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Geek Fee

Understanding Internet Speed

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How fast is my internet connection? Am I getting what I am paying for? These are typical concerns for consumers, especially if they think their internet connection is too slow. We will look at this from the top-down, starting with the service from the internet provider to the residence or business, then the modem/router that provides the local network over wire and Wi-Fi, and finally the adapters in the computing devices connected to the local network.

Internet service is provided under language like “speeds up to” many megabits per second (Mbps). This is the maximum speed that will be delivered with the lightest load on the providers’ distribution system. Suppose many consumers happen to be streaming movies simultaneously on the same network branch that you are connected to. In that case, you may only experience 80 or 90 percent of the maximum speed. This possibility should be considered before you decide on what speed of service you need. Do you know what speed you need? I doubt that most people do. Let’s look at some of the requirements.

Netflix recommends 3 Mbps for standard quality video (SD), 5 Mbps for high-definition video (HD), and 25 Mbps for ultra high definition video (UHD). Hulu recommends 3 Mbps for content from their streaming library, 8 Mbps for live streaming, and 16 Mbps for 4K content. Remember that if you have two people in the household or business who may be streaming videos simultaneously, these requirements will double, and four people would quadruple. To ensure that you always receive at least these speeds from your provider, you should increase the total simultaneous requirements by 25%. Suppose you don’t stream high-definition movies (or games) over the internet at all. In that case, you can use a rule of thumb of 5 Mbps for each simultaneous connection to the internet, which is plenty adequate for email, internet browsing, standard quality video or video conferencing, and such.

The modem/router which may be leased from your internet service provider or provided by you must be capable of handling the total simultaneous network requirements, in addition to providing each connected device with its needed speed. Old “G” routers (802.11g) generally have either 10 or 100 Mbps for each wired connection and a maximum of 54 Mbps for Wi-Fi connections. The Wi-Fi speed will drop off dramatically as the distance from the router increases.

The “N” routers may have a single 2.4 GHz radio like the “G” routers or may have both a 2.4 GHz and a 5 GHz radio (dual band). The single band generally provides up to 300 Mbps, and the dual band up to 600 Mbps (total for both bands). The wired connections maybe 100 or 1000 Mbps. Newer “AC” routers are all dual-band and are often identified by a total combined Wi-Fi speed such as AC1200 for one with a 300 Mbps 2.4 GHz radio and 900 Mbps for a 5 GHz radio, or AC1900 for one with a 600 Mbps 2.4 GHz radio and 1300 Mbps for a 5 GHz radio. Wired ports are generally rated for 1000 Mbps.

A modem and or router may have a total bandwidth limitation that is less than the sum of the ratings of all individual connections. In other words, a router with four wired ports rated 1000 Mbps each may only be capable of delivering a fraction of that if all ports are active simultaneously. Unfortunately, the bandwidth rating is often a very difficult specification number to find.

The wired Ethernet adapter or Wi-Fi adapter in your computer or other internet-connected devices may also be a G, N, or AC capable type with its own specifications for speed. For the last several years, computers have included wired adapters rated 1000 Mbps. The ratings for Wi-Fi adapters vary greatly, as does their antenna’s capability to send and receive signals over distance. For example, the 5 GHz adapter in the laptop I am using connects to the router at 390 Mbps at a distance of about 20 feet. An external USB 3.0 Wi-Fi adapter I recently tested connects at over 700 Mbps from the same distance. For those with 1000 Mbps internet service, the Ethernet cable used for wired connections can limit achievable speeds. It will generally be necessary for cables over a few feet in length to use CAT 5e or CAT 6 cables to obtain maximum speeds.

Ultimately, the most interesting number is the speed we can actually get at our computer or device. The speedtest.net site is often used to test the speed between your device and a selected server on the internet. For the most accurate test, other background tasks that could be connecting to the internet should be temporarily halted. Also, note that the site recommends using their app for testing connections rated 100 Mbps or more instead of the browser version. I have tested both ways on my 1000 Mbps capable internet service, and the browser version showed 394 Mbps compared to over 900 Mbps with the app. Real-world connections can be much slower than the test speeds because of the load on the servers for a particular website you are connecting to. Using a VPN service also generally results in slower speeds.