Recitation 7: Ethernet

MIT - 6.033

Spring 2021

Henry Corrigan-Gibbs
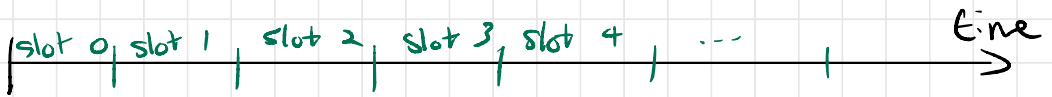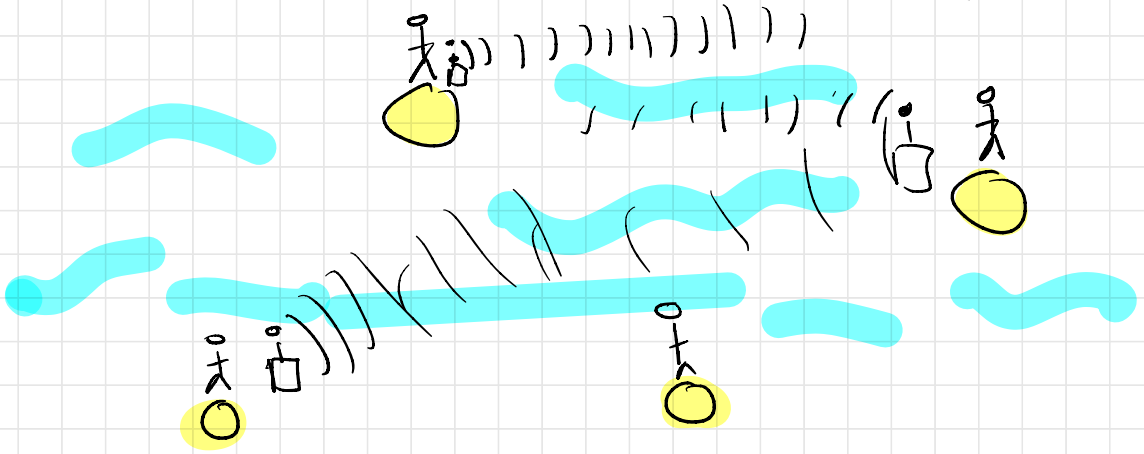
Plan

- Warm up: "Game"
- Ethernet & networking

- Key concepts:
    * Shared broadcast medium
    * Exponential backoff

Logistics

* DP Prep assignment due on Friday 3/12 5pm ET!

* Next assignment online by this weekend.

* Participation prelim grades by this weekend.

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

slot 0 | slot 1 | slot 2 | slot 3 | slot 4 | ... → time

— We are each on a different island... far apart

— We each have a list of msgs to send (when stuck on island for a while...)

— We divide time into "slots"

— Each person transmits or not in each slot

— If two+ people tx in same slot ⇒ COLLISION
   ↳ Nothing recovered

— Islands are far apart... only can tell if a collision happened after batch ot transmissions.

— GOAL/SCORE:
   Transmit collectively as many msgs as we can.

Game

* What are some Strategies?
  - Never tx
  - Always tx
  - Randomized?
  - How randomized?
    $\longrightarrow$ How often? $\left(\dfrac{\# \text{slots}}{\# \text{people}} \right)$

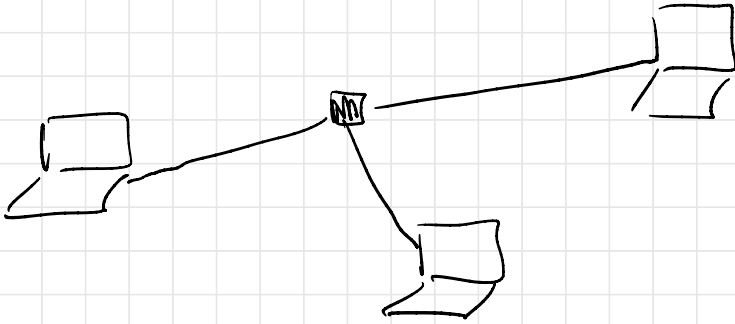* Change # slots and see what happens.
* What is the max score we can hope to achieve? ------ $\leftarrow$ Need some theory!

* 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 super long 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?

Collisions

- What happens if two people transmit at once?
- Why is this a good idea?

==Breakout rooms?==

How does exponential backoff work?
↳ Why this makes sense (binary seach)
↳ 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?