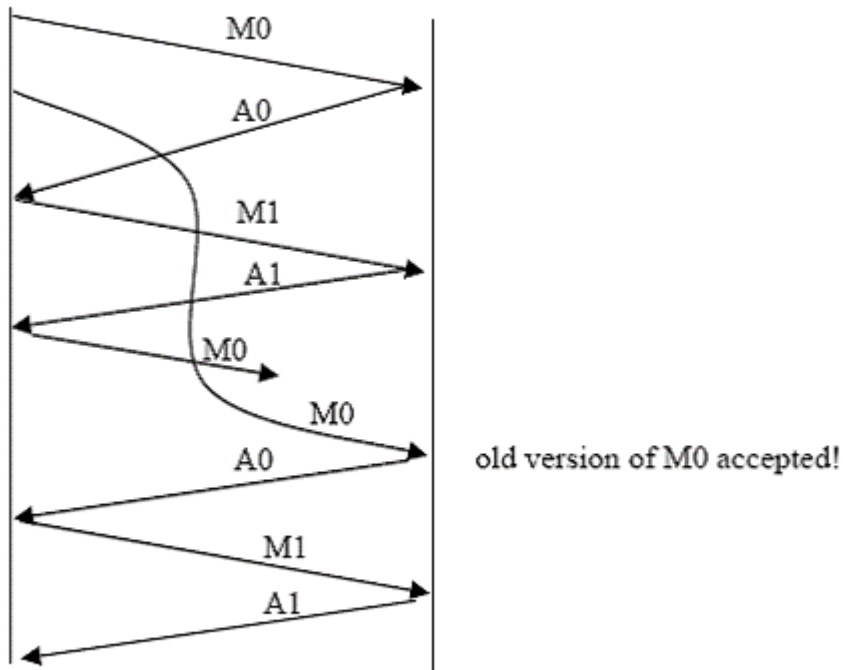


A few sample questions plus answers:

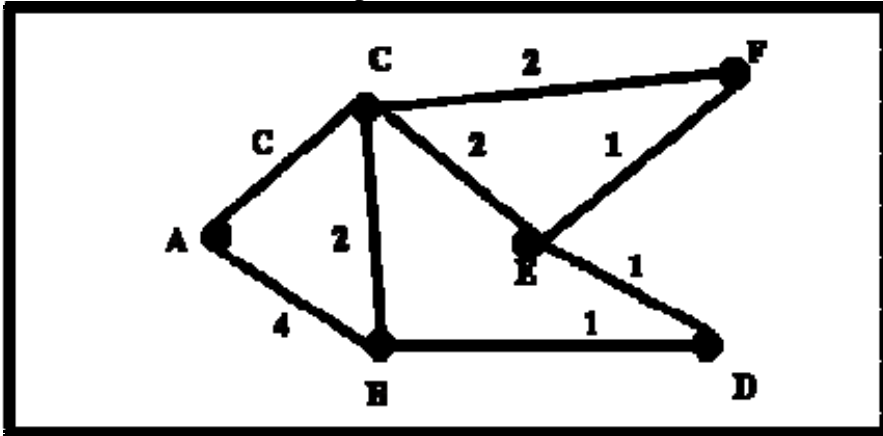
1. Suppose after sending a series of packets numbered, 1..n, TCP does not receive any acknowledgements for an extended period of time. Normally, after a certain timeout period is reached, TCP will reset the congestion window to 1, and will retransmit the first packet (packet 1). Suppose instead, that TCP were modified to send packet n+1 in this case. Under what conditions would this be a good idea and why? (Be specific.) Under what circumstances would this be a bad idea and why? (Be specific.)

This would be a good idea if packet one (and perhaps later packets as well) were received. It would prevent an unnecessary retransmission and the next ACK would indicate which, if any, packet actually needed to be retransmitted. This is likely to occur mainly if reverse congestion is high (many ACKS are lost) and windows are small (so fewer ACKs need to be lost to allow a timeout to occur). This is a bad idea if the receiver buffer is full (because packet n will have to be dropped)

2. Consider a pair of hosts communicating using the stop-and-wait protocol. Draw a diagram that shows that if the network connection between the sender and receiver can reorder messages, then the stop-and-wait protocol will not work correctly (make sure you clearly identify the sense in which it will not work correctly). Your diagram should have the sender on the left and the receiver on the right, with the time axis running down the page (as we do in class), showing data (D) and acknowledgement (A) message exchange. Make sure you indicate sequence number associated with any data or acknowledgement packet.



3. Consider the network depicted below:



Suppose node E is a multicast source and the network uses Reverse Path Forwarding (RPF) to distribute multicast packets to destinations. Starting from point E, use arrows to describe how packets will be forwarded across the network. Use the following symbols in your diagram:

- Packet will be forwarded further
- Packet will not be forwarded beyond the receiving router

Answer:

