Before Today: Datagrams, User Datagrams, Reliable byte streams on top of unreliable service abstraction

Today: Packet Switching

Logistics:

* Come to the lab
* Help each other out both in the lab and on Ed
* Extra credits will be given in upcoming checkpoints for new test cases

How does end point drop a “postcard” to its destination?

* Circuit-switched networks (e.g. telephones)
  + Each telephone is connected to a center office
  + And a staff worked in the office would connect the wires upon customers’ request
  + If the person you want to call does not belong to the same office as you, there are circuits between main offices
  + Any phone call has a real direct electrical circuit
  + BUT: setting up and tearing down circuit is expensive, it works for telephone calls, but would not make sense if you only want to send a short piece of data
* Packet Switching
  + The time it takes for the first bit to be received – **Propagation Delay:** (l = distance, c = light speed in that medium) (seconds)
    - in cable
  + The time it takes for the whole packet to be received after the first bi t is received — **Serialization (packetization) delay:**
  + **Total time to send a packet across a link:** 
* The path between sender and receiver consists of multiple links
  + 
  + Each hop on the link receives the whole packet before sending it out, and therefore each hop would have propagation delay + serialization delay
  + And there is **Queueing delay** if the link is busy (a packet needs to wait in line at the FIFO queue).
  + TIme until packet begins transmission on a link — **Queueing delay**:
  + 
  + **End-to-end delay**: