1. Packets of the same session may be routed through different paths:

A. TCP, but not UDP
B. TCP and UDP
C. UDP, but not TCP
D. Neither TCP nor UDP

Answer:(B)
Explanation:

Both TCP and UDP use IP, which is a datagram service, as IP datagrams are routed independently to the path. Thus, packets for the same session may be routed through different paths in both TCP and UDP.

2. Imagine a TCP connection is transferring 18000 bytes of data. The first byte is the sequence number 1001. Find the sequence number of the second last segment sent if data are sent in 10 segments with the first 8 segments carrying 2000 bytes and the last two-segment carrying 1000 bytes.

A) 18000 B) 17001 C) 18001 D) 19000

Answer:(B)
Explanation:

1st segment: 1001 to 3000 (1001+1999=3000)
2nd segment: 3001 to 5000
3rd segment: 5001 to 7000
4th segment: 7001 to 9000
5th segment: 9001 to 11000
6th segment: 11001 to 13000
7th segment: 13001 to 15000
8th segment: 15001 to 17000
9th segment: 17001 to 18000(17001 + 999 = 18000)
10th segment: 18001 to 19000

3. Suppose the congestion window size of a TCP connection is 16 KB when a timeout occurs. The round trip time of a connection is 50 ms, and the maximum segment size is 2 KB. The time taken by TCP connection to get back to the 16 KB congestion window is _____?

A) 300 ms B) 600 ms C) 1000 ms D) 800 ms

Answer:(A)
Explanation:

Given the congestion window size is 16KB and RTT = 50ms,
Maximum Segment Size = 2 KB.
When Time Out occurs, Threshold = Size of congestion window / 2 = 16 KB / 2 = 8 KB
The initial phase is the slow start phase, and it grows exponentially, i.e.,

2KB | 4KB | 8KB (Threshold) | 10KB | 12KB | 14KB | 16KB
=> # of | = 6
Therefore, # of RTT = 6

So, the total number of RTT is 6 x 50 ms ==>> 300 msec.

4. Which of the following statements are true about the Congestion window?[MSQ]

A) The sender should not send data greater than the congestion window size.

B) The sender should always send data that is less than or equal to the congestion window size.

C) The congestion window is known only to the sender and is not sent over the links.

D) The sender should send data greater than the congestion window size.

Answer:(A,B,C)
Explanation:

All the statements are correct except option D
BCZ
The sender should not send data greater than the congestion window size. Otherwise, it leads to the dropping of the TCP segments, which causes TCP retransmission.

5. Which of the following statements are true about the Slow Start Phase?[MSQ]

A) Initially, the sender sets congestion window size = Maximum Segment Size.

B) In this phase, the size of the congestion window increases exponentially.

C) The sender increases the congestion window size linearly to avoid congestion.

D) This phase continues until the congestion window size reaches the slow start threshold.

Answer:(A,B,D)
Explanation:

All the statements are correct except Option C.

BCZ After reaching the threshold, the Sender increases the congestion window size linearly to avoid congestion. It happens in the Congestion Avoidance Phase.

6. Does the growth of the congestion window take place?

A) Infinitely

B) Up to Threshold

C) Up to the size of the receiver's window

D) Up to timeout

Answer:(C)
Explanation:

The growth of the congestion window is up to the size of the receiver's window.

7. Consider the effect of using a slow start on a line with a 10 msec RTT and no congestion. The receiver window is 24 KB, and the maximum segment size is 2 KB. How long does it take before the first full window can be sent?

A) 90 msec B) 60 msec C) 70 msec D) 80 msec

Answer:(A)
Explanation:
Given-
Receiver window size = 24 KB, Maximum Segment Size = 2 KB, RTT = 10 msec,
Slow start Threshold = Receiver window size / 2 = 24 KB / 2 = 12 KB

2KB (1st transmission) | 4KB | 8KB | 12KB
(Since the threshold is reached, so it marks the end of the slow start phase. Now, the congestion avoidance phase begins.) | 14KB | 16KB | 18KB | 20KB | 22KB | 24KB(10th transmission)
=> # of | = 9
Therefore, # of RTT = 9
The window size at the end of the 10th transmission is 24KB.
So, the Time taken before the first full window is sent = 9 x 10 msec = 90 msec.

8. Suppose that the TCP congestion window is set to 18 KB and a time-out occurs. How big will the window be if the next four transmission bursts are all successful? Assume that the MSS is 1 KB.[MSQ]

A) 9 MSS B) 9 KB C) 10 MSS D) 10 KB

Answer:(A, B)
Explanation:

Congestion window size in terms of MSS
= 18 KB / Size of 1 MSS = 18 KB / 1 KB = 18 MSS
Slow start threshold = 18 MSS / 2 = 9 MSS, Congestion window size = 1 MSS
Window size at the start of 1st transmission = 1 MSS
Window size at the start of 2nd transmission = 2 MSS
Window size at the start of 3rd transmission = 4 MSS
Window size at the start of 4th transmission = 8 MSS
Window size at the start of 5th transmission = 9 MSS

Thus, after 4 successful transmissions, the window size will be 9 MSS or 9 KB.

9. On a TCP connection, the current congestion window size is 4 KB. The window advertised by the receiver is 6 KB. The last byte sent by the sender is 10240, and the last byte acknowledged by the receiver is 8192. The current window size at the sender is ____.?

A) 2048 B B) 4096 B C) 6144 B D) 8192 B

Answer:(B)
Explanation:

Sender window size
= Min (Congestion window size, Receiver window size)
= Min(4KB , 6KB) = 4 KB
= 4096 B

10. On a TCP connection, the current congestion window size is 4 KB. The window advertised by the receiver is 6 KB. The last byte sent by the sender is 10240, and the last byte acknowledged by the receiver is 8192. The amount of free space in the sender window is ____.?

A) 2048 B B) 4096 B C) 6144 B D) 8192 B

Answer:(A)
Explanation:
Given- The last byte acknowledged by the receiver = 8192
The last byte sent by the sender = 10240

This means that bytes from 8193 to 10240 are still present in the sender's window.
These bytes are waiting for their acknowledgement.
Total bytes present in sender's window = 10240 – 8193 + 1 = 2048 bytes.

Amount of free space in the sender's window currently = 4096 bytes – 2048 bytes
= 2048 bytes
This indicates that half of the sender's window is currently empty.