

Why 5G will become the foundation of your mobile world



5G represents a generational change for wireless communications. 5G connectivity is expected to offer organizations a wireless network that transforms the way people and machines use data.

The anticipated benefits of 5G go well beyond speed. This new standard is expected to deliver flexible bandwidth allocation, high capacity and low-latency communications that rival current fixed high-speed broadband networks. Such capabilities make 5G networks particularly well suited for the latest innovations in virtualized networking, agile networking, the Internet of Things (IoT), edge computing, and cloud computing processes and applications.

5G is a networking technology that can use three distinct radio frequency bands, which gives businesses the flexibility to support a broad range of solutions. Each band—the high band (millimeter wave, or mmWave), the mid band (or sub-6 GHz), and the low band (or sub-1 GHz)—has its appropriate uses. Service providers can take advantage of the different bands to provide a range of throughput capacity with consistent, low-latency delivery over diverse geographies:

- **Low-band spectrum:** The use cases for low-band 5G are like those for LTE, emphasizing massive numbers of simultaneous device connections, service reliability and high-mobility capabilities. Leveraging carrier aggregation, speeds for low band can approach 200 Mbps. Low-band spectrum propagates well, bringing with it improved building signal penetration as well as the ability for enterprises to seamlessly and more reliably extend their 5G footprint
- **Mid-band spectrum:** For many in the 5G industry, mid-band spectrum is often described as the Goldilocks of 5G spectra given its ability to provide a highly prized mix of spatial coverage and speed. With a larger channel size compared with low-band spectrum, mid-band 5G will be able to deliver such subscriber services as hotspot-based mobile broadband along with enterprise-targeted massive machine type and ultra-reliable low-latency services across urban and suburban footprints
- **mmWave spectrum:** Ultrawide-band spectrum provides the highest throughput, making solutions such as autonomous transportation and Industry 4.0 (near real-time industrial automation) possible. Although the propagation range will be shorter (currently, about 2,500 yards in dense urban settings), it will be able to support millions of connected devices with average peak speeds in the 1 Gbps range. That means connectivity dynamics that were unimaginable just a few short years ago will now be possible

A key 5G capability is Dynamic Spectrum Sharing (DSS), which gives providers the ability to expand 5G networks beyond bespoke deployments into areas they are currently serving via LTE. DSS is a technology that allows a carrier to decide if the spectrum is used for LTE or 5G connections in real time, based on priority and the unique needs of customers. DSS means that spectrum usage is not binary; an implementation such as a fully automated manufacturing environment could use all three spectrums. 5G, therefore, can move much more data, more quickly, with low latency and in real time—providing the foundation for exciting new transformational business initiatives.

Improving business outcomes using 5G

As organizations have gained experience transforming their operations with new digital systems, their focus has moved from the technology itself to the business outcomes driven by the technology. 5G's capabilities support that change.

Better employee outcomes start with enhancing their digital experience, particularly as the workforce becomes increasingly virtual. The rise of remote work is not a short-term change: A Citrix survey completed in May found that 67% of U.S. workers said they were not ready to return to the office and 28% were planning to wait at least three more months before considering going back.

5G connectivity makes remote work more efficient simply because remote workers can access large, bandwidth-intense resources over a cellular connection. In addition, virtualized networks and applications can be managed over the air, keeping them more secure, and insights can be garnered from distributed assets through a combination of robotics, sensors, intelligent video and artificial intelligence (AI).

Moreover, mmWave 5G deployments can deliver immersive experiences that are expected to transform interactions for both employees and customers. The lower latency and increased wireless bandwidth and flexibility of 5G will let organizations dream bigger about new projects that give them a competitive advantage, particularly as they apply their ideas to cloud computing architecture.

The common theme of today's major business trends is an insatiable demand for data—data that 5G can help deliver. Here are some ways that 5G is key to how business is done today:



Collaboration: Collaboration is now the way work is done. Existing tools provide the basics, but much more functionality will be available in the future. Virtual whiteboarding, immersive video, real-time data delivery and updates, AI-powered virtual assistants, and machine learning to support teams will all be available and need a network that can support them



Augmented reality (AR) and virtual reality (VR): AR/VR will dramatically improve training, and employees will benefit from enhanced visualization of project work and the ability to “live” in a design. Customers will also benefit from solutions, such as virtual fitting rooms and smart lighting. Such capabilities are very compute- and data-intensive, making 5G necessary to make them happen



Analytics: The use of analytics is moving quickly from being the domain of experts to becoming an everyday task for most workers. Analytics demands large amounts of data to provide accurate and insightful results; evaluating that data will be faster and more efficient with high-performance networks and infrastructure, all of which 5G delivers

Using 5G to enable new and enhanced industrial and machine automation outcomes

The next generation of automation for industrial machines and equipment is coming quickly, and it will be driven by 5G. As organizations look to improve intelligence, throughput, manageability and agility, they will need to move data on wireless networks quickly and reliably. 5G will be critical in real-time industrial automation to let information move between devices and the systems that control them.

5G—particularly on the mmWave spectrum—delivers the new functionality necessary for next-generation industrial and machine automation. This class of 5G provides the reliable, persistent and high-speed wireless communications required for real-time operations. And 5G provides much more than that. There is a general expectation in the 5G industry that the major U.S. 5G network operators will eventually offer 5G services

based on all three spectrum bands to businesses and organizations across the country. With three distinct spectrum options available, many organizations can start now by using a lower-throughput spectrum for industrial automation projects and switch to mmWave 5G as needed.

The innovation and new outcomes supported by 5G will help businesses come closer to becoming real-time enterprises. Such enterprises use digital technologies to eliminate delays between systems and create ecosystems in which each input results in immediate actions or changes in response. Real-time operations will help businesses analyze data and get actionable insights fast, so they can quickly optimize operations and maximize their financial outcomes.

Some of the ways 5G-powered solutions may manifest themselves include:



Industry 4.0: Industry 4.0 is the ongoing technological transformation of traditional manufacturing and industrial practices, primarily focused on large-scale machine-to-machine (M2M) communication in a manner that is well suited to 5G. It is typified by increased automation, cost control, real-time communication and self-monitoring. Many systems of this type can analyze and diagnose issues without the need for human intervention



Autonomous devices and systems: Self-managing devices that deliver societal changes—such as autonomous vehicles and robots—are now on the horizon, and 5G provides the necessary communications capabilities to enable them in a safe way. In addition, there will be many more use cases for autonomous devices that are less visible to the casual observer



Smart environments: The combination of a new generation of sensors and the ability to link them with 5G will enable smart environments that deliver a wide range of new services for our physical world. The changes to transportation hubs will be pronounced, as they will improve transit efficiency and save travelers time. Smart roads will help reduce traffic jams and cut pollution

For businesses of every type, 5G is expected to improve the outcomes of both existing processes and new ones. 5G provides foundational wireless communications for real-time critical IoT applications, such as robotic and remote surgery. The same functionality is expected to also enhance human interactions with digital systems in ways that are not possible today, allowing devices to connect to one another and humans in new ways.

Delivering on that promise will require the use of 5G infrastructure that includes both the data/network center and the edge to provide a complete stack for real-time, persistent and high-throughput wireless connections. Applications and services that depend on very low-latency interactions, particularly mmWave 5G, will hinge on deploying a multi-access edge computing (MEC) solution. The use of edge infrastructure to put computing resources closer to applications is essential to the successful deployment of autonomous devices, image and video recognition, AR/VR, and more.

With comprehensive 5G infrastructure in place, businesses can improve their current outcomes and progress along their transformational journey with the flexibility and agility they need. 5G should also improve both current and future outcomes, since it is integrated with traditional networks and provides a single virtual network infrastructure that is simple to operate and manage. It will now be possible to enable real-time, low-latency, high-performance communications with dispersed digital assets and systems, facilitating outcomes that were no more than a dream a few short years ago.

Verizon is the 5G partner of choice.

To get the results they want from 5G, many businesses are partnering with Verizon to simplify the journey to full 5G implementation. Relying on our expertise and experience in 5G is your fastest route to success.

For many companies, the ultimate goal is to make data available to both humans and machines, and to make it easy to aggregate data from a wide range of new sensors, devices and tools. Verizon is uniquely suited to help, because our vast and cohesive portfolio of products and services work together to provide the next wave of human- and machine-focused business outcomes. We are not bound to any one type of connection or technology, and we have deep expertise in technology integration to ensure that deployments work together cohesively.

As a leader in 5G, we are on track to be the first to deploy 5G mobile solutions in the U.S. We're a leader in edge computing for 5G with our MEC solution. We deliver effective 5G/SD WAN integration through our Virtual Network Services, and provide new levels of cybersecurity and operational efficiency to help you work more safely and more efficiently. Our ability to deliver effective protection for both mobile users and the IoT will be essential as businesses use 5G in mission-critical environments. We are also working with best-in-class cloud service providers, such as Amazon Web Services, to give you more options for cloud-5G integration.

Key takeaways

5G delivers functionality and power that have never before been available. Its capabilities let businesses dream bigger and create new and innovative digital processes. For many businesses, 5G will be the foundation for new approaches that enable a competitive advantage.

For example, 5G delivers:

- Revolutionary capabilities that provide throughput and bandwidth for wireless networks that were never possible before
- Radical enhancements for both people and machines that improve interaction, productivity and monitoring
- Support for new outcomes that organizations have only dreamed about

Our expertise and experience are the starting point for businesses that want to move quickly to successfully deploy 5G. Our professional services can also guide you through our 5G edge computing and cloud integration solutions.

For more information, please contact your Verizon business specialist.