

Alteryx in Fortune Magazine



HOW 5G WILL SUPERCHARGE THE GLOBAL ECONOMY

The 5G revolution that will enable new levels of mobile connectivity is fast on its way to becoming reality. Whether for businesses or consumers, new cellular advances will provide seamless connectivity, faster download speeds, and greater reliability well beyond current levels.

TODAY TELECOMS, WIRELESS PROVIDERS, AND EQUIPMENT

manufacturers are building on the foundation created by earlier cellular iterations to expand mobile networks and connect a vast number of devices. As they work to capitalize on the performance potential of new 5G technology, however, success depends on a dizzying array of industry variables, including augmenting the extensive infrastructure of cell towers and antennas, testing spectrum performance and launching early 5G services, agreeing on industrywide connectivity standards, and meeting FCC regulations, to name a few. Once in place, 5G promises fiber-optic-like speeds (1Gbps transfers) for near-instantaneous downloads.

Such performance ability will enable mass access to technology that has, up to this

point, remained specialized, such as real-time-translation wearables in business and medicine, virtual-reality gaming, and augmented reality.

Wireless densification with ubiquitous cell towers combined with increasing numbers of small cells will provide low-latency communication (less than 10 milliseconds), whether indoors or on the go. These technology advances are set to occur across all areas of society and within every business sector, from informed manufacturing processes based on the Internet of Things and autonomous vehicle navigation to intelligent

HOW A MODERN INFRASTRUCTURE WILL ANSWER THE 5G CALL

To comprehend the 5G revolution in context, it's important to understand previous cellular network iterations. 4G technology focused on faster data transmissions and increased smartphone connectivity compared with earlier 3G and 2G iterations. The advances made possible by the current generation of 4G LTE networks will play an essential role in 5G networks moving forward. In fact, due to the phased rollout of the new technology, 4G and 5G will exist side by side. In some cases, 4G LTE will continue to meet end-user needs and push performance boundaries. For new innovations, as well as for the sheer number of connected devices, transformative 5G will provide the lower latencies and response times that current LTE networks are unable to sustain. "The carriers do a fantastic job in the USA and have developed some of the best wireless coverage

in the world supported by a nationwide network of shared cellular towers, rooftop installations, and in-building systems. This shareable infrastructure will continue to facilitate the rapid deployment of the next generation of wireless technology—5G," says American Tower's Marshall.

Such generational shifts in technology occur roughly every 10 years. There's always a gray edge where the cellular industry might be devising and demonstrating new technology while still pushing performance of the current generation, as is the case with 4G LTE. At the same time, new use cases demanding higher 5G performance will be introduced. These new innovations and the continuity between generations represent fertile R&D territory for mobile technology leader Qualcomm.

"We see that the mobile technology platform, which our inventions and technologies made possible, is starting to proliferate into new industries, new services, and new applications. And this really is the signature of our 5G vision," says Matt Branda, director of technical marketing at Qualcomm. "We've been working on 5G for many years, inventing the underlying technologies, and now we're leading the industry to expand the utility of mobile, as we move into this more hyperconnected world."

From a wireless networking perspective, Qualcomm sees

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city grids, more-efficient smart homes, and new medical advances. "American Tower's innovation teams are working on new in-building wireless infrastructure solutions that will enable new revenue streams for property owners, reduce tenant churn, and speed access to buildings for wireless providers," says Steven Marshall, President, U.S. Tower, a division of American Tower, and Chairman of the Wireless Infrastructure Association (WIA).

According to an Accenture report commissioned by wireless communications association CTIA, "Smart Cities: How 5G Can Help Municipalities Become Vibrant Smart Cities," 5G infrastructure investment is projected to reach as much as \$275 billion, creating as many as 3 million jobs and spurring an increase in the U.S. gross domestic product by up to \$500 billion.

its mission as solving those system-level problems, allowing the industry to progress toward 5G in a timely manner and at scale. Branda points out that LTE was first introduced in 2010, and each year there have been additional features to not only increase speeds but also to offer new approaches and applications for using wireless networks. In that regard, a key breakthrough on the path to 5G is Gigabit LTE, designed to deliver blazing-fast Internet speeds over wide geographic areas and ensuring high levels of consistency and reliability.

The foundational technology of this hyperconnected world includes complex airwave-sharing techniques, beam-forming antennas, interference coordination coding, and millimeter-wave spectrum to boost performance and lower costs. Because 5G uses the high-frequency band of the wireless spectrum, as well as currently used fre-

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quencies, it can transfer data at very fast speeds.

High-frequency waves don't travel as far as low-frequency, though. It's also difficult for high-band-spectrum millimeter waves to get around walls, buildings, and other barriers. It's the reason why cell site densification on existing towers and new infrastructure has taken on growing importance. Simply put, having more antennas in place enables and boosts 5G performance.

GETTING ON THE 5G HIGHWAY

In addition to employing adaptive antennas and 3-D beam-forming software as well as its innovative TD-LTE technology, Sprint holds more radio frequency spectrum than any other carrier in the U.S., and 78% of its spectrum is ideal for 5G transmission.

"We're maturing 4G LTE and getting ready for 5G. In that process, Sprint is pioneering and driven by necessity because we have a lot of high band spectrum," says Günther Ottendorfer, chief operating officer technology at Sprint. "The advantage is that we can deliver a lot of capacity."

Beyond Sprint's spectrum holdings, the company's densification and optimization toolkit is designed to make concerted progress on providing more overall capacity and density to Sprint's cellular networks by adding more cell sites.

One new technology, for example, is Sprint's Massive MIMO (multiple input, multiple output) antenna. With 128 antenna elements that can each deliver focused radio beams to individual phones, the technology greatly improves Sprint's performance and coverage. "We have been the first carrier in the U.S. to very clearly state our densification and optimization strategy, and that densification is by small cells and Massive MIMO," says Ottendorfer.

The emergence of a totally connected world with access to data and application from anywhere at any time continues to expand. And while intelligent sensors embedded into nearly every object is still far off, the infrastructure to support unforeseen inventions needs to be in place.

One company that is redefining what's possible for ensuring cell site backup power is Alteryx. The company reimagined and patented a completely new approach to designing and manufacturing hydrogen fuel cells. They also replaced traditionally fragile and expensive parts with rugged components, and they further reduce costs through high-volume automated assembly. Remote site maintenance and monitoring is also available.

One Alteryx system configuration consolidates all radio gear and fuel cell equipment into a single, small profile cabinet, drop-shipped to site and wired to the antenna, providing a fully functional cell site with built-in, long-lasting backup power. "We have the largest deployed fleet of fuel cells in telecom backup," says Eric Mettler, president and CEO. "Our systems have compiled more than 32 million operating hours, so this is a proven technology that's extremely robust and reliable."

He points out that some of the most innovative technologies for these new telecommunication devices rely on a faulty 100-year-old grid for their power. "Can you really modernize your network infrastructure and keep your customers constantly connected using batteries and generators, which are really last-generation technology?" he asks.

As the rollout continues over the next few years, it's clear that the 5G revolution is actually an evolution—one in which multiple generations will exist side by side to interact with and power the global 5G economy. ●

UPGRADE YOUR BACKUP POWER

CLEAN | SAFE | PROVEN

Fear no storm. You've already modernized your communications network and embraced sustainability. Continuous connectivity requires reliability and runtime not available with batteries and generators. It's time to upgrade – with a modern solution – and save hundreds of thousands of dollars in the process.

Altergy's advanced fuel cell systems provide more reliable, compact, longer-lasting backup power. Our solutions can also exceed the 24-hour-plus runtime FirstNet demands. For more information visit www.altergy.com/upgrade


*Leading the
Fuel Cell Revolution*