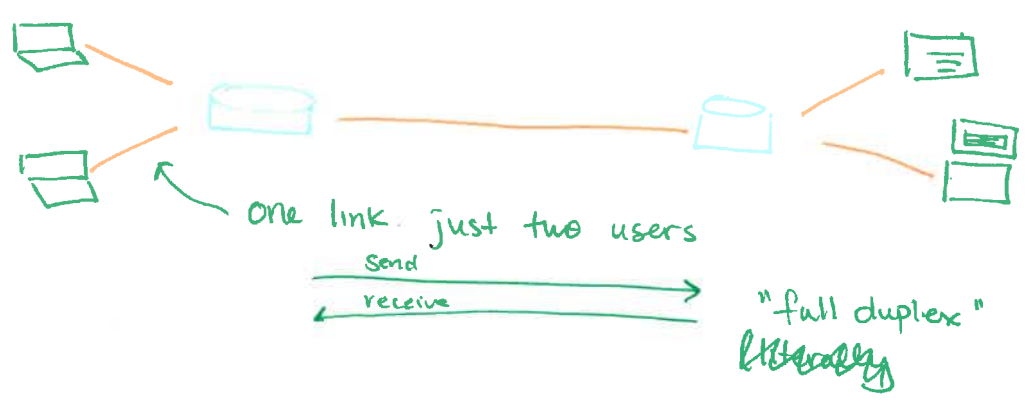
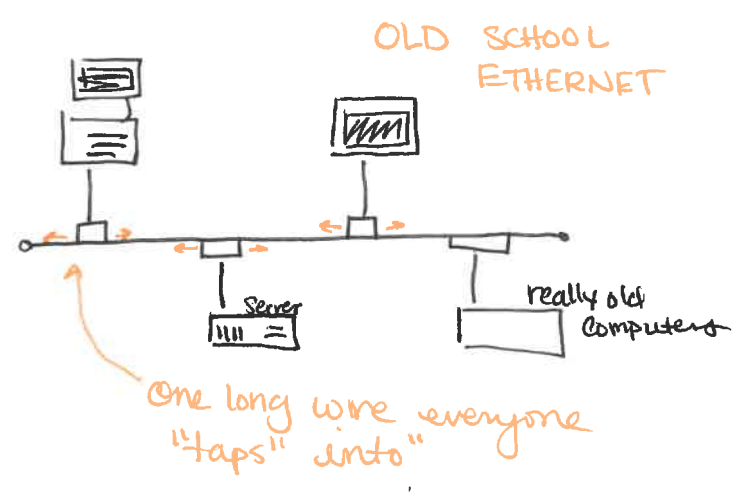


Networking with Multiple Access

MOST OF THE TIME, WE THINK OF NETWORKS THAT ARE NOT MULTIPLE ACCESS.



BUT SOME PHYSICAL MEDIUMS ARE MULTIPLE ACCESS



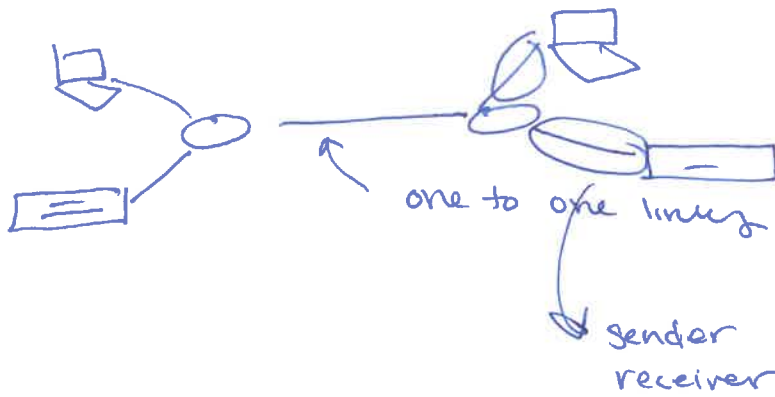
THE CHALLENGE WITH MULTIPLE ACCESS IS THE SAME AS TRYING TO SPEAK AT A LARGE DINNER PARTY

↳ TRY: COUNT TO 100!

WHEN TWO SIGNALS OVERLAP...



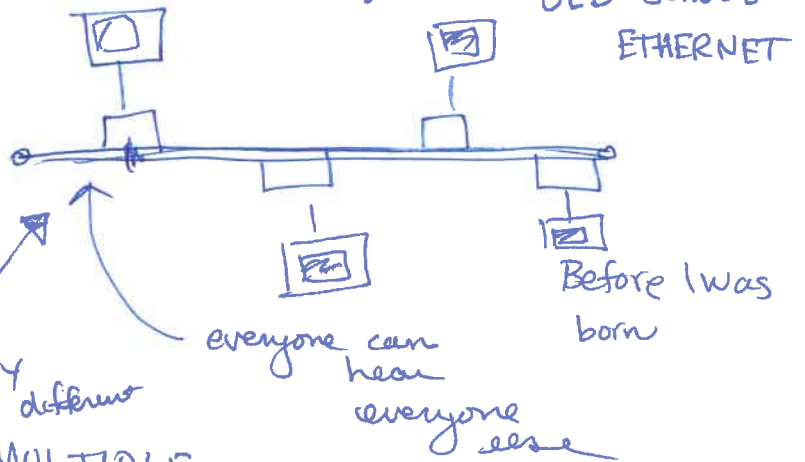
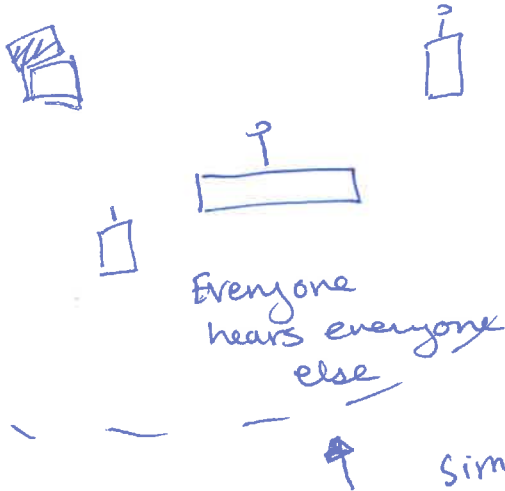
Networking w/ Multiple Access



Not really multiple access

"full duplex"
 Send and receive at the same time

A LOT OF PHYSICAL ~~MEDIUMS~~ MEDIA ARE MULTIPLE ACCESS



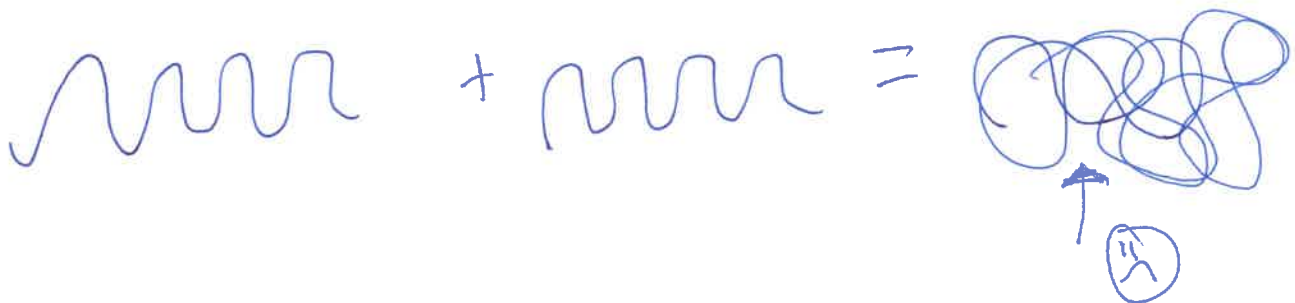
legit grammar #english

OLD SCHOOL ETHERNET

Before I was born

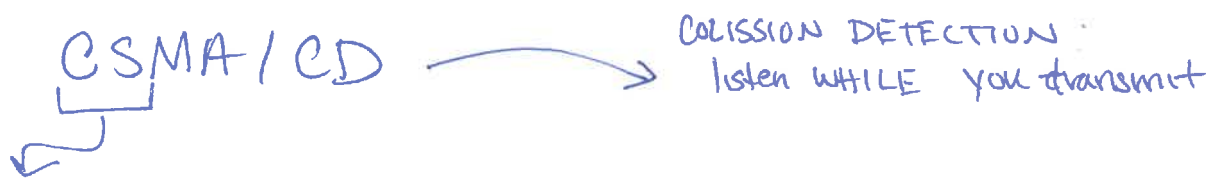
Similar... but subtly different

THE CHALLENGE W/ MULTIPLE ACCESS: WHAT IF EVERYONE SPEAKS AT ONCE?



OLD SCHOOL ETHERNET

~~CSMA / CD~~



Carrier sense: LISTEN BEFORE YOU TRANSMIT

IF I DETECT A COLLISION →

① JAM → garbage signal

② EXPONENTIAL BACKOFF: wait $(1 \dots 2^k)$ timesteps for k the number of times we've collided w/o a successful transmission

SIMPLE IDEA!

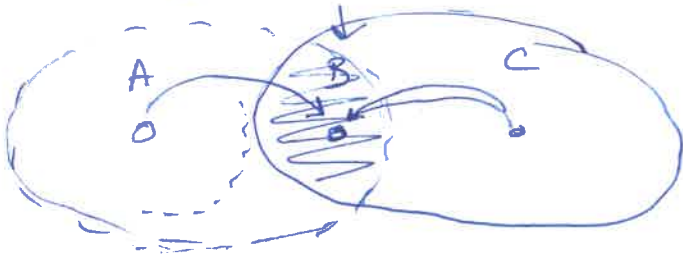
2 phases: Carrier sense - Before I send
collision detection - WHILE I send

WIFI → multiple access!

NOT just like (OS) Ethernet
↳ OLD SCHOOL

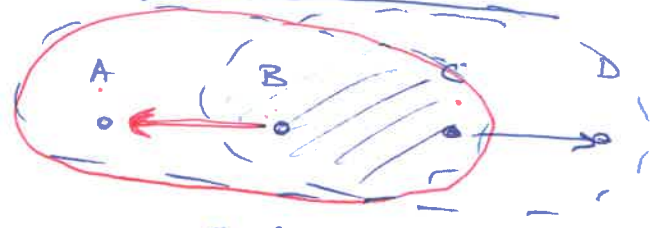
WHY CARRIER SENSE SUCKS IN WIFI

HIDDEN TERMINALS



Even if A listens before sending - it can't detect the collision!

EXPOSED TERMINALS



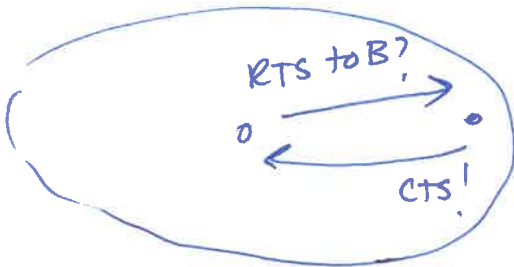
Carrier sense?
Efficient

CARRIER SENSE SUX FOR WIFI

"RTS/CTS"

Request to Send / Clear to Send

The only person who really knows if there is a collision - receiver!



CARRIER SENSE DOESNT WORK

COLLISSION DETECTION DOESNT EITHER



LISTEN WHILE I SEND IN OS ETHERNET

IN WIFI I CANT LISTEN



NOT BOTH

COST OF COLLISSION IS "HIGH"