

Q1 TCP sequence numbers

- ❖ A TCP sender is just about to send a segment of size 100 bytes with sequence number 1234 and ack number 436 in the TCP header. What is the highest sequence number up to (and including) which this sender has received all bytes from the receiver?
 - A. 1233
 - B. 436
 - C. 435
 - D. 1334**
 - E. 536

Transport Layer3-1

Q2 TCP sequence numbers

- ❖ A TCP sender is just about to send a segment of size 100 bytes with sequence number 1234 and ack number 436 in the TCP header. Is it possible that the receiver has received byte number 1335?
 - 1. **Yes** *if there's gap*
 - 2. No

Transport Layer3-2

Q3 TCP timeout

- ❖ A TCP sender maintains a SmoothedRTT of 100ms. Suppose the next SampleRTT is 108ms. Which of the following is true of the sender?
 1. Will increase SmoothedRTT but leave the timeout unchanged
 2. Will increase timeout
 3. Whether it increases SmoothedRTT depends on the deviation.
 4. Whether it increases the timeout depends on the deviation
 5. Will chomp on fries left over from the rdt question earlier

Transport Layer3-3

Q4 TCP timeout

- ❖ A TCP sender maintains a SmoothedRTT of 100ms and DevRTT of 8ms. Suppose the next SampleRTT is 108ms. What is the new value of the timeout in milliseconds? (Numerical question)

$$T_o = \text{SmoothedRTT} + 4 \times \text{DevRTT}$$

$$100\text{ms} + 4 \times 8 = 32$$

$$T_o = 132\text{ms}$$

Transport Layer3-4

Q5 TCP header fields

❖ Which is the purpose of the receive window field in a TCP header?

- A. Reliability
- B. In-order delivery
- C. Flow control
- ☒ D. Congestion control
- E. Pipelining

Indicates to sender how much data receiver can accept

Q6 TCP connection mgmt

❖ Roughly how much time does it take for both the TCP sender and receiver to establish connection state since the connect() call?

- A. ☒ RTT
- B. 1.5RTT
- C. 2RTT
- D. 3RTT

Q10

Ben Bitdiddle's home network connection can upload at 125,000 bytes/second. His router has a 100,000 byte first in first out buffer for packets awaiting transmission.

If the buffer is completely full, how long will it take for the buffer to clear?

- A. 0.4 seconds
- B. 0.6 seconds
- C. 0.8 seconds
- D. 1 second
- E. 1.25 seconds

Q11

Ben Bitdiddle's home network connection can upload at 125,000 bytes/second. His router has a 100,000 byte first in first out buffer for packets awaiting transmission.

At time 0, Ben's client starts sending 1,000 byte packets at 150 packets/s. When will the first packet be dropped by the router?

- A. 2 seconds
- B. 3 seconds
- C. 4 seconds
- D. Buffer will never discard a packet in this case

Transport Layer3-11

Q12

Alyssa P. Hacker and Ben Bitdiddle communicate over a link with capacity of 100 pkts / sec. The latency (RTT) on this link is 100 ms.

If a sliding window protocol with acknowledgement packets is used, and there is a *FIXED* window size of 4 packets, what is the maximum rate of traffic on the link?

- A. 20 pkts / s
- B. 40 pkts / s
- C. 80 pkts / s
- D. 100 pkts /s

Transport Layer3-12

Q9

❖ Which of the following services use TCP?

- DHCP
- ☒ SMTP
- ☒ HTTP
- TFTP
- ☒ FTP

Q8

❖ A sender that underestimates the round-trip time of a connection may unnecessarily induce a TCP timeout

☒ T/F

Q7 TCP reliability

- ❖ TCP uses cumulative ACKs like Go-back-N, but does not retransmit the entire window of outstanding packets upon a timeout. What mechanism lets TCP get away with this?
 - A. Per-byte sequence and ack numbers
 - ☒ B. Triple duplicate ACKs *Indicates packets may be lost*
 - C. Receive window-based flow control
 - D. Using a better timeout estimation method
 - E. Ketchup (for the fries)