

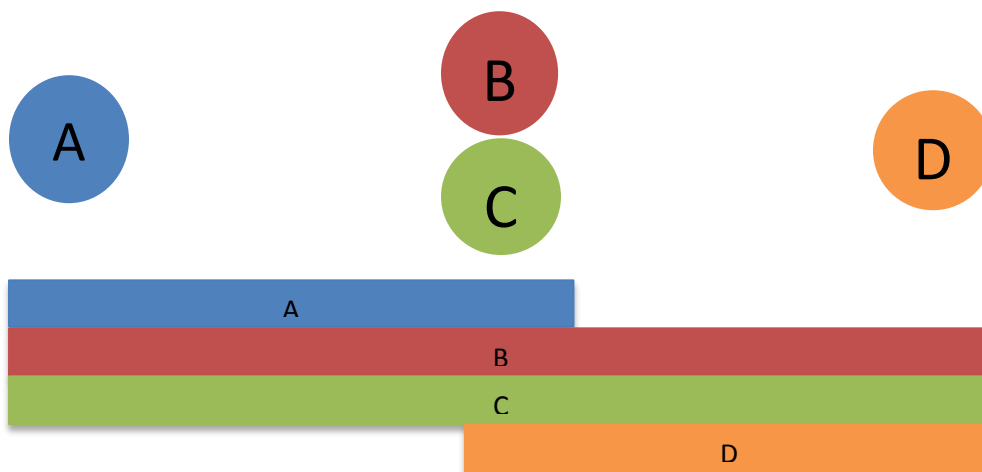
Section 9: Wireless

Q1: You've got the power!

A big problem in wireless is signals attenuating as they propagate through the physical environment. One solution for this would be to boost the strength of signal sent by the transmitter. State two problems with doing so.

Q2: Cheaters

Consider wireless nodes communicating as indicated below, i.e. B and C can hear A, but D cannot; B and C can hear D, but A cannot; and every node can hear B and C. The horizontal bars denote these ranges.



Suppose that A and B are using MACA (Multiple Access with Collision Avoidance), and A is sending a large data item to B requiring many packets (but B does not need to send back acknowledgments). C wishes to transmit data to D (again, D does not need to send back acknowledgments).

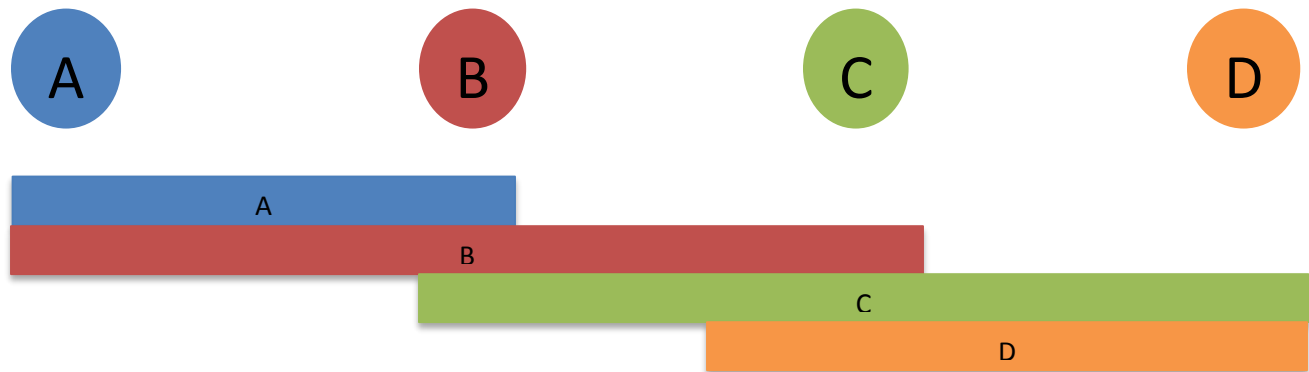
a) To what degree can C improve its performance by “cheating” and ignoring the CTS messages exchanged between A and B. (Here “ignoring” means not taking the action that C is supposed to take when it hears the CTS messages.) Explain why and at what cost (would anything be worse)?

b) Now consider instead B sending a large data item to A. To what degree can D improve its performance by “cheating” and ignoring the CTS messages exchanged between A and B. Explain why.

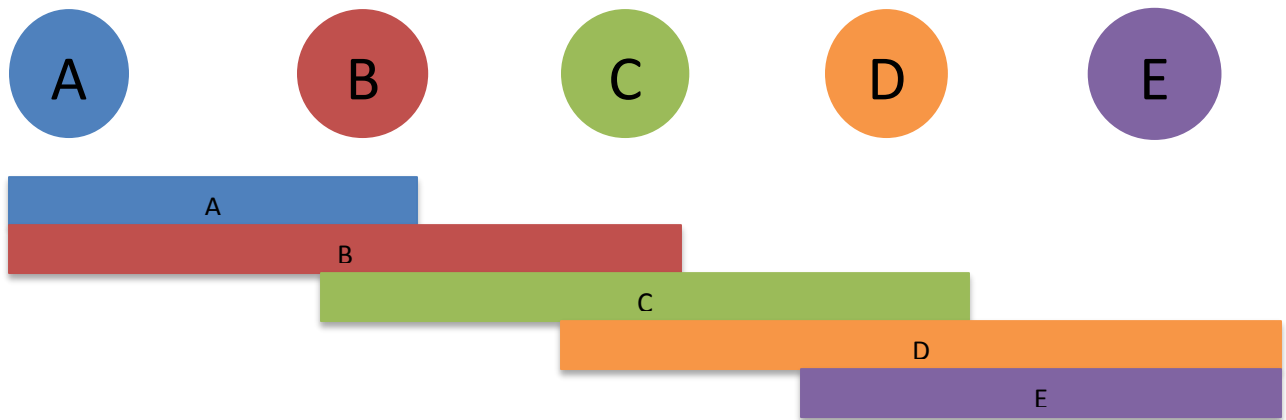
Q3: More Problems with RTS/CTS

In this problem we will study cases where RTS/CTS fail to meet some desired goals.

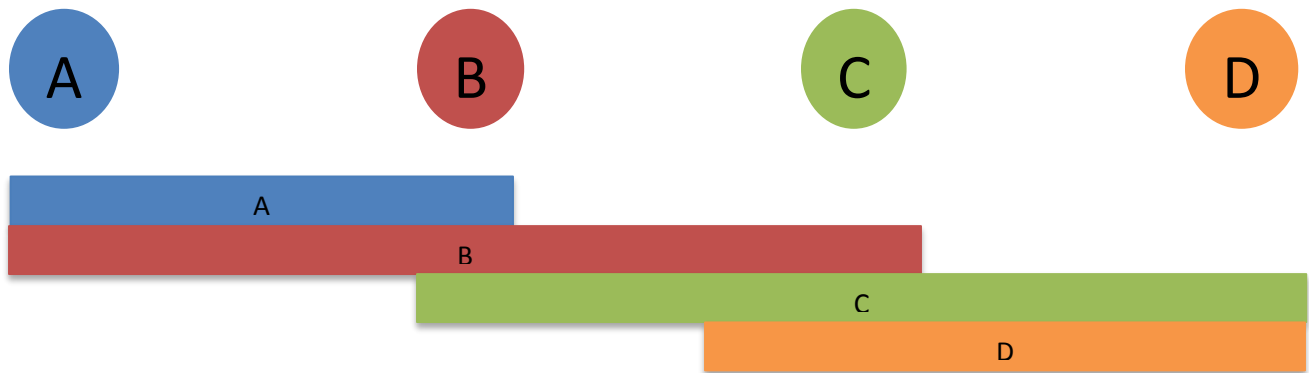
a) Consider the scenario below, A wanting to send to B and D wanting to send to C. (The directions are opposite to what we did in the exposed-terminal problem.). If A and B undergo a successful RTS/CTS exchange, will D be able to send to C? Write down the sequence of RTS / CTS packets.



b) Consider the scenario below with A wanting to send to B and D wanting to send to E. Suppose D and E exchange RTS/CTS successfully, then D starts transmitting. Then, A and B exchange RTS/CTS and A starts transmitting. Once D's transmission is over while A is still transmitting, can A -> B communication be affected by some events even though they exchanged RTS/CTS sufficiently? Write down the sequence of RTS / CTS packets.



c) Consider the scenario below with A wanting to send to B, and C wanting to send to D. Let's say A starts transmitting after a successful exchange of RTS/CTS with B. Can it so happen that C never gets a chance to send to D?



Q4: Overhead

If the packets being sent by the wireless nodes are very short (few bytes each), would RTS/CTS be a useful mechanism if link-layer ACKs are already being used? Why or why not?