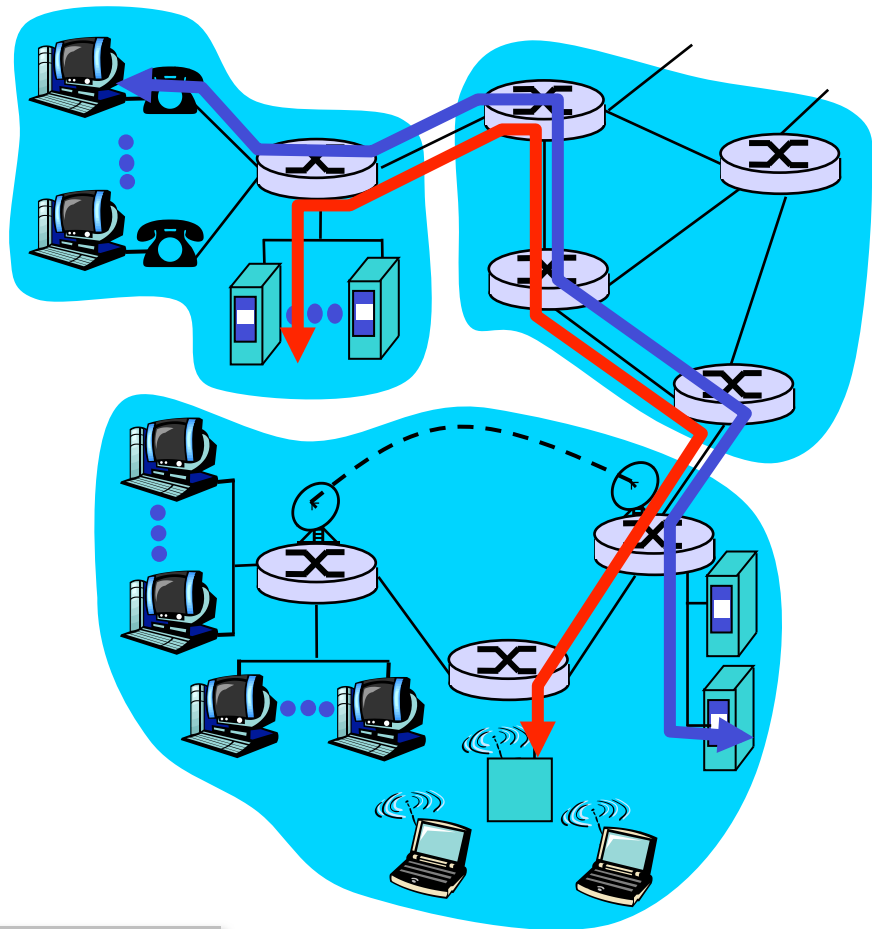


Network Core: Circuit Switching

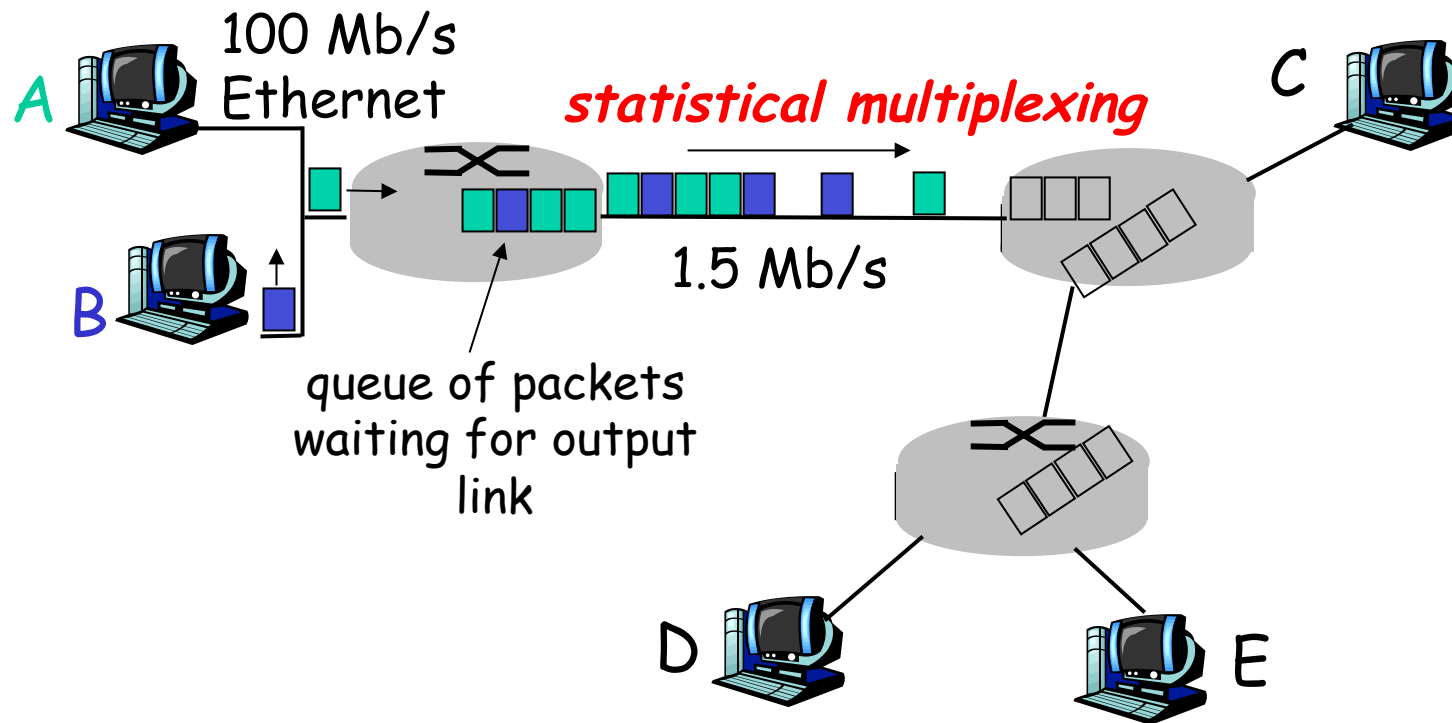
End-end resources
reserved for “call”

- ❑ link bandwidth, switch capacity
- ❑ dedicated resources: no sharing
- ❑ circuit-like (guaranteed) performance
- ❑ call setup required



Analogy: When president travels, a CS path set up.

Packet Switching: Statistical Multiplexing



Sequence of A & B packets does not have fixed pattern, shared on demand ➡ *statistical multiplexing*.

TDM: each host gets same slot in revolving TDM frame.

Compare

Thoughts on **tradeoffs** between packet switching and circuit switching?

Which one would you take?

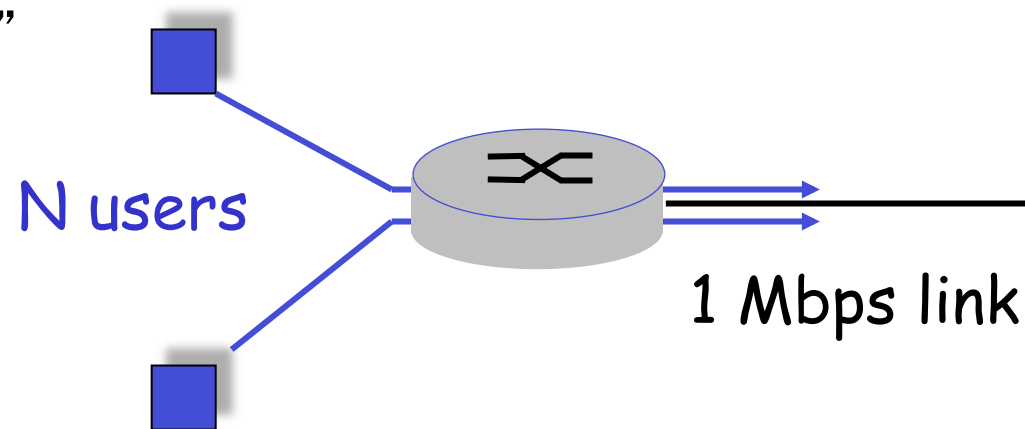
Under what circumstances?

Why?

Packet switching versus circuit switching

Packet switching allows more users to use network!

- ❑ 1 Mb/s link
- ❑ each user:
 - 100 kb/s when “active”
 - active 10% of time
- ❑ circuit-switching:
 - 10 users
- ❑ packet switching:
 - with 35 users, probability > 10 active less than .0004



Q: how did we get value 0.0004?

Packet switching versus circuit switching

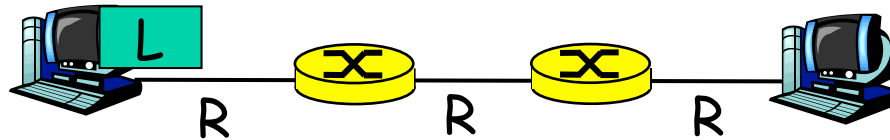
Is packet switching a “slam dunk winner?”

- ❑ Great for bursty data
 - resource sharing
 - simpler, no call setup
- ❑ Excessive congestion: packet delay and loss
 - protocols needed for reliability, congestion control
- ❑ Q: How to provide circuit-like behavior?
 - bandwidth guarantees needed for audio/video apps
 - still unsolved (chapter 7)

Why?



Packet-switching: store-and-forward



- ❑ Takes L/R seconds to transmit (push out) packet of L bits on to link or R bps
- ❑ Entire packet must arrive at router before it can be transmitted on next link: *store and forward*
- ❑ delay = $3L/R$ (assuming zero propagation delay)

Example:

- ❑ $L = 7.5$ Mbits
- ❑ $R = 1.5$ Mbps
- ❑ delay = 15 sec

} more on delay shortly ...

Packet-switched networks: forwarding

- ❑ Goal: move packets through routers from source to destination
 - we'll study several path selection (routing) algorithms (chap 4)

- ❑ **datagram network:**
 - *destination address* in packet determines next hop
 - routes may change during session
 - analogy: driving, asking directions

- ❑ **virtual circuit network:**
 - packet carries tag (virtual circuit ID), tag determines next hop
 - fixed path determined at *call setup time*, remains fixed thru call
 - *routers maintain per-call state*