

Yes, 5G and Wi-Fi6 Will Coexist Nicely

By: Shrihari Pandit

The need for next-generation connectivity is now as strong as the industry push for it. The need for increased bandwidth and faster speeds is clear, with over [three billion](#) Internet users active worldwide and our current infrastructure near its breaking limit. As Internet usage continues to grow with ever more content and services moving online, technology must evolve to keep up.



Enter 5G and Wi-Fi 6, each touting game-changing improvements.

Both are built upon the same fundamental idea: to extend wireline connections using radio waves. Up to now, 4G and Wi-Fi have been complementary, each supporting different use cases. As new technologies are introduced to the market, we're faced with how they will integrate into our existing infrastructural framework. Moving forward the question has become, will 5G and Wi-Fi 6 produce revolutionary or evolutionary advances? And will 5G live up to its hype and supplant Wi-Fi for non-mobile uses? Let's break it down.

The Future of 5G

The arrival of 5G is generating excitement, but what will it actually mean? Nearly a decade in the making, 5G—or, more simply put, the fifth generation of mobile cellular communications—is an evolutionary improvement over 4G networks, a fundamental re-architecture of wireless networks. But let's back up to explain the bigger picture.

5G is the next step in mobile broadband technology. This newest generation will start off by augmenting current 4G LTE connections, and eventually replace 4G altogether. Major metropolitan areas are already suffering from slowdowns during high-traffic time periods, which is caused by diminished LTE capacity. 5G promises to give users both faster download and upload speeds, as well as quicker connectivity between devices.

5G has roots in the telephone industry and runs on a trio of spectrum bands, which are licensed for exclusive use by a variety of carriers including ATT, Verizon, Sprint and T-Mobile. Select carriers began rolling out fixed 5G connectivity in 2018, while mobile 5G will continue to roll out throughout a handful of U.S. cities this year. Its versatility will come to the fore when we think about its three different bands of spectrum.

Sub-1GHz spectrum is primarily used for LTE by U.S. carriers—especially by T-Mobile—and offers a wide-ranging coverage area, but only at a maximum of 100Mbps. 5G's mid-band spectrum—favored by carriers like Sprint—gives users faster coverage and low latency, but its range and functionality at a maximum of 1Gbps proves difficult throughout buildings and other common infrastructure. High-band functionality—being rolled out by AT&T, T-Mobile, and Verizon—is synonymous with 5G, offering a peak speed of 10Gbps with an extremely low latency quotient. But high-band signals have limited coverage areas and suffer from even more severe penetration problems than mid-band spectrum. The physics of radio frequencies still applies, with an inverse relationship between robustness and coverage and bandwidth. Unfortunately, much of the 5G hype has glossed over these fundamentals.

2020 will open the floodgates for 5G, but there are a few challenges. Only the big carriers can deploy and use 5G, which is a huge undertaking. Successfully and

strategically deploying a nationwide network for seamless mobile coverage from collectively connected base stations, whose signals are strong enough to serve multiple people across multiple areas at once, will require significant capital.

Upgrading a nationwide network for 5G will also take carriers a long time to fully deploy, perhaps at least several years. 5G requires smaller cells, so many more locations need to be added, usually with fiber backhaul. Additionally, consumer adoption may lag as users wait to see the value of upgrading. Those in major cities that currently have access may very well be able to take advantage of lightning-fast connectivity speeds with a 5G-enabled device, but coverage so far is still severely limited.

To eventually recoup any sort of 5G investment, the carriers will most likely have to rely on increasing subscription premiums, which can also have a negative reaction on the consumer side.

Additionally, the speed of your 5G connection will still vary depending on your location. Since each carrier will have differing rollout strategies, your experience using 5G in New York may be totally different than that of your parents who live halfway across the country in Chicago. Even then, experience in each location will also vary by carrier.

There are also multiple barriers to supplanting Wi-Fi usage with 5G, starting with existing hardware. For example, while a 5G booster claims it will work wonders for telemedicine or seemingly far-out ideas like remote surgery, it's hard to imagine any entity like a hospital, school or even an office migrating all their Wi-Fi hardware to connect via 5G. Expensive medical devices, university networks and multibillion-dollar servers can't be completely replaced overnight. Furthermore, any 5G migration would also entail paying a carrier for data transmission when they currently get free and unlimited via Wi-Fi on their wireline connection.

5G will greatly improve bandwidth and latency of current mobile networks, but it seems implausible that 5G will supplant many use cases for Wi-Fi 6. Speaking of which, let's take a look at that alternative.

The Future of Wi-Fi 6

The opposite side of the connectivity coin lies in Wi-Fi 6. Similar to the Wi-Fi we use today, Wi-Fi 6 will be used primarily to wirelessly connect devices within an area. For example, in offices as local area networks or in public areas as an amenity, but with huge performance improvements in throughput and latency.

While fiber connectivity is foundational to both platforms, with both Wi-Fi 6 and 5G seen as wireless extensions of underlying fiber connections, Wi-Fi 6 relies on unlicensed spectrums. The primary distinction in use is rooted in history and FCC policy.

Wi-Fi is a protocol that is rooted in the computer industry and was developed to run on unlicensed spectrum. This means it can be used by any device and by any user, which is in stark contrast to 5G's reliance on major carriers.

But it is this permission-less aspect of Wi-Fi that has driven adoption over the last two decades to near ubiquity for wireless connections in offices, homes and public spaces. In other words, Wi-Fi 6 will complement current standards and infrastructure, not replace them.

The hope is that this next generation of wireless technology, based on what is called the IEEE 802.11 ax standard, will be used to usher in a cutting-edge wave of new devices and wireless capabilities that will boost networks with speedier connectivity and much less congestion — not to mention the potential it has for enabling lower battery consumption across devices.

Wi-Fi 6 improves performance because it manages bandwidth more efficiently. Through a scheme called orthogonal frequency division multiple access (OFDMA), it can put multiple client devices on a single channel and provide improved signal modulation through quadrature amplitude modulation, or QAM. This will boost performance for time-sensitive applications like VoIP.

This sounds similar to what 5G hopes to achieve but there are some major differences.

Wi-Fi is interoperable, so devices work on any Wi-Fi network. This means that Wi-Fi 6 will improve bandwidth and performance and has a straightforward hardware upgrade path.

Wi-Fi 6 is also prepared for immediate rollout because its functionality is designed to operate in the existing Wi-Fi bands. Wi-Fi 6 products initially hit the market in early 2019, but mainstream production hardware will be available in 2020. Essentially, one of the only timeline uncertainties for Wi-Fi 6 is the speed of consumer adoption.

So, it seems unlikely that only one technology will reign supreme and more plausible that complementary uses will continue. For now, it seems that the safest choice is to not jump to any conclusions and simply stick with what you have.

Businesses should focus on meeting their own communications needs and can safely ignore the excessive hype around 5G. For consumers, keeping a watchful eye on things will probably mean sticking with Wi-Fi and upgrading to Wi-Fi 6 when it becomes mainstream.

Still, as high-capacity networks of all kinds become more available, our growing connectivity demands will be met with more cutting-edge technology, better hardware and near endless opportunities for how to use it.