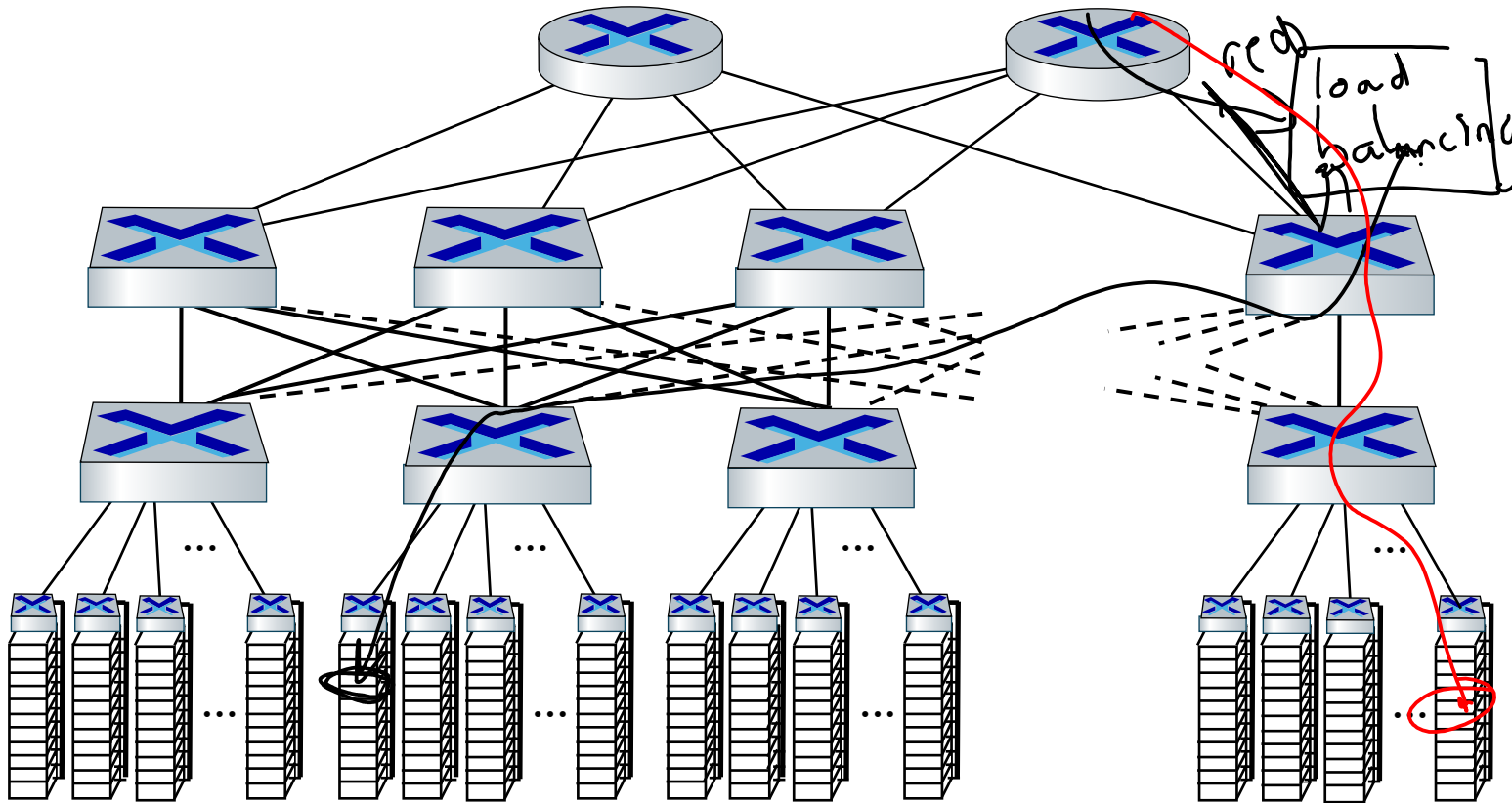


Datacenter networks: network elements



Border routers

- connections outside datacenter

Tier-1 (Core) switches

- connecting to ~16 T-2s below

Tier-2 (Aggregation) switches

- connecting to ~16 TORs below

Top of Rack (TOR) (Access) switches

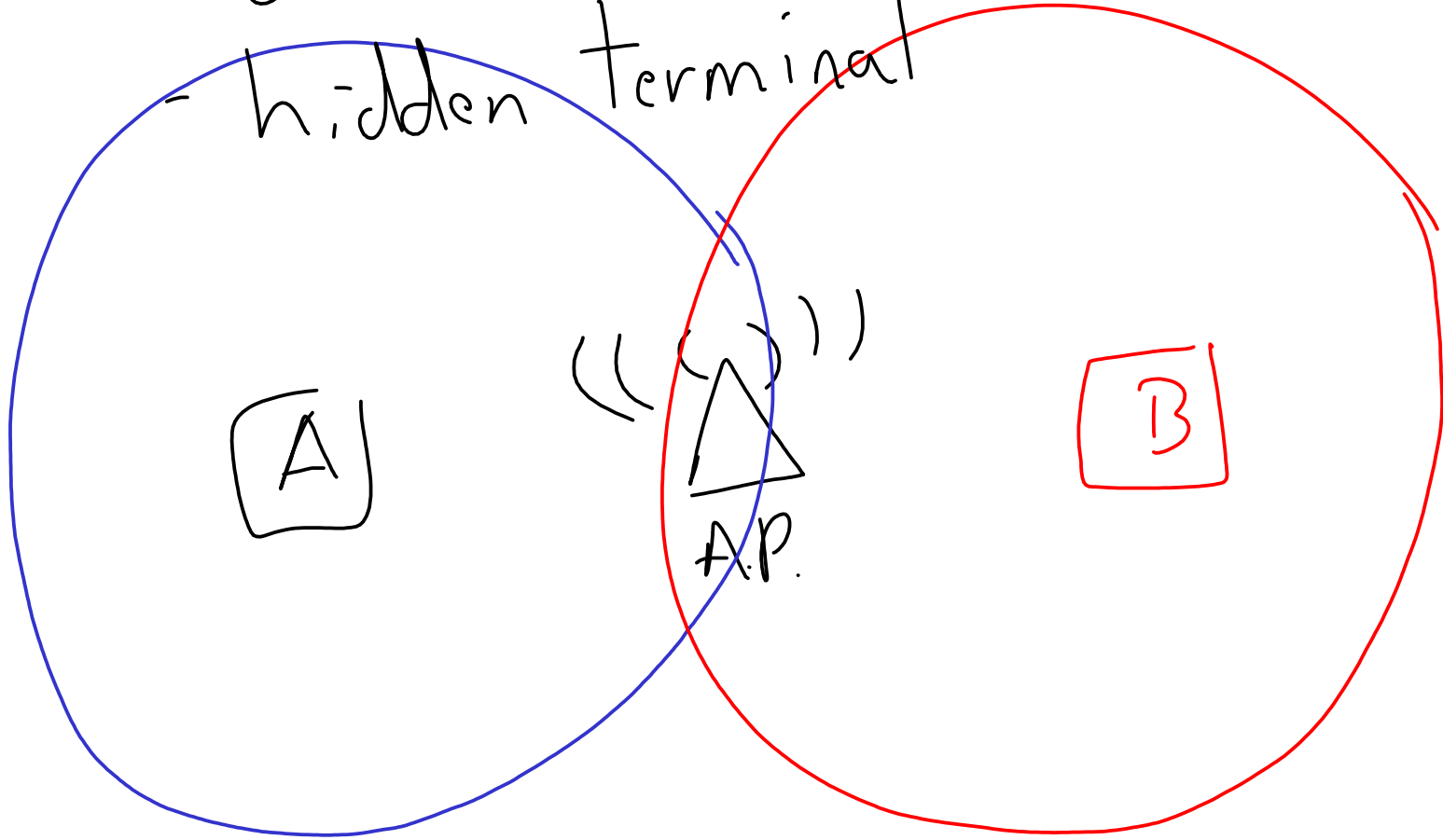
- one per rack, 100G-400G Ethernet to blades

Server racks

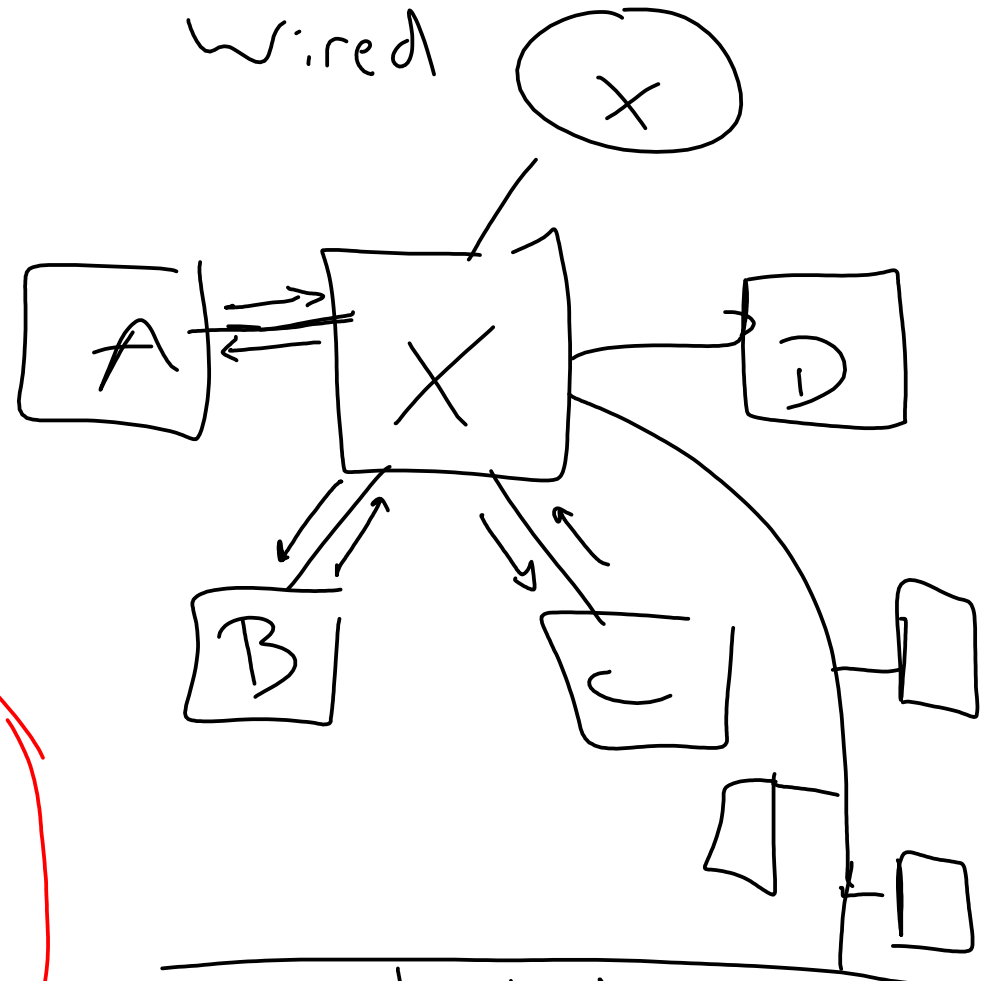
- 20- 40 server blades: hosts

Wireless

- shared frequency
- distance attenuation
- hidden terminal



Wired

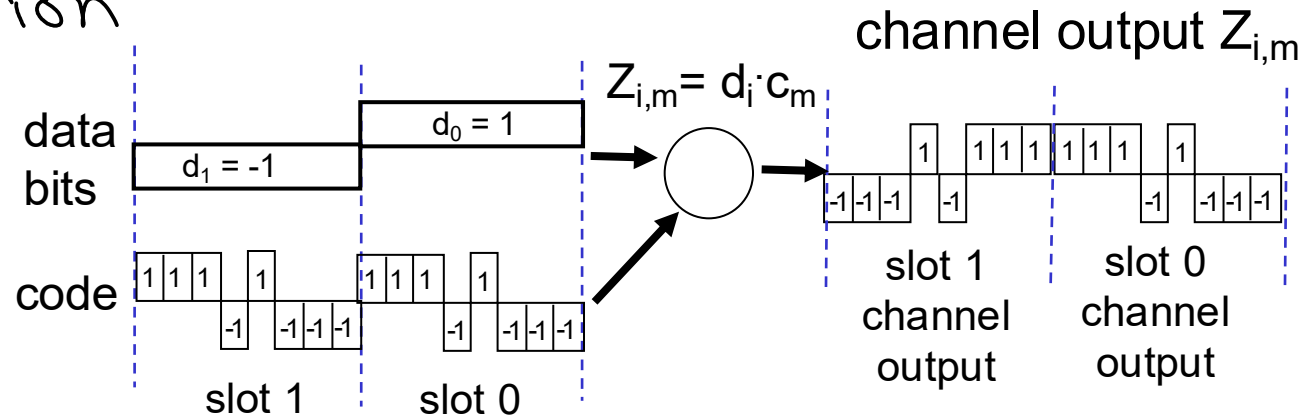


- can't listen while talking (no CD)

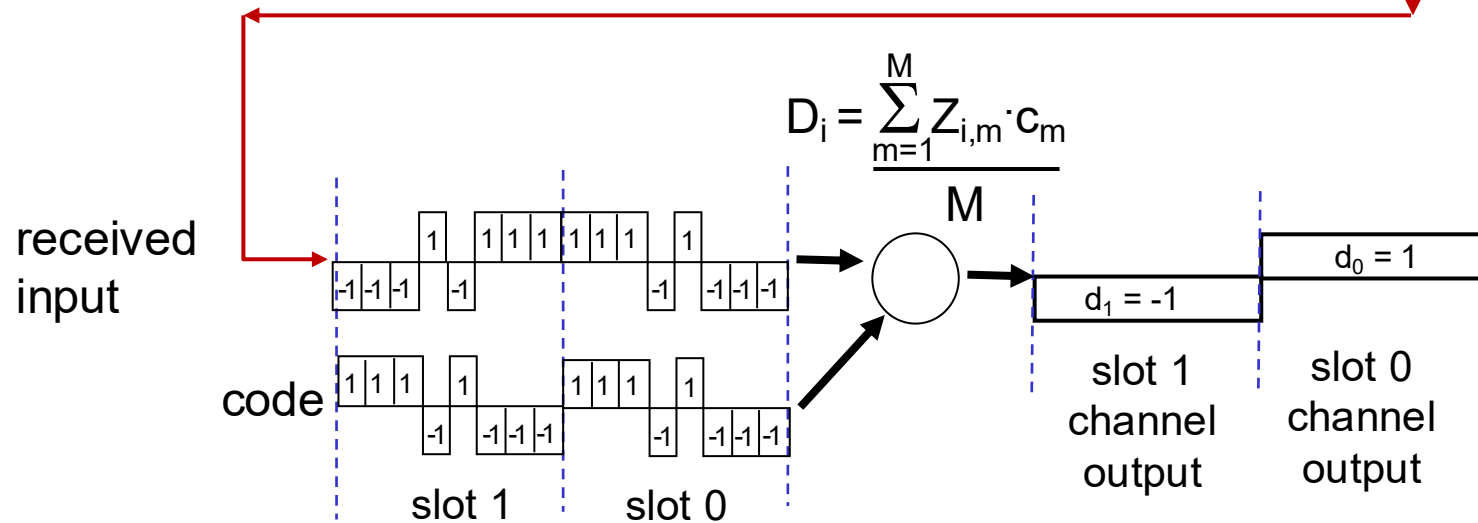
CDMA encode/decode

code division

sender



receiver

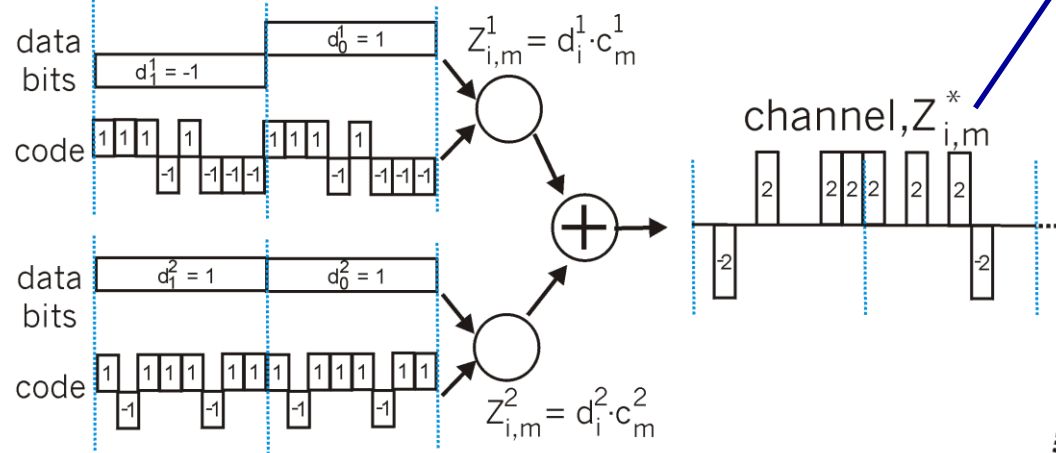


... but this isn't really useful yet!

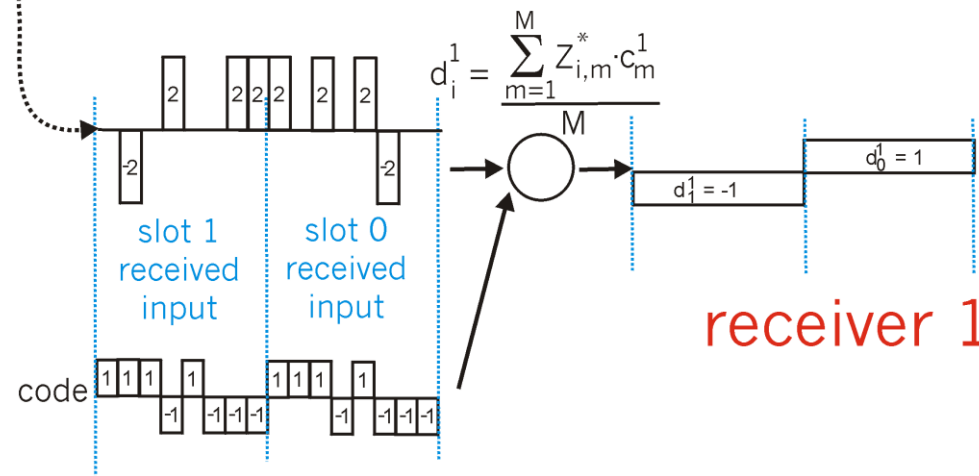
CDMA: two-sender interference

Sender 1

Sender 2



channel sums together transmissions by sender 1 and 2

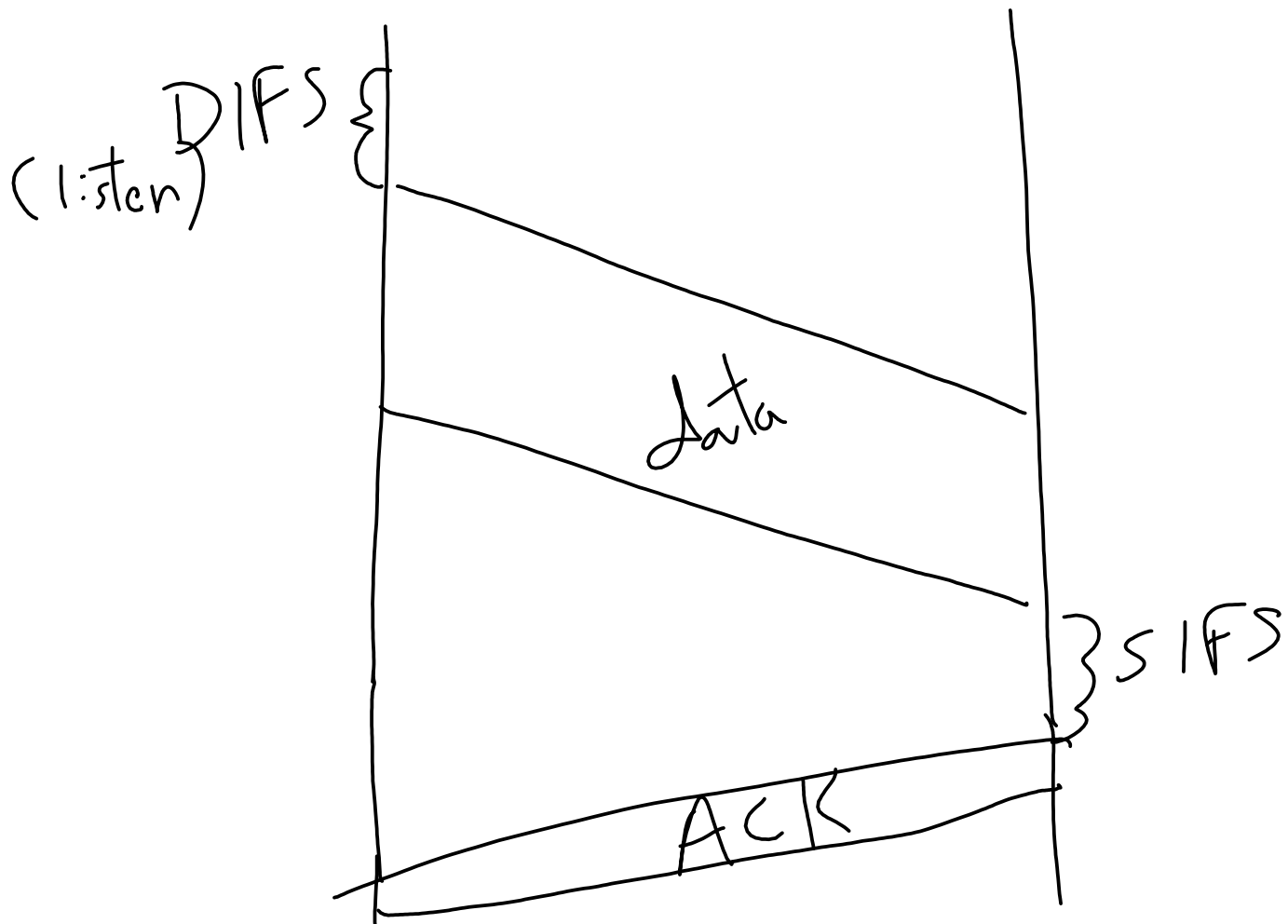


using same code as sender 1, receiver recovers sender 1's original data from summed channel data!
 ... now *that's* useful!

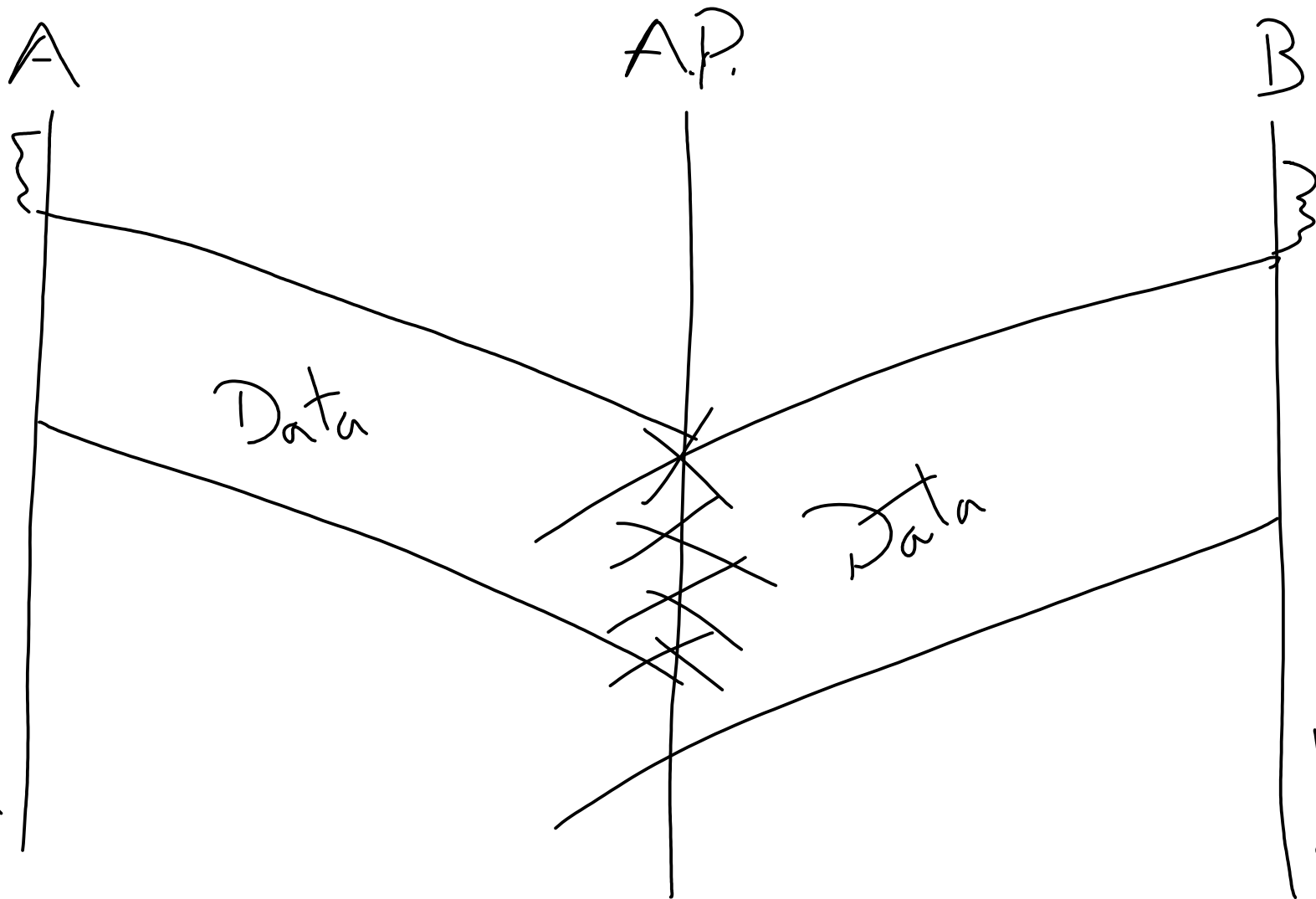
CSMA/CA (802.11 Wifi)

sender

rcv



CSMA



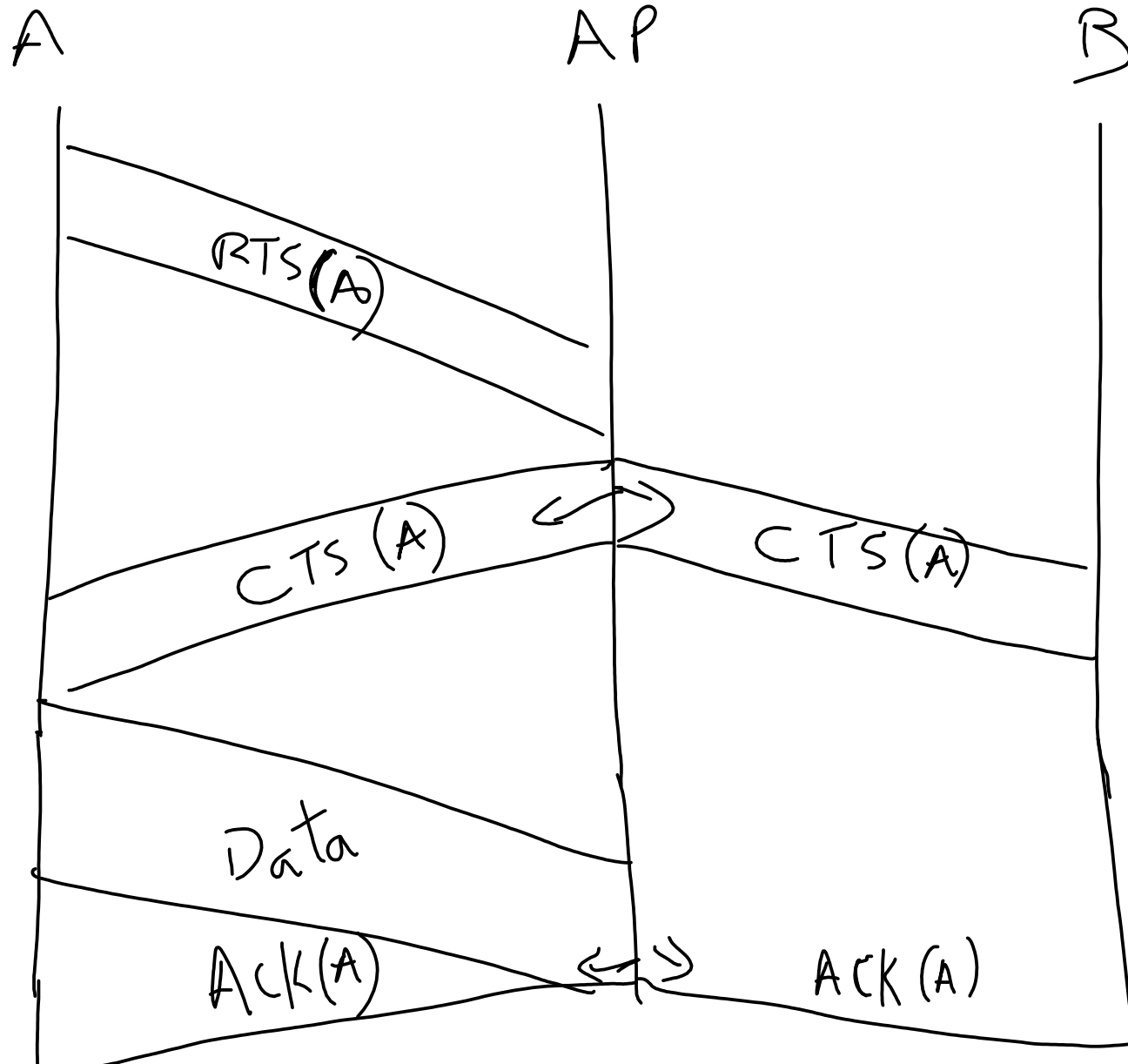
NO
ACK?
backoff
resend

NO ACK?
Backoff
resend

Collision Avoidance

CSMA/CA

RTS: request to send
CTS: clear to send



Mobility

