

## Worksheet: TCP Congestion Control and the Network Layer

### Q1. RTT Estimation:

Suppose that TCP's current estimated values for the round trip time are:

- estimatedRTT = 400ms
- devRTT = 10ms

Suppose that the next two measured values of the RTT are 340 msec and 250 msec.

Compute TCP's new value of DevRTT, estimatedRTT, and the TCP timeout value after each of these two measured RTT values is obtained. Use the values of:

- $\alpha = 0.125$ , and
- $\beta = 0.25$

Estimated RTT is given by:  $(1 - \alpha) * \text{estimatedRTT} + \alpha * \text{sampleRTT}$

DevRTT :  $(1 - \beta) * \text{DevRTT} + \beta * |\text{estimatedRTT} - \text{sampleRTT}|$

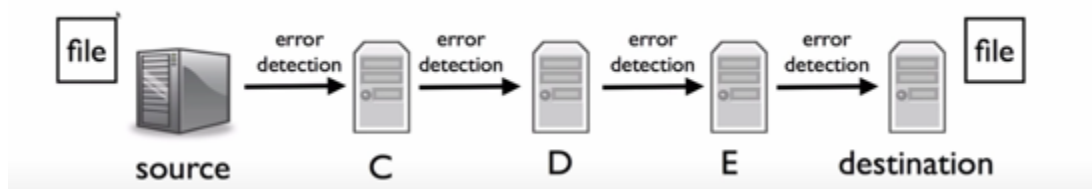
1. What is the estimatedRTT and DevRTT after the first RTT?
2. What is the TCP timeout for the first RTT?
3. What is the estimatedRTT and DevRTT after the second RTT?
4. What is the TCP timeout for the second RTT?

## The Network Layer

Q1. Which of the following is/are generally true of packet vs. circuit switching?

- A) Packet switching has more variance in performance.
- B) Circuit switching is reliable.

Q2. In the following figure, there is a file being transferred from source to destination and passes through multiple machines in-between. Each link has error detection and correction. If the packet is corrupt, the recipient can reject the packet. Sender will detect that the packet did not arrive successfully, and resend the packet (using reliable transfer, e.g., TCP). State whether you think the following statement is true:



Since we have error correction on every link, I know the packet won't be corrupted between links. And because it won't be corrupted on any given link, it won't be corrupted at all.

Q3. When should a router perform routing? Forwarding?

- A) Do both when a packet arrives.
- B) Route in advance, forward when a packet arrives.
- C) Forward in advance, route when a packet arrives.
- D) Do both in advance.
- E) Some other combination

Q4. How should we populate a router's forwarding table?

- A) A person should add entries to the table
- B) A program external to the router should add entries to the table.
- C) Routers should communicate with each other to add entries to their tables.
- D) Some other mechanism.

Q5. Routers exchange state (we'll save the what and when for later). They decide, for each destination, how to get there, and build a lookup structure for their forwarding table. What should they build?

- A) A list – scan for the destination.
- B) A hash table – look up the destination.
- C) A tree – Follow branches that lead to the destination.
- D) Some other software structure.
- E) We can't do this in software, we need special hardware.

Q6. What services would we like a router to implement?

- A) Basic connectivity: route packets to destination
- B) Find policy-compliant paths (keep ISPs happy)
- C) Traffic engineering
- D) Impose limits on what can be accessed on the Internet vs. local ISP
- E) All of the above