

Wifi 6 - What happened to b, g, n, ac

Phil Sorrentino, Sun City Centre Computer Club

Ever since Wi-Fi appeared way back around 2005, the Wi-Fi version has been described by a letter because of the letter reference used in the 802.11 Local Area Network standard. Initially, there were 802.11a and 802.11b. Most of us became familiar with the “b” version because this version used the 2.4 GHz frequency band which had better coverage than the “a” version that used the 5 GHz frequency band. (Today many Wi-Fi routers provide networks at both 2.4 and 5 GHz.) So, until recently the version of the standard has been used as the version for the Wi-Fi router product. When there was only a and b, that was easy enough, but as time went on, faster and more capable standards were developed and each had a new designation, and now the standards are using multiple letters for the designation like ac, and ax (the latest).

To simplify the designation for products, the Wi-Fi Alliance (the group responsible for certifying Wi-Fi products) decided to use numbers to designate the version. The newest standard 802.11ax is to be known as Wi-Fi 6. Earlier versions will be called Wi-Fi 5 (previously ac) and Wi-Fi 4 (previously n), but you will probably never see those designations in practice. This may initially cause some confusion but eventually, it should be a simpler way of determining Wi-Fi product capabilities. Eventually, we'll all know exactly what the 6 in Wi-Fi 6 indicates; well, at least as well as we know what the “n” indicates in the n version of Wi-Fi.

Unlike many of the earlier Wi-Fi updates, Wi-Fi 6 is not just an increase in speed, it also provides the groundwork for future improvements that will ensure that Wi-Fi speeds continue to increase in the future. Wi-Fi 6 is just starting to arrive this year. There is a good possibility that it will be in your next smartphone or laptop. At some time in 2021, new Wi-Fi 6 routers will start to include 6E which will be the use of a new 6 GHz frequency band (I guess the E indicates an extension into the 6 GHz band).

So, what is Wi-Fi 6? Wi-Fi 6 is just the next generation of the Local Area Network standard that will do the same thing past Wi-Fi standards have done - it will connect your many devices to the internet, but it will do that at faster speeds, and it will introduce new, faster and more efficient technologies into the router. Wi-Fi provides the critical link between our Client Apps and the internet Servers (remember Client-Server Technology?). Much of the improvements with Wi-Fi 6 are aimed at handling the demands of the Internet of Things (IoT). (In fact, very small networks might not even notice much of an improvement. A single Wi-Fi 6 device connected to a Wi-Fi 6 router may only be slightly faster than a single Wi-Fi 5 device connected to a Wi-Fi 5 router.) Another benefit of Wi-Fi 6 will be the fact that all Wi-Fi 6 certified devices will include WPA3, a new, stronger, Security Protocol that improves on WPA2 making it harder for hackers to infiltrate a network.

Many of our homes now have many devices that need to be connected to the internet. Think about it, there are smart bulbs, smart plugs, smart assistants (Alexa comes to mind), indoor and outdoor cameras (Ring doorbell camera comes to mind), door or garage locks, smart thermostats, door or garage door magnetic sensors, as well as laptops, desktops, smartphones, streaming devices (Amazon fire stick comes to mind), and tablets. The last time I had to change the password on my router, I had to change it in 23 devices before I was finished, though the number for an average house today is about nine. (I have seen

predictions that the average home in the future may have up to 50 devices.)

Wi-Fi 6 introduces some new technologies to help mitigate the issues that come from putting tens of Wi-Fi devices on a single network router. Wi-Fi 6 has been designed to handle many devices efficiently, by splitting up the available bandwidth so that many devices can be serviced simultaneously. Without getting into any technical detail, Wi-Fi 6 will let routers communicate with more devices at one time, let routers send data to multiple devices in the same broadcast, and let devices schedule check-ins with the router, all features that will allow more devices to be serviced. Where current routers might start to get overwhelmed by requests from a multitude of devices, Wi-Fi 6 routers will keep all those devices up to date with the data they need.

Without the improvements that Wi-Fi 6 will bring, the performance of your future network would slow down as you increased the number of devices on a given network. You may even want to use the fact that things may slow down with your old router to your benefit and wait till you notice your internet connection “seems to be a little slow” before you take the plunge into Wi-Fi 6.

To get Wi-Fi 6, you’ll need to purchase a new Wi-Fi 6 router. Without a Wi-Fi 6 router, all the devices that may be Wi-Fi 6 compliant will not have any advantage. To take full advantage of Wi-Fi 6, all the devices connected to your Wi-Fi 6 router will have to be Wi-Fi 6 compliant. So, the improvements we get from having Wi-Fi 6 will probably only slowly be incorporated into our internet experience, but it eventually will be worthwhile. New devices will slowly appear with Wi-Fi 6 incorporated, but it will probably take a few years to get to the point where your whole network is compliant with the Wi-Fi 6 standard (and by that time we’ll probably be talking about Wi-Fi 7).

Just a brief review of the new technologies. Two technologies are helping speed up Wi-Fi 6. One is “Multi-user, Multiple-input, Multiple-output” (MU-MIMO), which is already in use in some high-end routers and devices, which allows the router to communicate with multiple devices at the same time, rather than broadcasting to one device, and then the next, and then the next, etc. Current high-end MU-MIMO routers can communicate with four devices at a time, Wi-Fi 6 will increase this to 8. (You have probably seen routers that incorporate MIMO because it involves multiple antennas, which let the router talk to multiple devices at one time.)

The second technology is “Orthogonal Frequency Division Multiple Access” (OFDMA) which allows one transmission to deliver data to multiple devices at once. Both of these technologies are used to get more out of each transmission from your router to your devices. Most of the details of these technologies will probably never become too apparent to most of us, but we all will benefit from them in that we will be able to attach more and more devices to our router, without slowing it down, so we can enjoy the benefit of all the features provided by all of those wonderful internet servers.