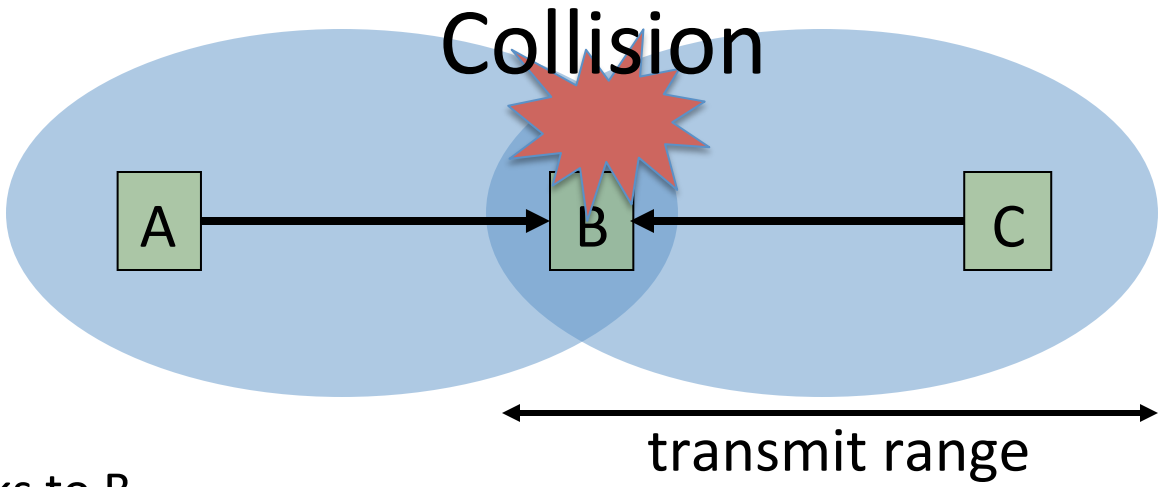
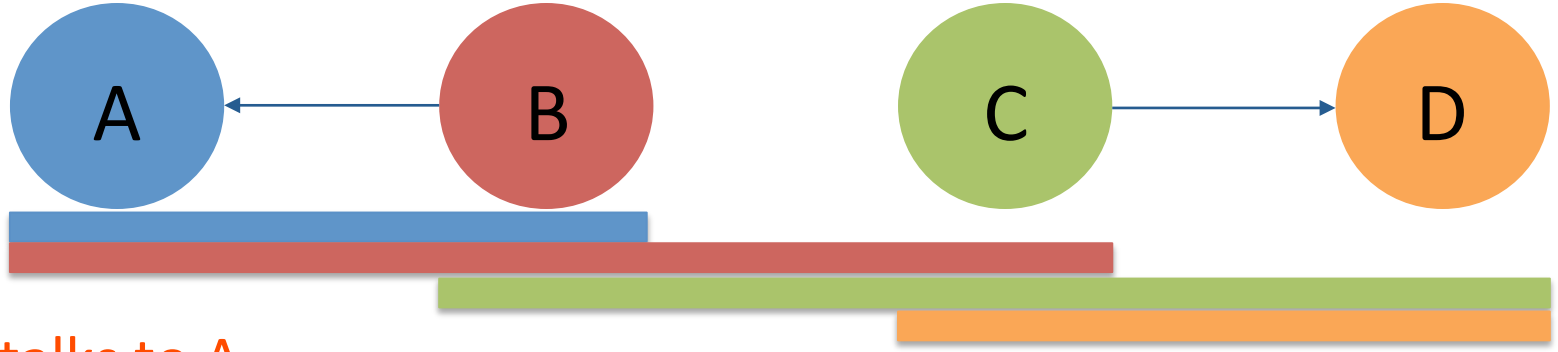
Wireless

Hidden Terminals



- A talks to B
- C senses the channel
  - C does not hear A's transmission
- C talks to B
- Signals from A and B collide
- Carrier Sense will be ineffective – need to sense at *receiver*

Exposed Terminals

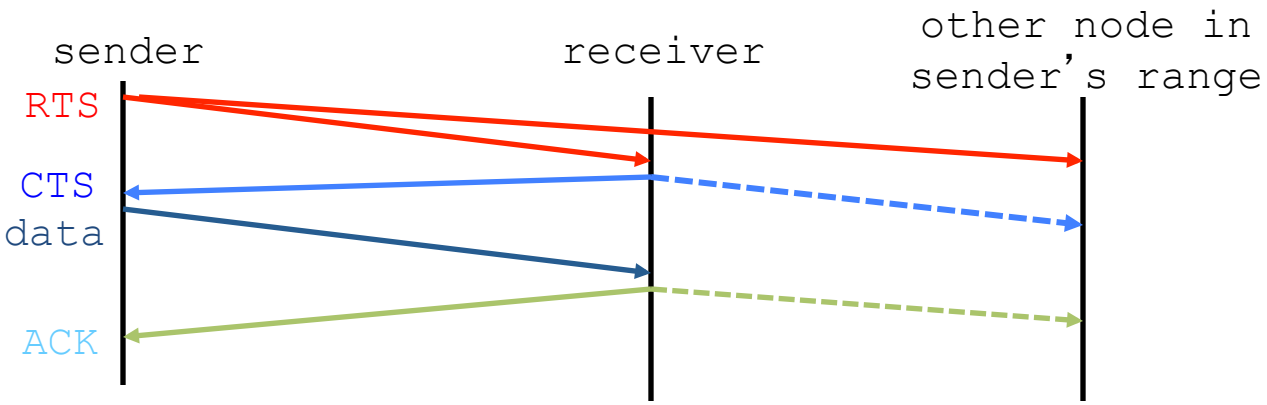


- B talks to A
- C wants to talk to D
- C senses the channel and finds it busy
- C remains quiet (when it could have transmitted)
- Carrier sense would prevent a successful transmission
  - But we do carrier sense anyway (why?)

Key Points

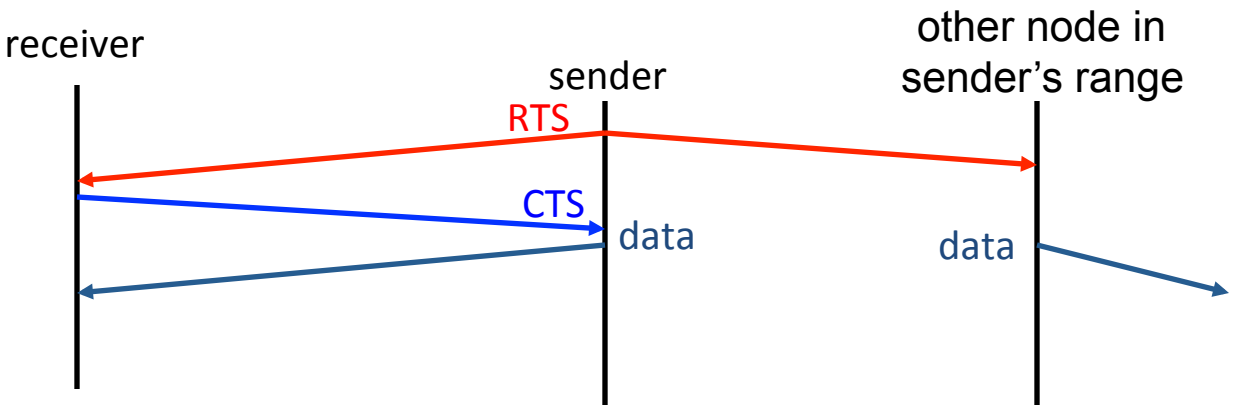
- No concept of a global collision
  - Different receivers hear different signals
  - Different senders reach different receivers
- Collisions are at receiver, not sender
  - Only care if receiver can hear the sender clearly
  - It does not matter if sender can hear someone else
  - As long as that signal does not interfere with receiver
- Goal of protocol:
  - Detect if receiver can hear sender
  - Tell senders who might interfere with receiver to shut up

MA with Collision Avoidance (MACA)



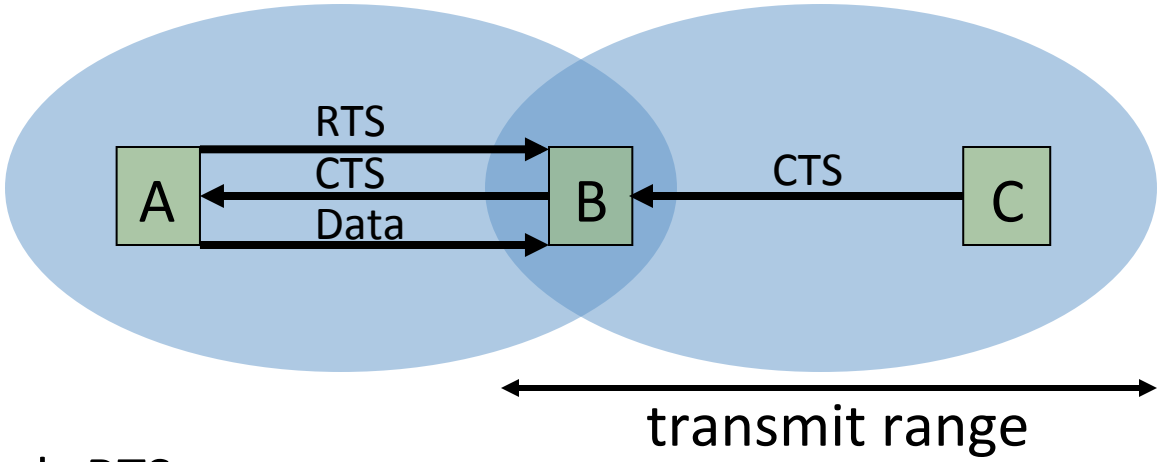
- Before every data transmission
  - Sender sends a Request to Send (RTS) frame containing the length of the transmission
  - Receiver responds with a Clear to Send (CTS) frame
  - Sender transmits
  - Receiver sends an ACK; now another sender can send data
- When sender doesn't get a CTS back, it assumes collision
- When you hear a CTS, you keep quiet until scheduled transmission is over (hear ACK)

MACA, con't



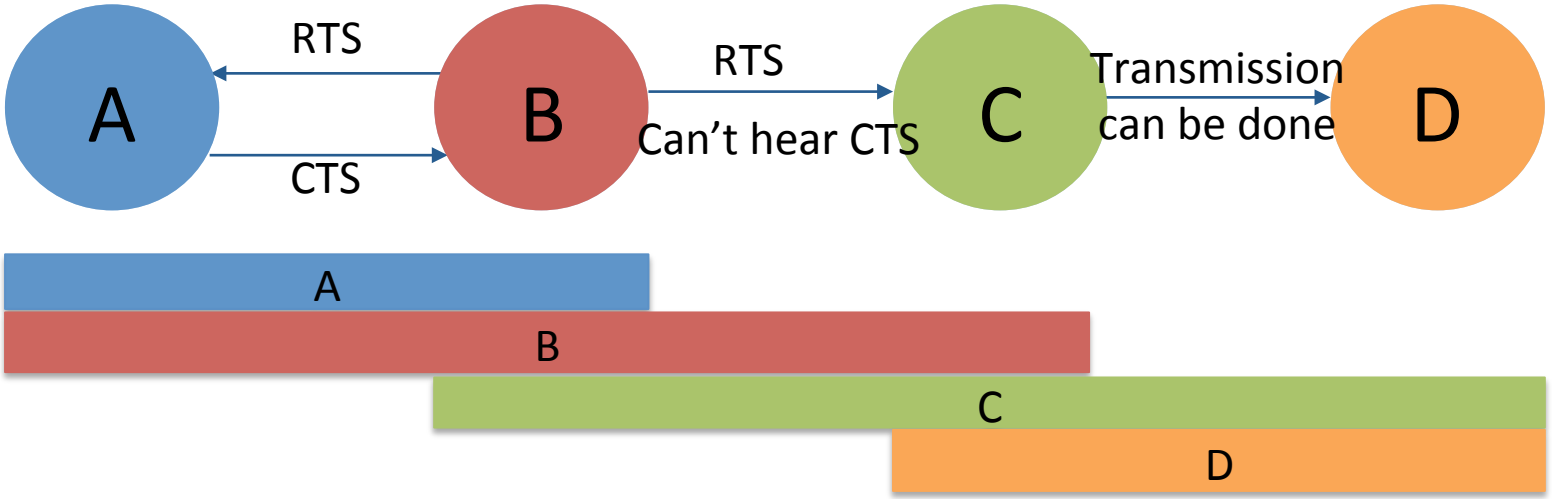
- If other nodes hear RTS, but not CTS: send
  - Presumably, destination for first sender is out of node's range
  - Can cause problems when a CTS is lost

Hidden Terminals



- A sends RTS
- B sends CTS
- C also hears CTS
  - C doesn't transmit
- Collision avoided!

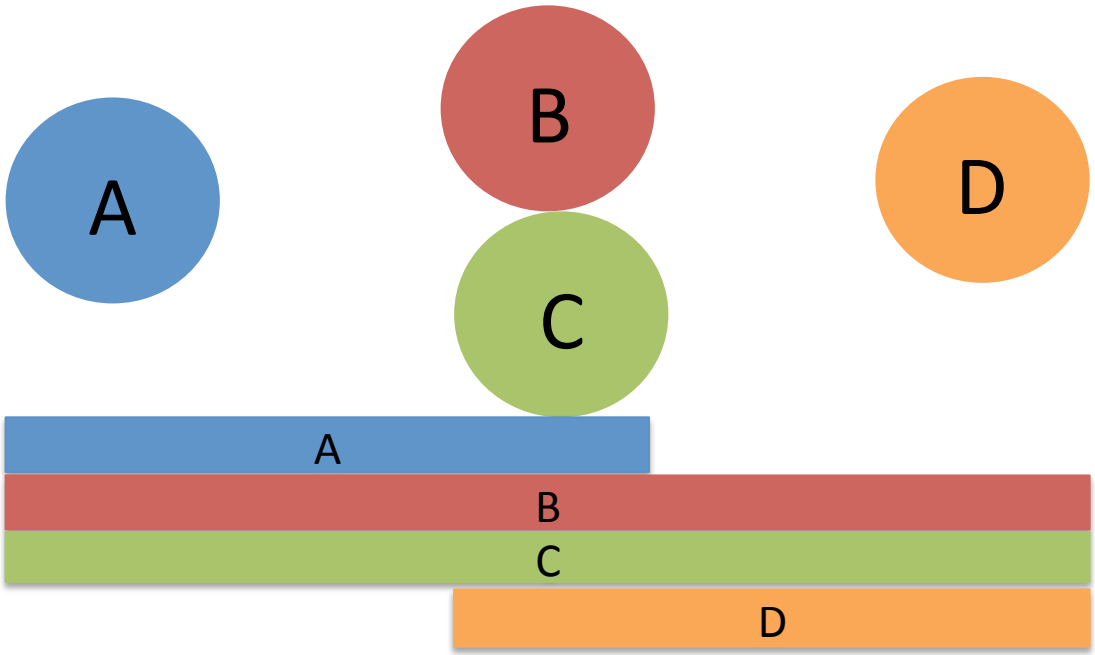
Exposed Terminals



- B sends RTS to A
- C gets this RTS as well
- C cannot hear A's CTS
- C can also transmit!!

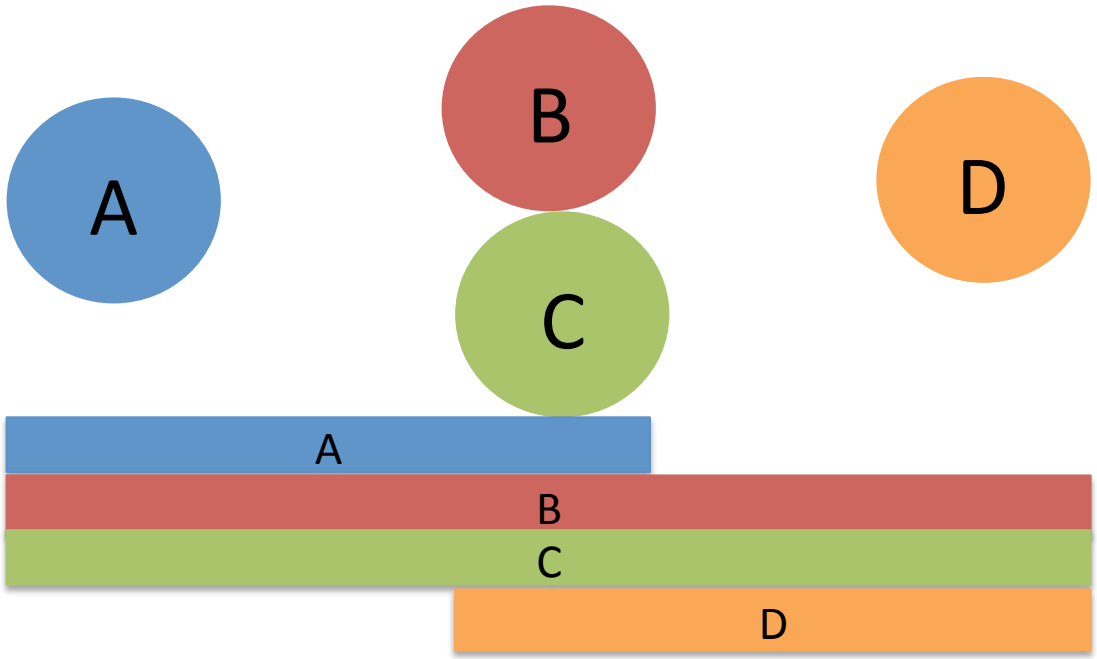
Problem 2
Cheating

Can C improve it's performance by "cheating" and ignoring the CTS messages exchanged between A and B?



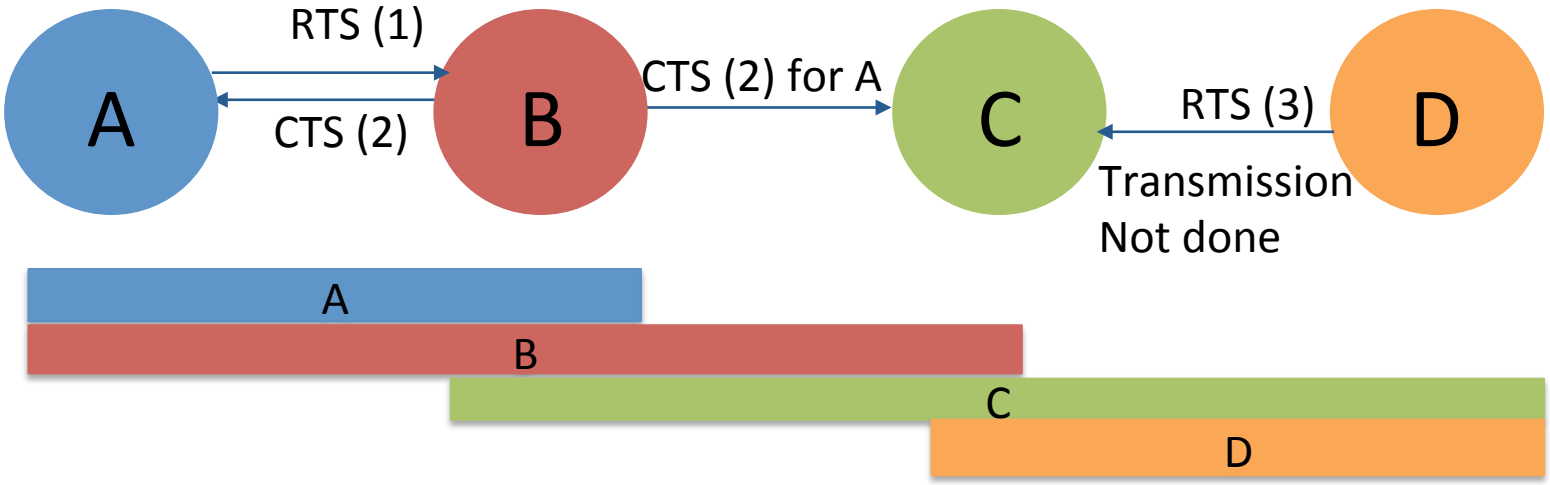
Problem 2
Cheating

Can D improve it's performance by "cheating" and ignoring the CTS messages exchanged between A and B?



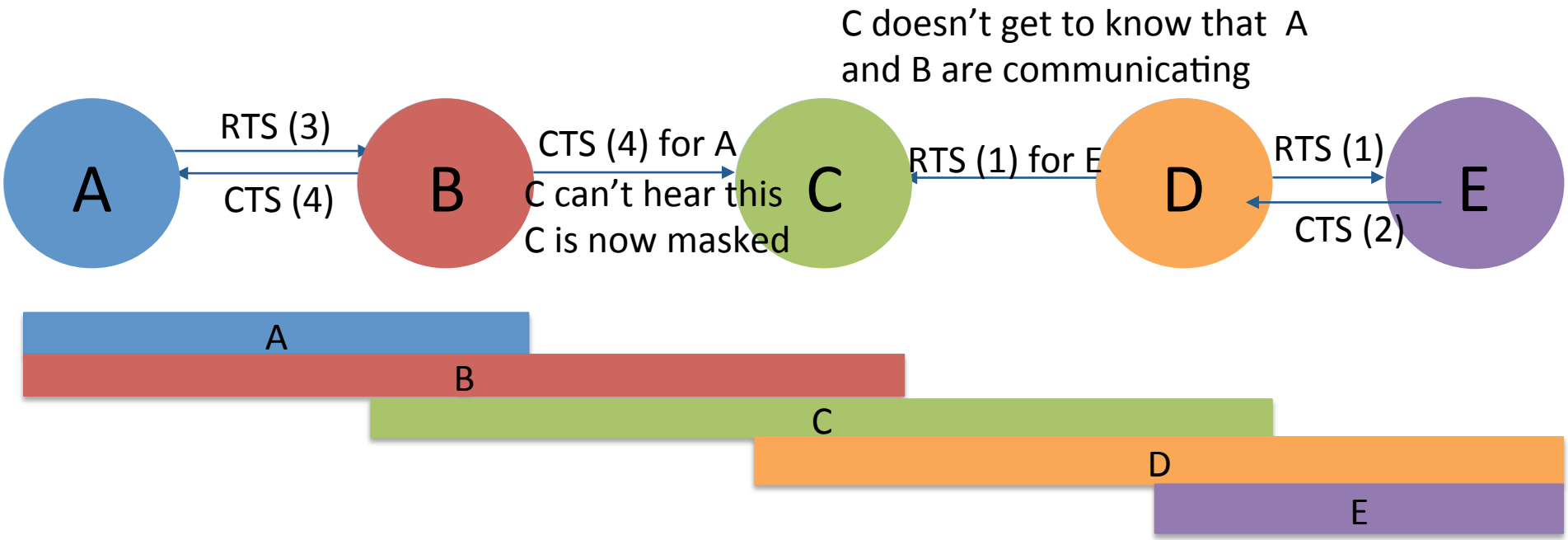
Problem 3: (a)

Gagged Station:



Problem 3: (b)

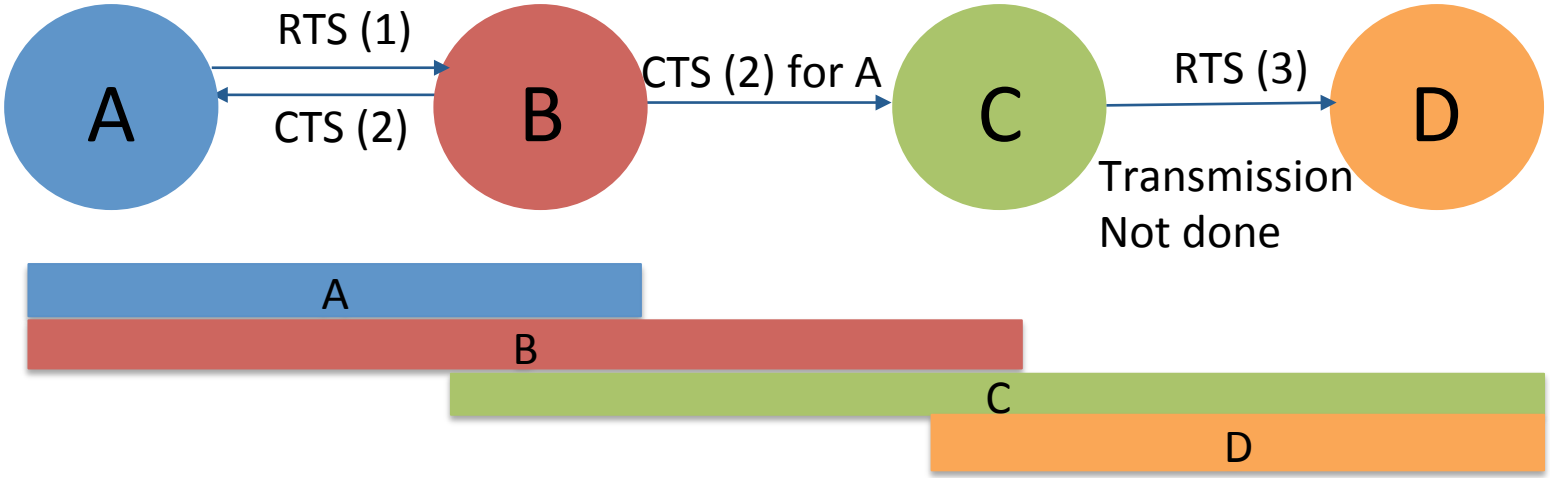
Masked Station:



Problem 3: (c)

Fairness?

Starvation?



Problem 4: Frame Sizing

- Too small frames
- Comparable to size of RTS / CTS messages
- Large overhead!