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

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.

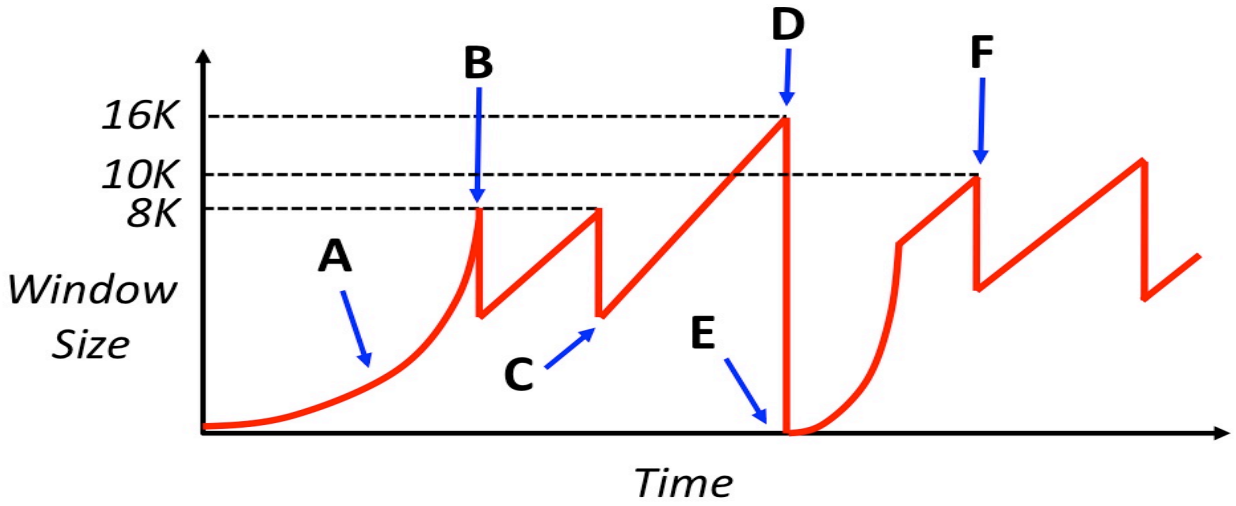
At time 0, Ben's client starts sending 1,000 byte packets at 150 packets/s. When will the first packet be dropped by the router?

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

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.

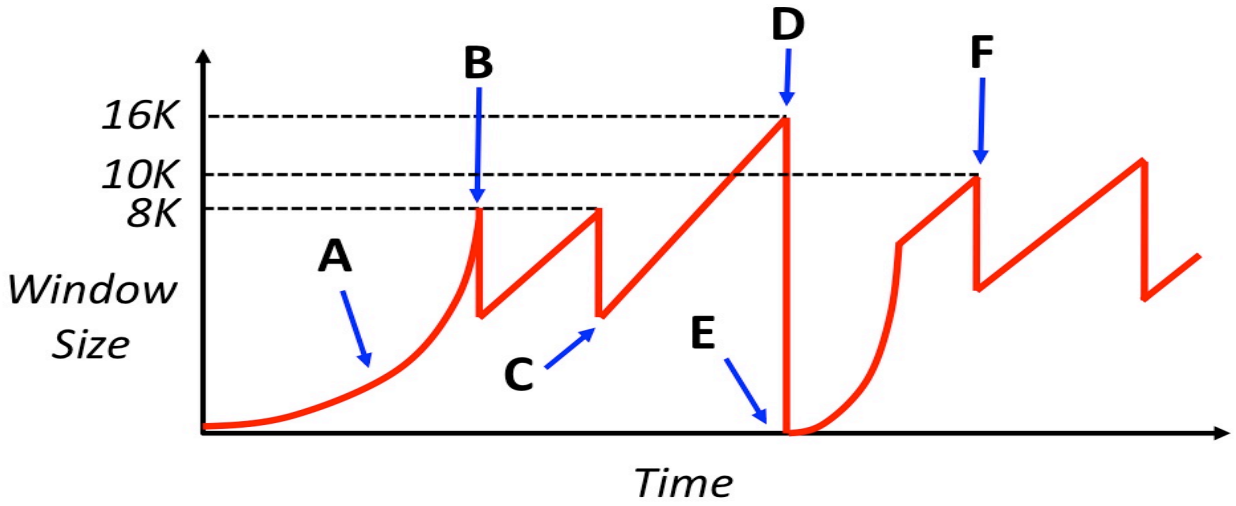
If a sliding window protocol with acknowledgement packets is used, and there is a *FIXED* window size of 4 packets, what is the maximum rate of traffic on the link?

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



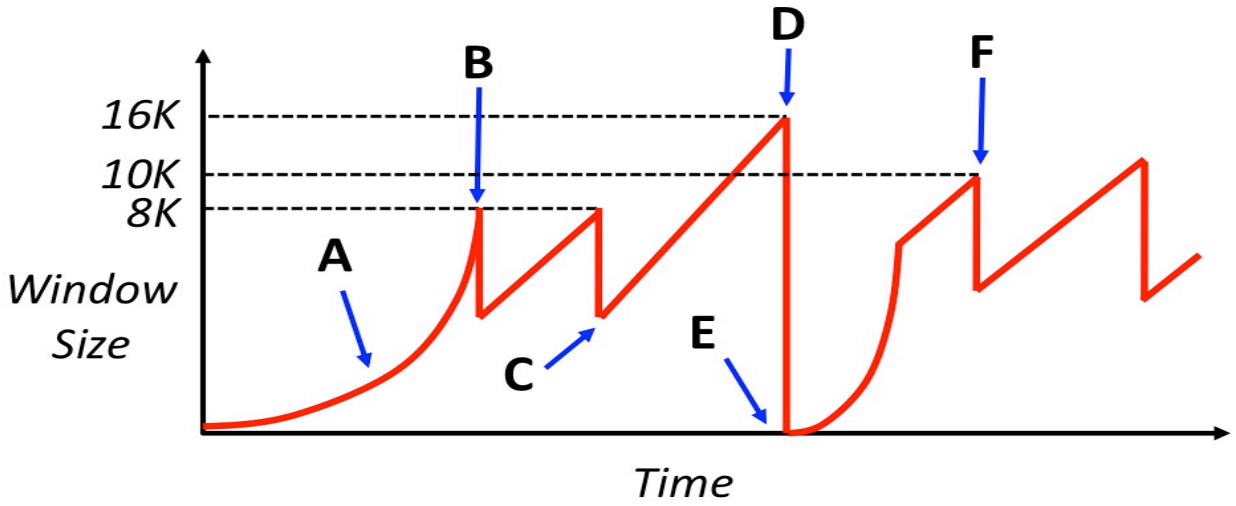
1. Name the event at B which occurs that causes the sender to decrease its window

(a) Triple Duplicate Ack
(b) Slow Start
(c) Packet loss
(d) Time out



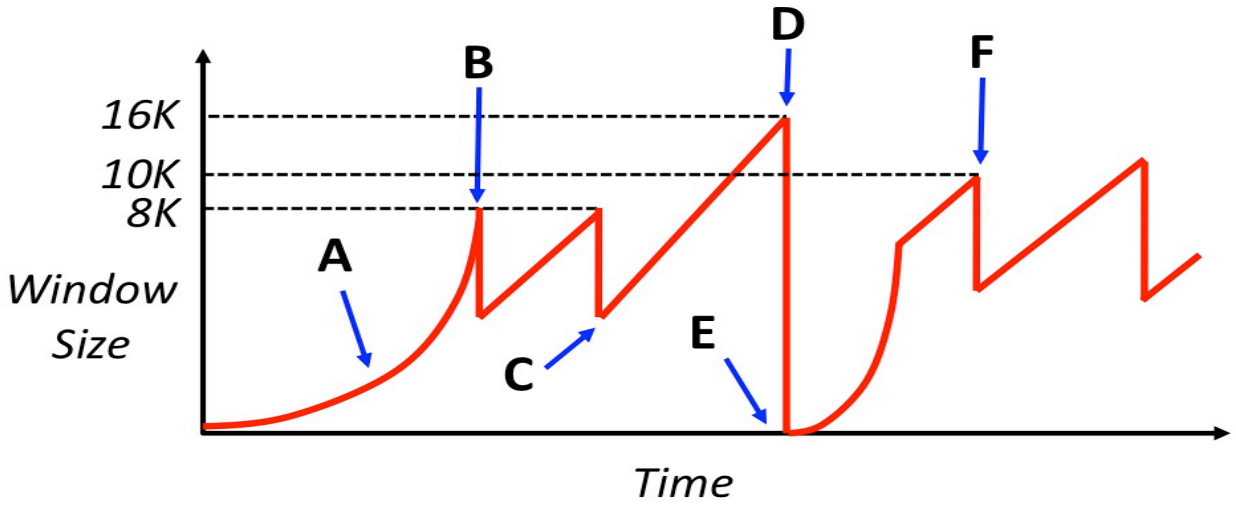
2. Does the event at B necessitate that the network discarded a packet ?

(a) Yes
(b) No
(c) Don't know



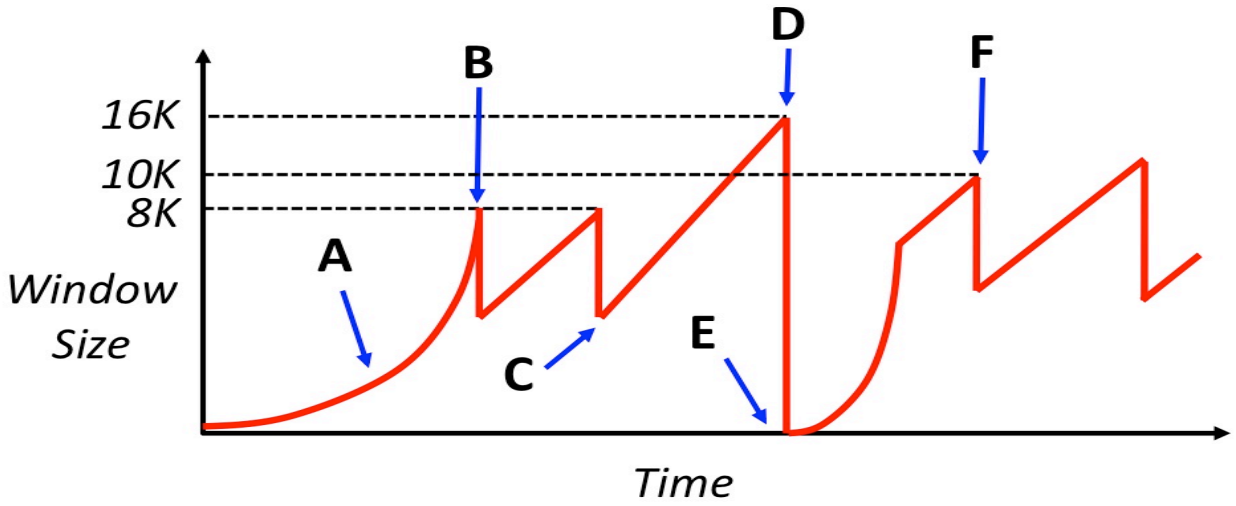
3. Name the event at D which occurs that causes the sender to decrease its window.

(a) Triple Duplicate Ack
(b) Slow Start
(c) Packet loss
(d) Time out



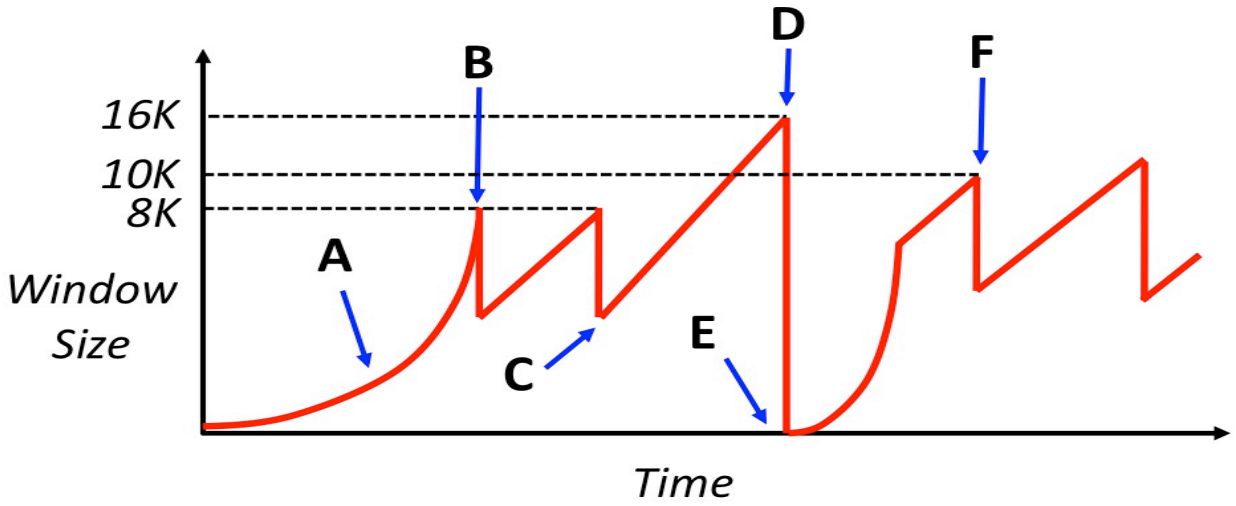
4. Does the event at D necessitate that the network discarded a packet

(a) Yes
(b) No
(c) Don't know

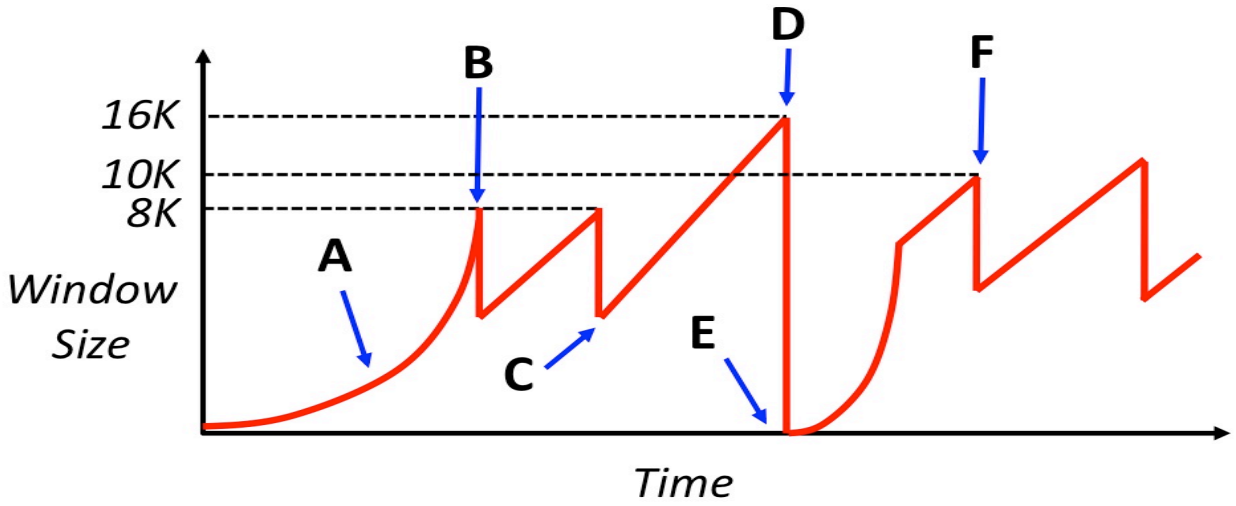


5. For a lightly-loaded network, is the event at D MORE likely or LESS likely to occur when the sender has multiple TCP segments outstanding

(a) MORE
(b) LESS
(c) ALMOST SAME



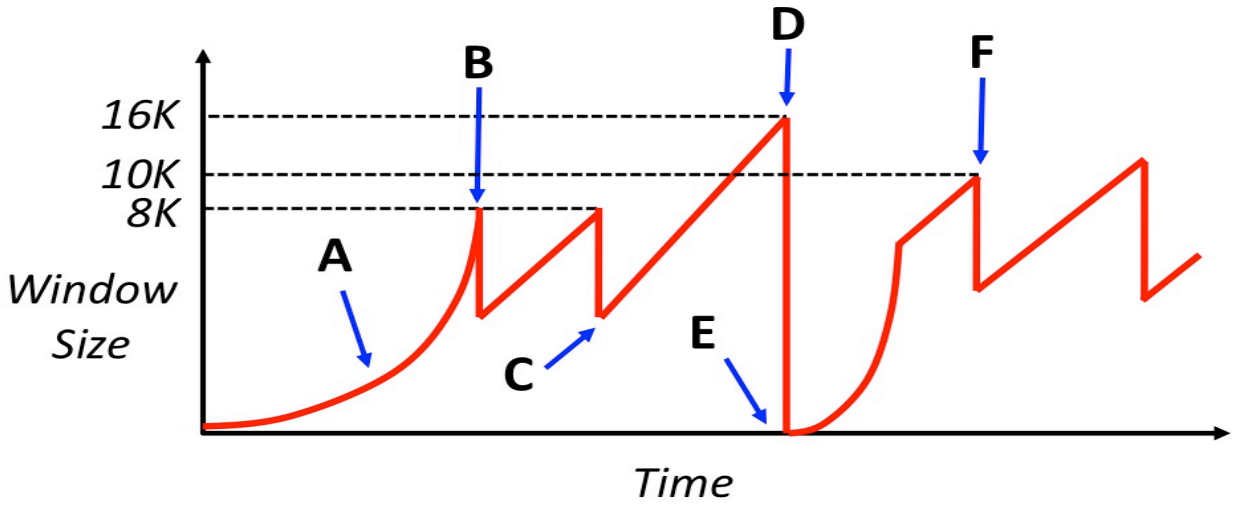
6. Consider the curved slope labeled by point A. Why does the TCP window behave in such a manner, rather than have a linear slope? (Put another way, why would it be bad if region A had a linear slope?)



Assume that the network has an MSS of 1000 bytes and the round-trip-time between sender and receiver of 100 milliseconds.

Assume at time 0 the sender attempts to open the connection.

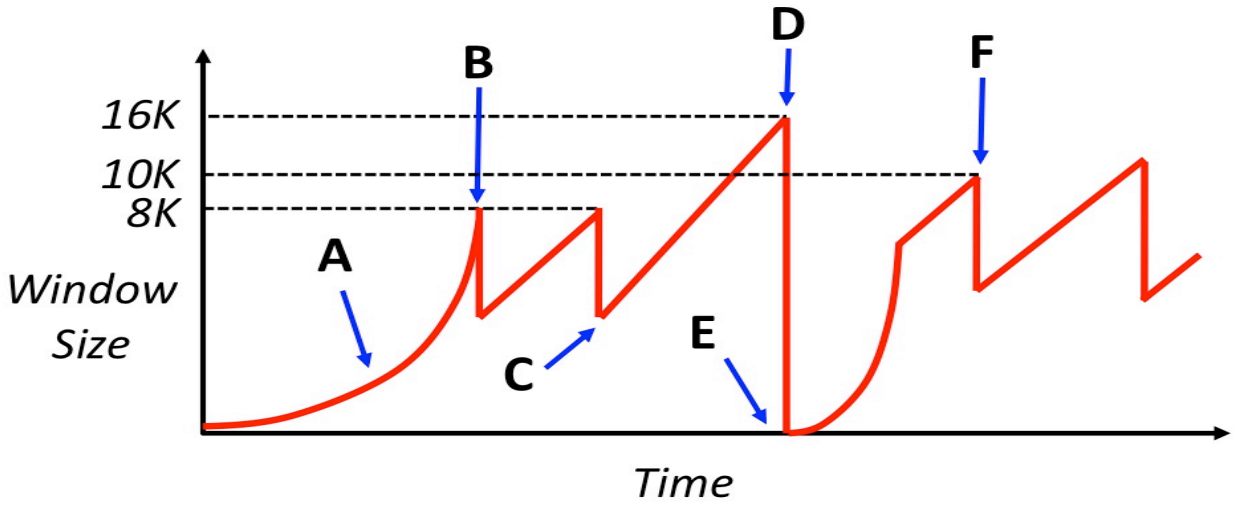
Also assume that the sender can “write” a full window’s worth of data instantaneously, so the only latency you need to worry about is the actual propagation delay of the network.



RTT = 100ms, MSS = 1000 bytes

7. How much time has progressed by point B ?

(a) 200ms
(b) 300ms
(c) 400ms
(d) 600ms
(e) 700ms



RTT = 100ms, MSS = 1000 bytes

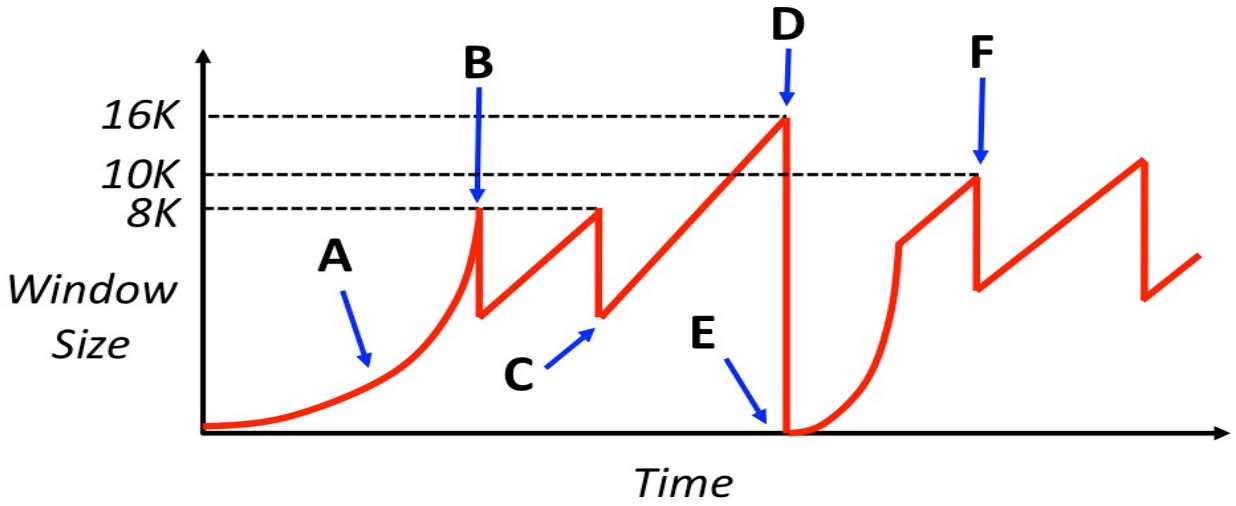
8. How much time has progressed between points C and D?

(a) 800ms

(b) 1000ms

(c) 1200ms

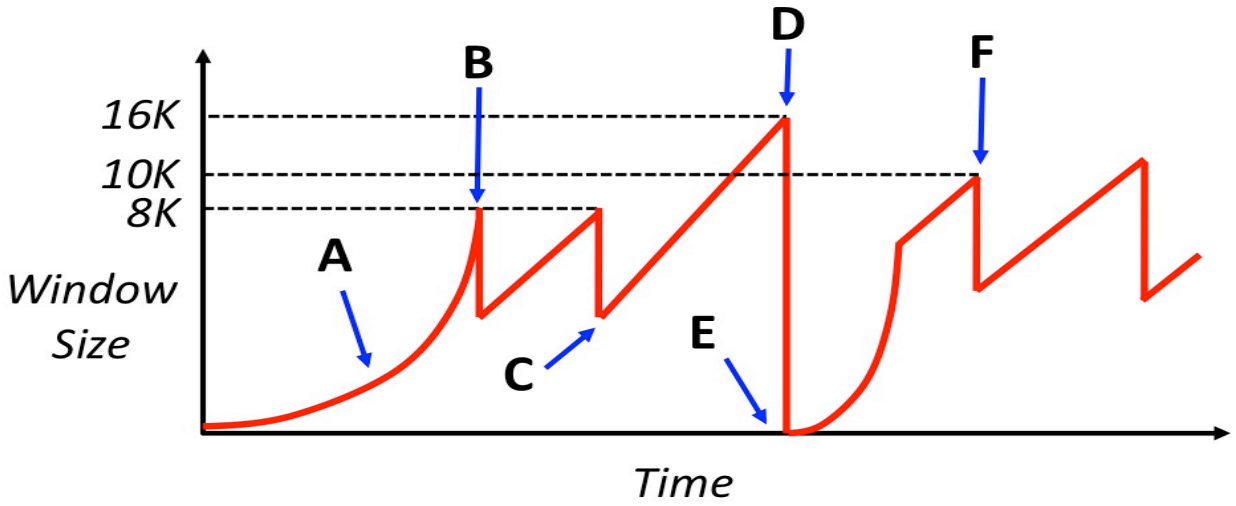
(d) 1400ms



RTT = 100ms, MSS = 1000 bytes

9. How much time has progressed between points E and F?

(a) 400ms
(b) 500ms
(c) 800ms
(d) 900ms



10. If the sender shares its network with other clients whose traffic traverses the same IP routers, give one explanation for why point D is higher than point B?

1 In slow start, a sender doubles its window size every RTT if all sent packets were acknowledged

T/F