connection of a huge number of diverse sensors, monitors, devices, and systems into a cohesive whole, driving efficiency and flexibility to much higher levels. With a wireless approach, deployment is simpler and mobility is supported. Many of the basic tenets of this use case are outlined in visions for Industry 4.0,<sup>1</sup> but 5G is the critical technology to make those visions reality because it will provide wireless connectivity with the ultra-low latency necessary to support the speed of intelligent manufacturing environments. In addition, as the factory becomes a digital entity, integration with other digital systems such as raw materials management, customer order systems, and inventory will make it possible to tune the intelligent manufacturing facility to instantly optimize output based on market demand.

## Key Takeaways

5G is a critically important, foundational technology that will enable businesses to innovate and create competitive advantage. 5G will broadly impact the organization, enhancing both human- and machine-centric solutions. The three key capabilities that 5G delivers are the ability to integrate mobile people and devices, the ability to deliver large amounts of data quickly to non-wired devices or users, and the ability to add intelligence using connections to the broader digital ecosystem and input from vast numbers of sensors, devices, and individuals.

T-Mobile is leading the 5G charge with a network built from the ground up for the next wave of innovation. We help manufacturing companies of all sizes get ready for the future of wireless and provide fast, reliable connectivity for their business and their mobile workforce. T-Mobile for Business is committed to helping you move your mission forward with products and services that close the digital divide and enhance your manufacturing operations—all with the dedicated, exceptional service you deserve. T-Mobile for Business has an ambitious vision for fueling innovation in manufacturing.

To continue exploring 5G-fueled transformations across the manufacturing ecosystem, [visit our industry webpage today.](#)



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