

Stage Test for Computer Network

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Date: November 9, 2022

Name: _____

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I. Acronyms match the acronyms to the questions, using each acronym once: Congestion Control, CNAME, FIN, Flow Control, IEEE, RFC, RST, TCP, TLD, UDP. (10 points, 2.5 points for each item)

- 1) The most widely used reliable transport protocol.
- 2) A control flag used to terminate a TCP connection abruptly.
- 3) How the sender keeps from overloading the receiver in a TCP connection.
- 4) Congestion control is an algorithm used to adjust the number of packets sent at a time on a Transmission Control Protocol (TCP) connection

Answer: 1) _____ 2) _____ 3) _____
4) _____

II. Single choice. (30 points, 6 points for each item)

(1) Assuming that the application layer of OSI reference model wants to send 400B data (without splitting), and all layers except physical layer and application layer add 20B extra cost when encapsulating Protocol Data Unit (PDU), then the data transmission efficiency of application layer is about ().

- | | |
|--------|--------|
| A. 80% | B. 83% |
| C. 87% | D. 91% |

(2) With Go-back-N (GBN) protocol, the sender has sent the frame with the number of 0-7. If the sender only receives confirmation of frame 0, 2 and 3 when the timer is overtime, the number of frames that the sender needs to resend is ().

- | | |
|------|------|
| A. 2 | B. 3 |
| C. 4 | D. 5 |

(3) Host A sends a TCP segment (SYN=1, seq=11220) to Host B. It is expected to establish a TCP connection with Host B. If Host B accepts the connection request, the correct TCP segment sent by Host B to Host A may be ().

- A. (SYN=0, ACK=0, seq=11221, ack=11221)
- B. (SYN=1, ACK=1, seq=11220, ack=11220)
- C. (SYN=1, ACK=1, seq=11221, ack=11221)
- D. (SYN=0, ACK=0, seq=11220, ack=11220)

(4) A TCP connection always sends a TCP segment with a maximum segment size (MSS) of 1KB. The sender has enough data to send. When the congestion window is 16KB, a timeout occurs. If the transmission of TCP segments in the next four RTT times are successful, then when all TCP segments sent in the fourth RTT

- (5) Host **A** and **B** have established a TCP connection. **A** always sends data in segments with **MSS=1KB**, and there is always data to send; **B** will send an **ack** segment with a **receive window of 10KB** each time it receives a data segment. If the congestion window is **8KB** when A times out at time **t**, then from time **t**, when the time out does not occur again, after **10 RTTs**, A's sending window is ().

- III. Decide true or false (T or F).** (10 points, 2.5 points for each item)

- 2) In TCP, the sender window can be the same size as the receiver window. ()

- 4) A and B have established a TCP connection. When A receives an ack segment with an ack number of 100, it means that the segment with the last byte sequence number of 99 has been received. ()

IV. Comprehensive problems. (36 points)

1. The information (in hexadecimal) of a UDP header is in Table 1. The format of UDP datagram is shown in the Figure 2. Please answer the following questions: (8 points)

Table 1: the information (in hexadecimal) of a UDP header

Number	1	2	3	4	5	6	7	8
Data	F7	21	00	45	00	2C	E8	27

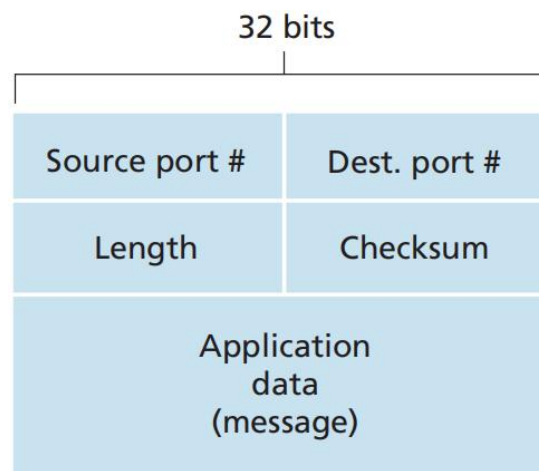


Figure 2: the format of UDP datagram

- 1) What are the source port and destination port? (4 points)
- 2) What are the total length of datagram and the length of application data (message) respectively? (4 points)

2. Host A sends three TCP message segments to host B based on TCP. The sequence number of the first segment is 90, the sequence number of the second segment is 120, and the sequence number of the third segment is 150. (8 points)

- 1) How much data is in the first and second message segments? (4 points)
- 2) Suppose that the second segment is lost and the other two segments arrive at host B, what is the acknowledgement number in the acknowledgement message sent by host B to host A? (4 points)

3. Assuming TCP Reno is the protocol experiencing the behavior shown in Figure 3, answer the following questions. (20 points)

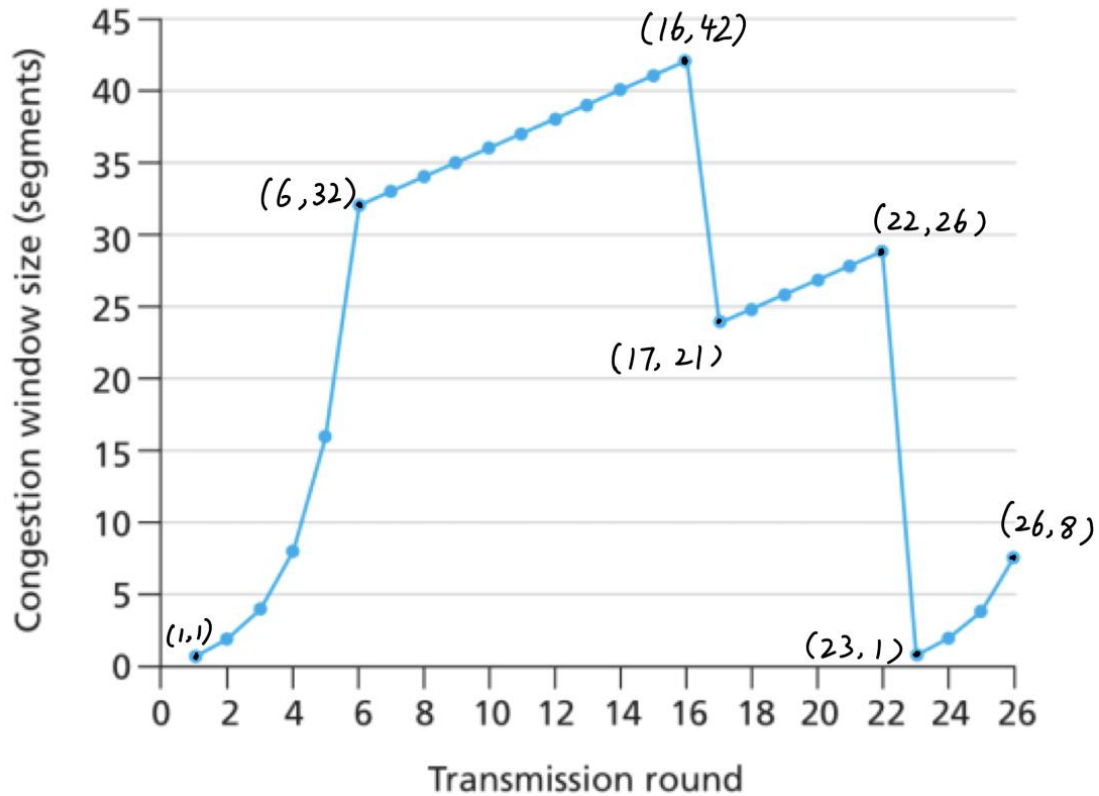


Figure 3: TCP window size as a function of time

- 1) What is the initial value of ssthresh at the first transmission round? (2 points)
- 2) What is the value of ssthresh at the 18th transmission round? (2 points)
- 3) What is the value of ssthresh at the 24th transmission round? (2 points)
- 4) During what transmission round is the 70th segment sent? (2 points)
- 5) Assuming a packet loss is detected after the 26th round by the receipt of a triple duplicate ACK, what will be the value of the congestion window size and the value of ssthresh? (4 points)
- 6) Suppose TCP Tahoe is used (instead of TCP Reno), and assume that triple duplicate ACKs are received at the 16th round. What are the value of the congestion window size and the value of ssthresh at the 19th round? If there is a timeout event at 22nd round, how many packets have been sent out from 17th round till 22nd round? (8 points)