

# What Are Access Networks?

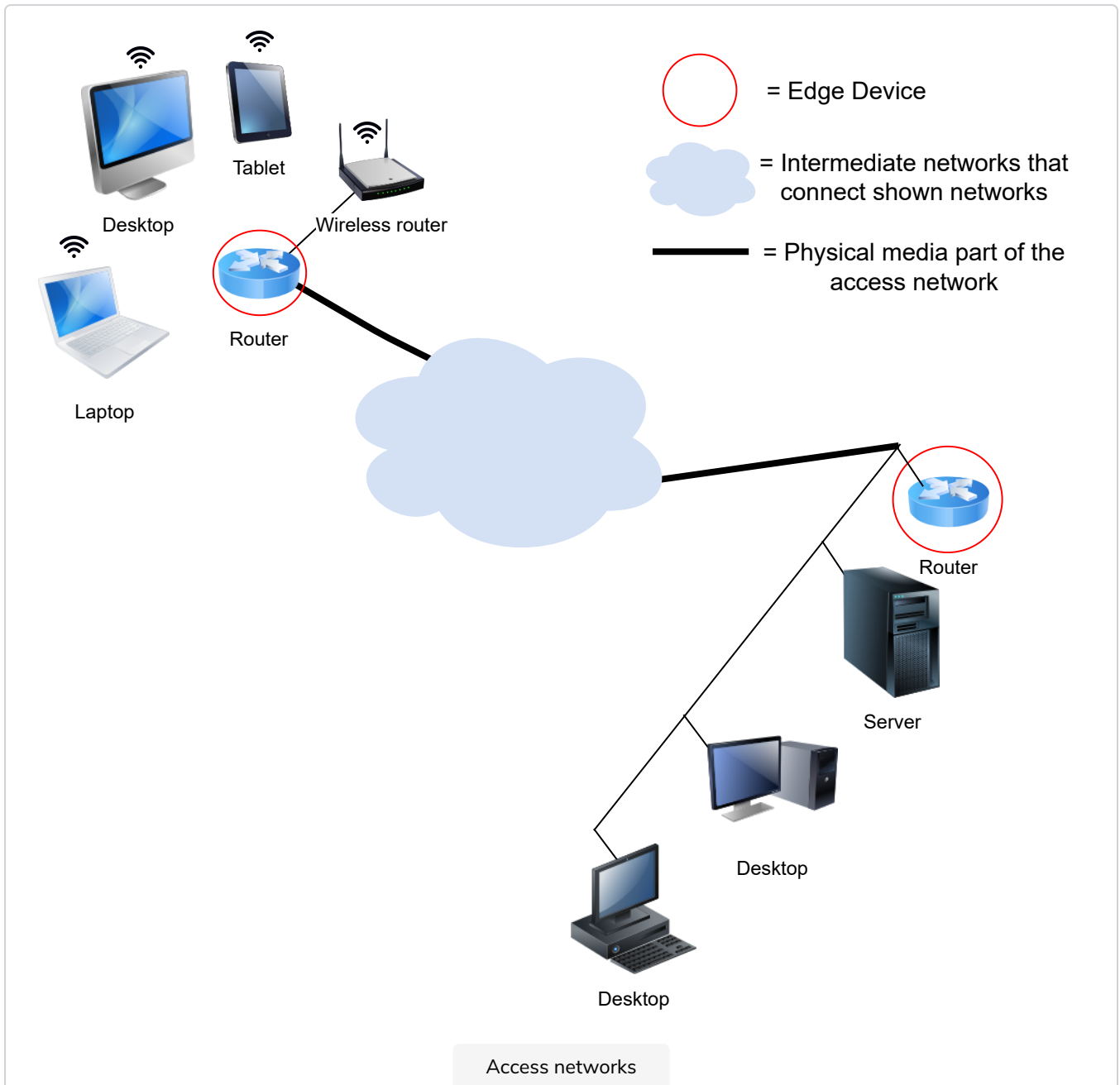
Let's study how end systems access the Internet.

## We'll cover the following

- Access Networks
- Transmission Rates
- Quick Quiz!

## Access Networks #

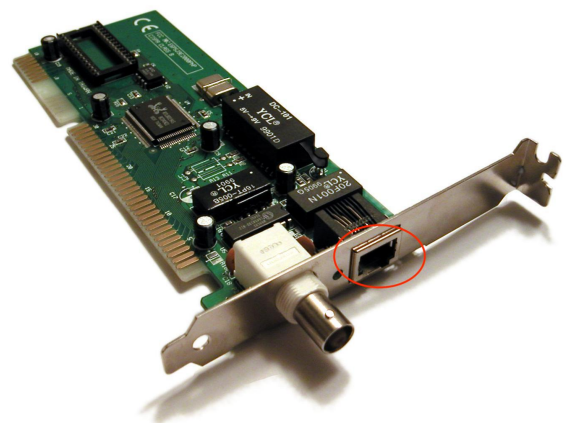
Access networks, also known as **the last mile**, consist of the media through which end systems connect to the Internet. In other words, **access networks** are networks that physically **connect end systems to the first router** on a path which connects them to some other end systems.



## Network Interface Adapter

The network interface adapter enables a computer to attach to a network. Since there are so many different types of networks, network adapters are used so that the user can install one to suit the network to which they want to attach.

Network interfaces also usually have an address associated with them. One



A network card. Taken from:  
[https://commons.wikimedia.org/wiki/File:Network\\_card.jpg#filelinks](https://commons.wikimedia.org/wiki/File:Network_card.jpg#filelinks)  
 Notice the port that the cable would go into.

machine may have multiple such interfaces.

These interfaces are essentially the **physical gateways** that connect devices to the Internet.

Most machines then have external ports which network cables can be plugged into. The type of access network depends on the physical media involved. Here are some common access networks:

1. **Digital Subscriber Line (DSL)**
2. **Cable Internet**
3. **Fiber To The Home (FTTH)**
4. **Dial-Up**
5. **Satellite**
6. **WiFi**

We'll go through the what and how of most of these access network in the next few lessons.

But first, how is the speed of a network measured? What exactly is the unit of speed of a network? Let's have a look!

## Transmission Rates #

The rate at which data is transmitted from one point to another in a network is called the **transmission rate**. In other words, the speed of the network is its transmission rate.

The smallest unit that digital data can be divided into is a *bit*: a 1 or a 0. Transmission rates are measured in units of **bits/sec**. However, since bits/sec is a really small unit, multiples/prefixes are commonly used. Common prefixes and their interpretation is given below:

$$\begin{aligned} 1 \text{ kilobit/s} &= 1 \text{ kbps} = 1000 \text{ bits/s} = 10^3 \text{ bits/s} \\ 1 \text{ megabit/s} &= 1 \text{ mbps} = 1000000 \text{ bits/s} = 10^6 \text{ bits/s} \\ 1 \text{ gigabit/s} &= 1 \text{ gbps} = 1000000000 \text{ bits/s} = 10^9 \text{ bits/s} \end{aligned}$$

For example, a speed of 240 Mbit/second means that 240, 000, 000 or 240 million bits get transmitted every second!

There are essentially **two** ways that data flows in a network: *from* an end system or *to* an end system. The outgoing transmission rate is called the **upload rate**, and the incoming transmission rate is called the **download rate**.

Some networks have varying upload and download transmission rates, called **asymmetric transmission rates**. This is useful because traffic going out from end hosts generally consists of small requests which solicit comparatively much larger responses.



**Note** You can check the upload and download transmission rate of *your* Internet connection from <https://www.speedtest.net>!

## Quick Quiz! #

1

What does 'asymmetric transmission rate' mean?

- ☐ A) The speed of the Internet varies at different times of day
- ☐ B) The speed of the Internet remains the same throughout the day
- ☐ C) The upload speed and the download speed vary
- ☐ D) The upload speed and the download speed are the same

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Now that we've covered the basics, let's move on to some detail about the physical media that actually make up these networks.