

HUD Choice Neighborhoods Internet Peer Exchange

The Basics of Internet Connection Types

Basic Terms

- **ISP (Internet Service Provider)** - For each type of Internet connection there is an ISP which is the company that provides customers with access to the internet. These companies have infrastructure (connection types) that enable widespread internet access. The technology or infrastructure that ISPs use to connect customers to the internet can be different.
- **Internet speed** - The measure of how fast information is transferred and is the result of greater **bandwidth**.
- **Bandwidth** - How much data can be transferred over an internet connection in a given amount of time at any single moment in time. It is generally measured in **Megabits per second (Mbps)**.ⁱ
- **Data usage** - Includes all the data downloaded and uploaded over a period of time, such as a month, and is measured in **gigabytes (GB)**. Internet connections with greater bandwidth can handle more data.
 - **How much internet data does the average U.S. family use in a month? What is the impact of a monthly data cap?** Data from FCC annual reports estimates that the average household's monthly broadband consumption in 2020 is **344 gigabytes (GB)** and the median consumption is more than **250 GB**.^{ii iii} A data cap that limits the amount of data usage in a month could negatively impact families with high demands for in-home internet use. Data caps can range from as low as 2 GB to more than 1,000 GB, depending on the ISP's plan.
- A **modem** - The key piece of hardware equipment that connects home devices to the internet.
- A **router** - Hardware that allows all of your wired and wireless devices use the internet connection at once and also allows them to talk to one another without having to do so over the Internet.^{iv}
- A **repeater** - A device that can be installed to extend/strengthen connection between devices in the home or facility but does not connect directly to the internet.
- **What is broadband or high-speed internet?** The Federal Communications Commission's (FCC) standard for broadband is a minimum **25 Mbps download and 3 Mbps upload** (25/3 Mbps). Cable operators typically don't advertise speeds below 40 Mbps anymore, except for low-cost offerings to low-income customers. Cable operators attend to advertise 100 or 200 Mbps service.^v
 - **How much speed will a family need to run multiple devices and services at the same time?** A family with 3-5 internet devices active at the same time and requiring streaming video for work or education platforms may need a minimum of 50 Mbps.^{vi}

Internet Connection Types

- 1. Wired Internet Access**
 - *Cable* - Same type of copper cable or coaxial for cable TV service that is installed to each unit of a property. Uses a standard called DOCSIS (Data Over Cable Service Interface Specification).
 - *Digital Subscriber Line (DSL)* - Uses existing telephone lines to transmit digital data.
 - *Fiber* - One of the fastest home internet options available. Unlike traditional cable, fiber-optic cables are made out of glass or plastic that can be installed in each unit of a property or be connected in close proximity to a property. They use light to transmit digital data.
 - *Hybrid-fiber-coax broadband (HFC)* – Provides internet using a main fiber optic trunk line located near a property that connects to coaxial cable within the property. Leading choice of consumers today. In this type of connection, the property would have a nearby main fiber line to connect to and then use cable/coax cable within each unit.
- 2. Mobile Broadband or Mobile "Hotspots"** - Cell phone companies provide wireless Internet access through a portable modem, USB wireless modem, tablet, smartphone, or other mobile device. Internet access is delivered through cellular towers to the mobile devices or "hotspots". A typical hotspot will allow 10-15 devices to connect simultaneously to the internet. This provides residents with an option to connect to the internet both in and out of the home; however, the speed of the connection will range from 5-40 Mbps based upon the quality of cell tower coverage and plans have a low monthly data cap.
- 3. Fixed Wireless Broadband Internet Service Provider (WISP)** - Internet is sent over airwaves from a main access point tower (typically supplied with high-speed fiber-optic lines) to a receiver installed at the property. Each receiver is typically within 10 miles and has a line of sight with the access point.^{vii} The property receiver can then connect each unit through individual modems. This can allow a property to utilize its rooftop to connect to high-speed internet for residents, where a main access point is available, and also improve internet access for the surrounding community.
- 4. Mesh Networks** - Multiple internet connection points or nodes that cover a campus or area of a city that allow students or residents to connect to the internet through the network. A mesh network involves multiple nodes that are connected (wired or wireless) so they have multiple paths to other nodes. This creates multiple routes for digital data. In a full mesh topology, each network node is connected directly to each of the others.^{viii}

Additional Resource

[ConnectHome Playbook 6: Connectivity Strategies](#)

ⁱ From <https://techterms.com/definition/bandwidth>

ⁱⁱ From <https://decisiondata.org/news/report-the-average-households-internet-data-usage-has-jumped-38x-in-10-years/>

ⁱⁱⁱ From <https://speedmatters.org/news/average-monthly-us-internet-data-use-increased-27-2019>

^{iv} From <https://www.nytimes.com/wirecutter/blog/modem-vs-router/>

^v From Benton Institute, Weekly Digest, October 16, 2020, <https://www.benton.org/blog/att-fcc-abandon-rural-broadband-customers>

^{vi} From <https://www.tomsguide.com/us/internet-speed-what-you-need,news-24289.html>

^{vii} From <https://www.upwardbroadband.com/fixed-wireless-internet-vs-dsl-the-pros-and-cons/>

^{viii} From <https://internetofthingsagenda.techtarget.com/definition/mesh-network-topology-mesh-network>.