Class 8

Physical layer

- Deals with how bit-by-bit data is tranfered whether it be copper, nic, cables etc..
  - `cables`: Point to point
  - `Wireless`: Communicates around some redius

Channel types

- `Simplex` (Unidirecional) eg. keyboard, mouse, moniter..
- `Duplex` (bidirectional) eg. walky-talky
  - `half duplex` (Only one sender at a time) eg. wireless devices..
  - `Full duplex` (Simultaneous transfer aloud) eg. cables

Hub

- Physical layer hardware device that duplicated any signal it recieved on all other ports.
- Its job was to emulate a virtual cable able to support n devices. It was not suppose to be detected as a hardware device.

Problem with hubs

- `Collision domain`: A subnetwork where only one party can send at a time. If more then one party sends at a time, the message gets corrupt. It basically donwgrades the cables to a half duplex hardware. (Sends one at a time). Cannot recieve 2 different signals at the samee time.

`How did we fix this?` Carrier sense mutiple access (CSMA) protocal ..

- We can detect when data is being recieved by checking for an electrical current.

```
while (recieving) {
  wait(); // If other parties are sending
}
send(message);
```

What if other parties dont use CSMA?

- CSMA/CD (w/ collision detection)

```
//If you are not following CSMA rules, you get priotity.
top:
while(recieving){
    wait();
}
send(1 chuck) //instead of entire message, send one chunk of it.
goto top:
```

Data Link

- provides hop-to-hop transmission support using frames between two* directly connected devices.
    - *Does not include hubs/switches\

On top of the physical layer exists the `Data link layer`. This layer has 2 main sub-categories.

- `LLC`: *(Logical link control)* Which controls the flow control of the data by arranging digitcal bits into frames to be consumed by the network layer.
- `MAC`: *(Media access control)* Which directly interacts with the physcial layer by translating the digital bits into physcial signals.

`Mac address`

- 48-bit "Globally" unique hardware address
    - 6 pairs of (0-F) [FF-FF-FF-FF-FF-FF]
        - The first half of this adress is used to identify the manufacture.
        - The second half must be unique within the organization.