Types of Access Networks: DSL

There are a number of ways that your end system can access the Internet, let's look at each in detail!

We'll cover the following

Now that we know *what* access networks are, let's look at some common types.

Digital Subscriber Line: DSL

A Digital Subscriber Line or **DSL** uses the existing groundwork of telephone lines for an Internet connection. DSL connections are generally provided by the same company that provides local wired phone access.

Internet Service Providers

An ISP is just the company that provides end users with an Internet connection. For instance, AT&T and Verizon are ISPs. So the telephone company or **telco** *is* the Internet Service Provider or **ISP** in the case of DSL!

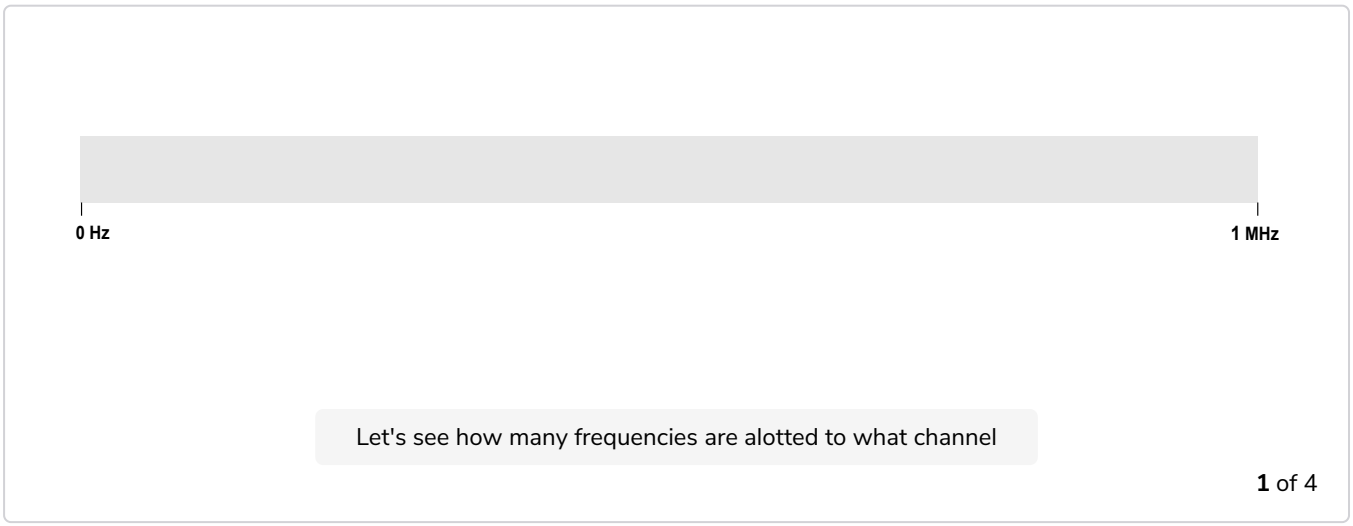
How DSL Works

- A device on the home user's end called a **DSL modem** *modulates* the digital signals that a computer outputs into high-frequency analog audio signals that are out of the human voice and hearing range.
- The telephone wire's frequency spectrum is divided into 3 parts:
  1. A **downstream channel** (which is used to *receive* data), in the 50 kHz to 1 MHz frequency range or 'band'

2. An **upstream channel** (used to *send* data) which takes up the 4 kHz to 50 kHz band
3. A **regular channel** used for telephone conversations taking up the 0 to 4kHz range

> 🔎 **Did You Know?** Modulation - demodulation is where the name **MoDem** comes from.

For reference, the human hearing range goes from 20 Hz to 20 kHz and the average human voice range goes from 85 Hz to 255 Hz.



- These signals are then carried by telephone wires over to the ISP
- Then, these high-frequency analog signals are converted back to digital signals using a device at the ISP's end called a **Digital Subscriber Line Access Multiplexer (DSLAM)**.
- The signals are then forwarded to the end system that it was meant to reach

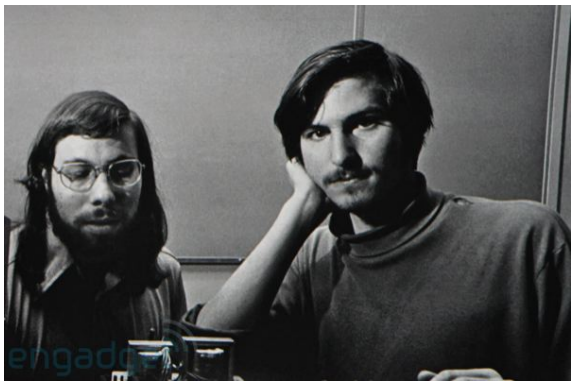
Here are slides that depict this process:

An end system

1 of 5

Due to the asymmetry between the width of the three channels, this type of DSL is termed as **Asymmetric DSL (ADSL)**. **Symmetric DSL**, on the other hand, offers equal upstream and downstream bandwidth.

🔎 **Did You Know?** Steve Jobs and Steve Wozniak, founders of Apple Inc., built a Blue Box in the 1970s that allowed them to make free international telephone calls. It worked by generating the same audio frequencies into telephone receivers that were generated by operators to make long distance calls essentially bypassing the telephone company's toll collection



Steve Wozniak (left) and Steve Jobs (right): https://www.flickr.com/photos/mac_filko/4309049355

system. With a little bit of

knowledge, they ended up rigging an international infrastructure!

Quick Quiz!

Q What's a DSLAM?

- A) A device that creates DSL signals
- B) A device that ISPs use to decode audio signals into digital signals
- C) A device that end users use to encode audio signals into digital signals

COMPLETED 0%

1 of 1

Now that we have an overview of DSL, let's look at a few other common access networks in the next lesson!