Did You Know

How Does High Speed Internet Actually Work?

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When you connect to the Internet at home, you're almost certainly using a form of broadband. Broadband is defined by various standards as being capable of transmitting data at 1.5 or 2 Megabits (Mbits) per second. This type of speed is necessary for streaming high definition video, playing online games and sending and receiving large amounts of data.

So how do you connect to the Internet at home? Let's take a look at the most common residential broadband Internet technologies.

Cable

In the United States, cable Internet is one of the most common forms of residential Internet access. Similar to Fiber and DSL (which we'll discuss below), cable works by providing what's called "last mile access" from the ISP to an end user.

The last mile refers to the final leg of a telecommunications network. It's the part that actually reaches customers.

Cable Internet requires a cable modem on the user's end and a cable modem termination system at the cable operator's facility. These two systems are connected using coaxial cable — the same stuff you use to get cable TV. The distance between the modem and the facility can be up to 100 miles for larger facilities and most nationwide cable providers operate out of several different hub.

Cable speeds are shared across users and the system is designed to distribute access evenly. If too many users use too much data, the backend can slow down

for everyone.

To help limit users from taking up all available bandwidth, cable modems are programmed with rate limits. Higher tier packages often offer higher speeds. In recent years, a number of major broadband providers have also moved to offering metered rates, meaning users who use more data pay more than those who use less.

The speeds on cable can theoretically be as high as 100 Megabits per second down in homes and as fast as 20Mbits per second up.

DSL

Cable's primary competition in the United States is DSL, otherwise known as digital subscriber line.

Just as cable Internet uses the cable television system for its backend, DSL uses existing telephone networks. DSL is delivered simultaneously over a regular wired telephone line.

Most residential DSL is actually asymmetric DSL (or ADSL). This means download speeds can be faster than upload speeds. With the less common symmetric DSL (SDSL), download and upload speeds are equal.

Like cable, DSL works by connecting an ISP to the last mile for the user. In this case, it means connecting to a user's copper phone line and a telephone exchange. The connection between a user's phone line and the telephone exchange is limited to about 2 miles. The further away one gets from the exchange, the slower the speeds. As a result, DSL is best used in areas that are located within close proximity to a telephone exchange.

Download speeds on residential DSL are usually limited to 40Mbits per second down — though the average tends to be much less.

Fiber

In recent years, cable and DSL have seen increasing competition from optical fiber systems. The benefit of optical fiber over coax or copper phone lines is that it can offer *much* higher data speeds over longer distances.

In fact, most Internet and cable backbones already use fiber for their backend infrastructure. These systems then switch to other technologies for the final delivery.

Speeds of 100 Mbits per second in both directions aren't unheard of with fiber. In fact, Google Fiber hopes to bring 1000 Mbit connections in both directions

directly to user homes.

Right now, the biggest hold-up with fiber is deployment. Homes and buildings need to be wired for fiber and retrofitting residential locations can take a lot of time.

LTE

Beyond just wired Internet connections, wireless technology is increasingly becoming a viable replacement for home broadband.

LTE — or Long-Term Evolution — is the next generation of wireless technologies. In the United States, Verizon, AT&T and Sprint have LTE networks (Verizon has the most robust network but AT&T is expanding quickly) and they can offer users true broadband speeds from mobile devices and wireless modems.

Unlike cable, fiber and DSL, LTE doesn't require a wired connection for access. Instead, users use either an LTE phone or tablet or a USB or battery-powered dongle to offer up access.

Speeds can be as high as 50 Mbits per second down and over 30 Mbits per second up. The next evolution of LTE, LTE Advanced, promises even faster speeds.

The most promising aspect of LTE is that it can significantly help with the "last mile" problem. While cable and fiber can work well over mid-sized distances, the systems are still out of contention for rural areas or in developing countries without deep infrastructure.

On the contrary, LTE can work over much longer distances and expanding support requires putting up new cellular towers.

Another advantage of LTE is that its access that can travel with the user. Unlike cable, fiber and DSL, LTE can be accessed from multiple locations. I can use my iPad's LTE connection from any place that supports LTE. If LTE isn't in the area, the signal defaults back to 3G.

How Do You Connect

What do you use to connect to the Internet? What speeds are you seeing at home? Let us know.

Image courtesy of Flickr, Morgan Harrison, iStockphoto, Pgiam

TOPICS: BROADBAND, CABLE, DID YOU KNOW, DSL, INTERNET ACCESS, TECH

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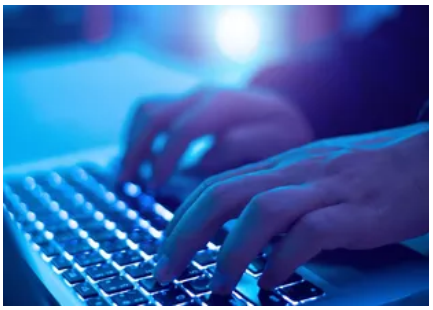

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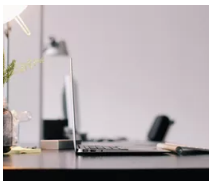

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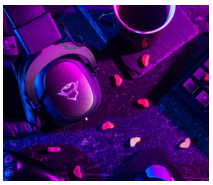

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