AT&T 5G Low-Band Service Shows Where The Technology Stands

Bob O'Donnell

5G

I'm a tech industry market research analyst that writes about 5G, Edge Computing, AI, Cloud Computing, IoT, Smart Devices and more.

Samsung Note 10+ 5G from AT&T

AT&T

As we come to the end of 2019, we've started to see several US carriers expand their range of 5G service offerings to a wider array of customers. As opposed to the flashy and fast, but limited reach of millimeter wave-based

5G service that AT&T, Verizon and T-Mobile have already launched in a few select cities around the country, all of these new offerings are based on the comparatively boring, but far-reaching sub-6 GHz 5G signals.

Technically, AT&T first announced a service based on 850 MHz about three weeks ago, but T-Mobile made a much bigger splash with their nearly nationwide 600 MHz offering a few days later (see *T-Mobile Nationwide 5G Launch Highlights Range Vs. Speed for more details)*. Now, AT&T is following up that initial 5G service announcement with the official debut of its sub-6 5G service in 10 cities around the country, with six more expected to come online shortly. While it's exciting on one hand to see these new services launch, the practical reality of how they are performing is a bit mixed.

Both the AT&T and T-Mo offerings are referred to as "low-band", because they use frequencies that are below 1 GHz. The physical characteristics of radio waves at those frequencies enable them to travel a long distance from cell towers and to easily pass through buildings, glass and other obstacles. That enables cell service with much longer range not only than millimeter wave, but also than "mid-band" frequencies (such as 2.5 GHz), which Sprint has started to use for its 5G service.

A number of carriers have been using some of these low-band frequencies for 4G LTE service over the last several years because of the distance benefits. The downside of these lower frequencies is that, for a number of legacy, historical reasons, the bandwidth of the channels at these frequencies is much narrower than it is at higher frequencies. As a result, the amount of data that can be transmitted is also much lower. In layman's terms, this means that the speeds you can currently achieve are relatively limited.

Thankfully, the telecom industry has figured out a number of ingenious ways to increase the amount of potential bandwidth and, subsequently, download speed by combining channels together via several different clever techniques, including Dual Connectivity, Carrier Aggregation (CA), Dynamic Spectrum Sharing (DSS) and more. (See "*How Fast Will 5G Really Be?*" for more details on all of these technologies.) As of right now, however, the only one of these in use for 5G service is Dual Connectivity, which lets carriers combine a channel of 4G bandwidth with a dedicated channel of 5G bandwidth to create a sum of the two parts. Carrier Aggregation still hasn't been deployed yet for 5G networks, and despite all the promise, DSS won't happen until network infrastructure equipment gets a software upgrade sometime in 2020.

Like T-Mobile, AT&T is using Dual Connectivity for its current low-band service. What that generally means is that you should get download speeds for the new AT&T 5G service that are a bit faster than what you would get at the exact same location with a 4G LTE Advanced Pro connection (which AT&T confusingly and incorrectly calls 5Ge). However, things can get complicated. Cellphone service is essentially like microclimates for weather, because it can vary a great deal over short distances, impacted by a number of local factors. In fact, mobile data service would essentially be more like a "picoclimate" if such a thing existed, because literally moving from room to room in a house or being in front of or behind a tree on the street outside can impact download and upload speeds. Subtle differences in signal strength, reflections, interference, and so many other factors can and do have impact when you move around.

Interestingly, AT&T initially claimed that this new 5G service would offer the same speeds as existing LTE—literally no change or improvement whatsoever. However, in very limited tests with a Samsung Note 10+ 5G on AT&T's newly launched service near my home in the SF Bay Area, speed

tests actually showed a 37% increase in download speeds, but a 30% decrease in upload speeds versus an iPhone 10S Max on AT&T with the exact same SIM card (switched between phones to run each test). While there are a number of different factors that could go into these results, the simple truth is that AT&T is still building out its 5G-capable network infrastructure, and the different phones likely ended up connecting to different towers and network sub-segments. Still, there does seem to be at least some performance improvement with 5G versus 4G on this low-band AT&T 5G service (just as there was with a few days of testing a One Plus 7T Pro 5G McLaren smartphone on a T-Mobile 600 MHz network in Hawaii a few weeks back).

The challenge for many consumers, however, is that in some cases the 5G service can actually be a bit slower than 4G—as was witnessed occasionally with the AT&T phone I just received. Again, this can be due to the state of network upgrades in a given area on a given day (and hence, nearly always subject to change), or it could be because the quality of LTE Advance Pro 4G connections has been so well-tuned in certain areas that it's hard to compete with. Over time this will change, but for now that's where the state of 5G technology stands. It can be a bit better, but in more than a few situations, it won't be as good as the best quality 4G LTE service that you've experienced in other locations.

Thankfully, as with T-Mobile, AT&T isn't charging extra for its standard 5G service—that is, as long as you have one of their unlimited plans—but you do have to purchase an expensive, though very nice, new phone to make it work. (The phone price is $1,299, but AT&T is offering a number of rebates and specials with trade-ins and monthly payment plans.) Another challenge that hasn't been mentioned yet is that—like every other 5G-capable smartphone currently for sale in the US—the Samsung Note 10+ 5G that AT&T is offering for this service only supports one type of 5G service—in

this case, sub-6 GHz. It doesn't support millimeter wave (even in AT&T's mmWave covered areas), nor can it be upgraded to support it because of the nature of the RF (radio frequency) components included. We likely won't see any phones that support both types of 5G service in the US until at least the second quarter of 2020.

So, the practical reality of 5G in the US as we reach the end of 2019 is that it offers promise, but it does so at a price, with the reality that more is still to come. The good news is that the network infrastructure improvements that AT&T has planned for its 5G service will make download speeds improve over time—even without any upgrades to the phone. Unless you're an eager early adopter, however, you're probably better off waiting until sometime next year.

Disclosure: *TECHnalysis Research is a tech industry market research and consulting firm and, like all companies in that field, works with many technology vendors as clients, some of whom may be listed in this article.*