# Recitation 7: Ethernet

MIT - 6.033
Spring 2022
Henry Corrigan-Gibbs

# Plan

- Warm up: "Game"
- Ethernet & networking
- Key concepts:
  - *Shared broadcast medium
  - *Exponential backoff

## Logistics

* DP prep assignment due tomorrow 2/25 at 5pm ET
* Next assignment online by this weekend.
* Participation prelim grades by this weekend.

# Recitation Qs

- What problem are the authors trying to solve?
- What choices do they make, and how do they explain or justify those choices?
- Do they mention alternatives? If so, what do they say is undesirable about those alternatives?
- What is the connection between this paper and lecture?

# On Ethernet...

- You use it all the time
  - ↳ Basically any "wired" network in home/office Ethernet
  - ↳ Even wireless networks use similar design idea ("Wireless Ethernet")

# Game: Multiple Access to Shared Network ("Aloha")

**Theme:** How to share a resource when many parties want to use it.

- We each have one msg to send
  - ↳ Our favorite _____ ?
- Everyone closes eyes, shouts word.
- If two people tx at once → COLLISION – both lost!

Goal: Get to 20 uncorrupted transmissions in minimum time.

↳ Amir keeps score.

# Game

* What are some strategies?
  - Never tx - fairness
  - Always tx
  - Randomized?
  - How randomized?
    - How often? $\left(\frac{1}{\#\text{people}}\right)$

* Change # people and see what happens.
  - First name ends with ␣.

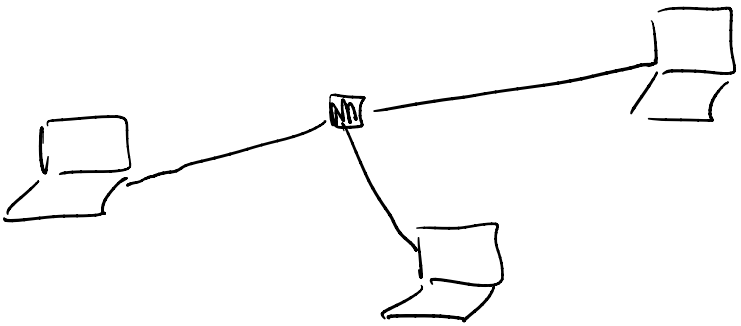
* What is the max score we can hope to achieve? ..... ← Need some theory!

* What happens if someone gets annoyed and wants to mess up our conversation?

* What if we don't know how many people are transmitting?

# Computer network

What is it?



What kind of network is this?
LAN vs WAN vs Internet

Some history on Ethernet ....

↳ The most widely used LAN scheme (Xerox PARC, etc)

↳ Metcalfe Xerox PARC, 3Com, ....

Idea: Local broadcast:

↳ One party sends msgs, all hear

Packets = data sent in short blocks ... not as one superlong stream

# Technical ideas

- Communicate over "dumb network"
  - ↳ Why is this nice? (cheap!)
  - Like our game example

- CSMA/CD
  - Carrier sense multiple access w/ coll detect

  MA = many people sharing same medium (as in our game)
  → Why is this good?

  CS = don't transmit when someone else is transmitting
  → Why is this good?

  CD = Sender listens to itself broadcasts junk if there's a collision
  → Why is this good?

How does exponential backoff work?
- ↳ Why this makes sense (binary search)
- ↳ Why not additive backoff?

# Questions

- What happens if diff terminals run at different speeds?
- Why is promising error-free communication costly & dangerous?
- What do you do if someone usurps the ether?
  - ↳ e.g. Zoom
- What is a good packet length for Ethernet?

# To discuss in groups...

1. Why this design is clever / took over the world?

- Cheap
- Easy to configure / change / expand
- Easy to implement
- No (?) single point of failure
- Scalable (?)
  ↳ How do you scale?

2. What are potential limitations?

- Throughput? Collisions
- Utilization - ineff use of cables if not topology is fixed (e.g. undersea cable)
- Limited size - can't scale to many nodes