

CMSC417 Spring 2016 Lecture #25 5/9/2016

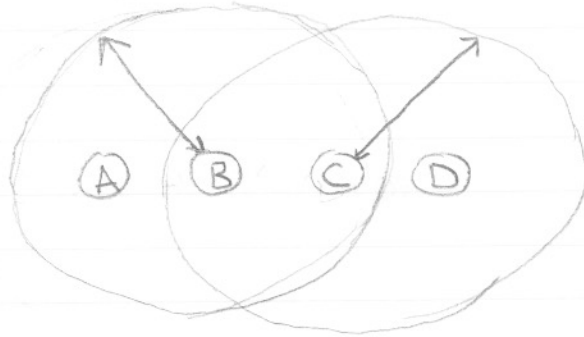
Agenda

- ⇒ midterm 2 grades posted by Wed
 - pick them up at collin's office hours if you want
- ⇒ course evaluations
- ⇒ project 5 due Wed 11:59pm

D Wireless

- ⇒ exposed node
- ⇒ hidden node
- ⇒ RTS/CTS
- Exam Review

Exposed Node/Terminal



⇒ B/C can hear each other, don't talk at the same time, but should be able to have:
D → B → A and C → D at the same time

RTS/CTS

⇒ before sending data, send a Request to Send (RTS) to the receiver

⇒ receiver responds with Clear to Send (CTS)

□ anyone hearing either the RTS or CTS

knows they're going to collide if they send

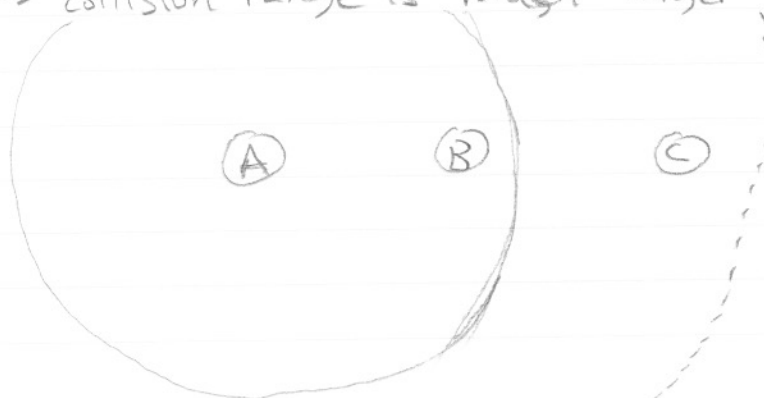
□ solves (most of) the hidden node problem

□ doesn't solve exposed node problem

Not used in practice

⇒ most of the time APs are lightly loaded
thus RTS/CTS is pure overhead

⇒ collision range is much larger than receipt range



⇒ C can't "hear" A

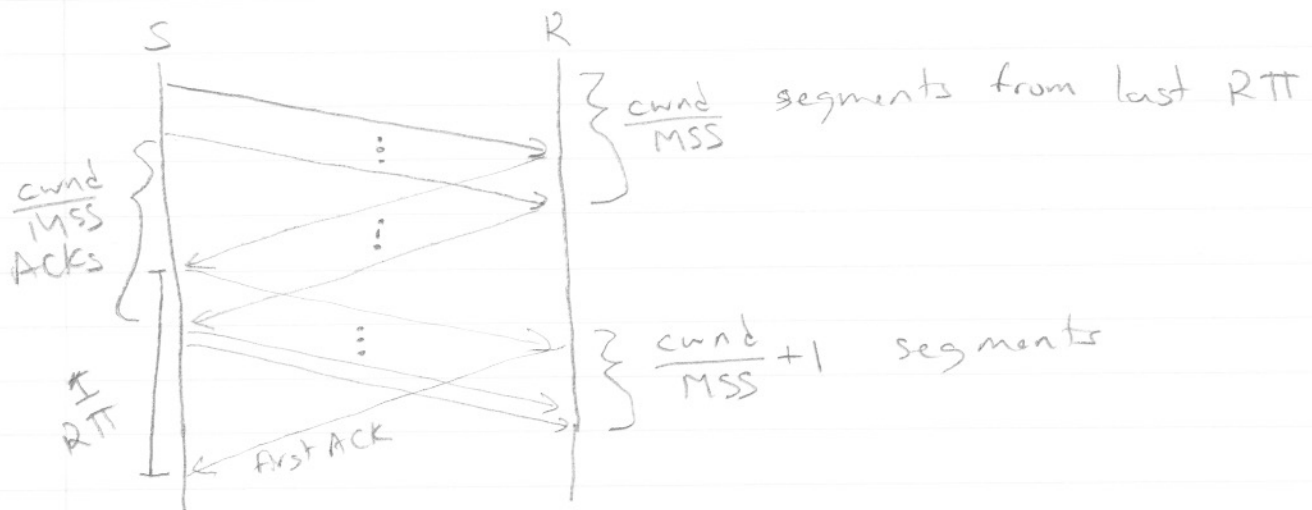
⇒ C can have collisions with A b/c A's transmissions still cause more noise

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midterm 2 q5b

send $\frac{\text{start_cwnd}}{\text{MSS}}$ segments last RTT, expecting that many ACKs

on getting All ACKs can send that many +1 segments b/c +1 segment per RTT or $+\frac{\text{MSS}}{\text{cwnd}}$ bytes per ACKed byte.



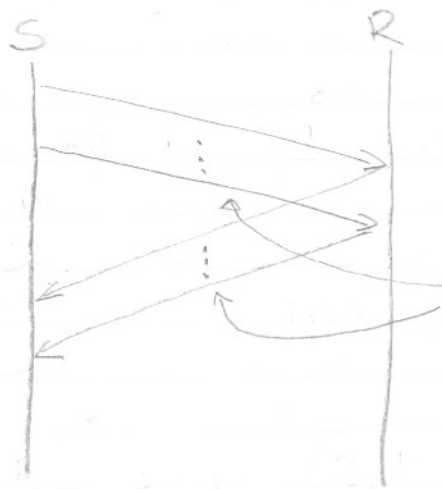
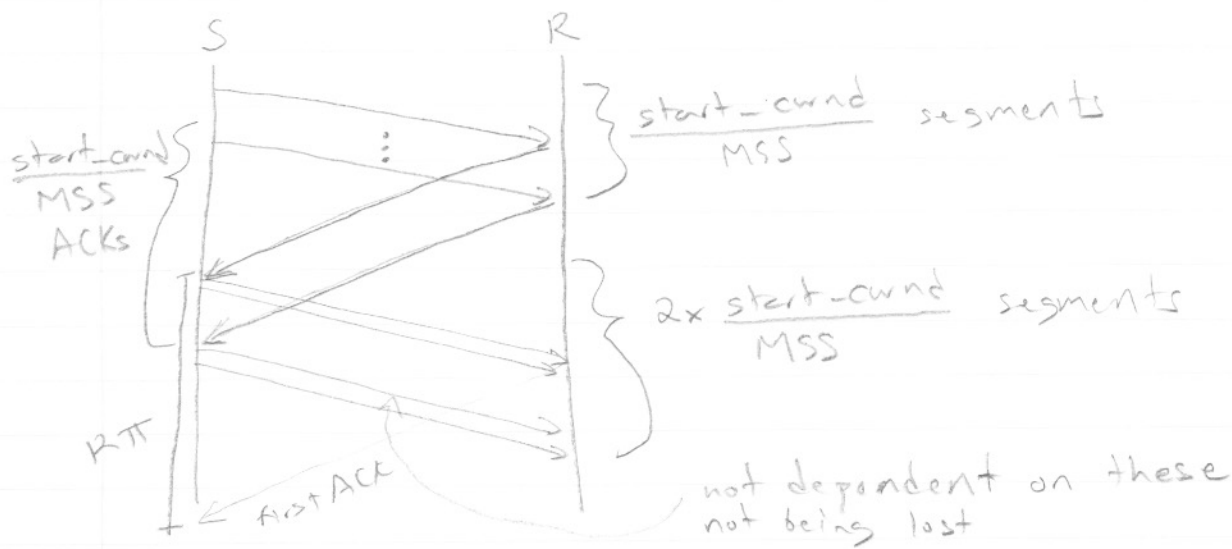
midterm 2 q5c,d

\Rightarrow if you lose all sent packets or no packets, it's clear you can send $2 \times \frac{\text{start_cwnd}}{\text{MSS}}$ segments in this RTT

\Rightarrow if you lose any sent packets, that will affect the next RTT, not this one

\Rightarrow if you lost any packets or ACKs from last time, you will send fewer packets b/c it will have fewer ACKs to generate increases in cwnd

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if any of these are lost, sender will only send more on fast retransmit means 3 packets after loss $\Rightarrow \text{start_cwnd} / \text{MSS} \geq 4$

\Rightarrow on fast retransmit, will send at most $\frac{\text{current_cwnd}}{\text{MSS}} + 3$ segments.

$$\max\left(\frac{\text{start_cwnd}}{\text{MSS}} + 3, \frac{2 \times \text{start_cwnd}}{\text{MSS}}\right)$$

$\text{current_cwnd} \leq 2 \times \text{start_cwnd}$

$$\Rightarrow \frac{2 \times \text{start_cwnd}}{\text{MSS}} \quad \text{b/c } 3 < \frac{\text{start_cwnd}}{\text{MSS}} \geq 4$$