



### TCP/IP Networking, 2018, Quiz 3

Use the separate answer sheet to return your answers. Do not return this sheet. We recommend that you first write your tentative answers on this sheet. In a second phase, when you are certain about your answers, you can mark them on the answer sheet.

For each question there is exactly one correct answer. If the good answer and only the good answer box is marked  $\Rightarrow +1$  point. If one bad answer box is marked and no other box is marked  $\Rightarrow -\frac{1}{3}$  point. If 0 or more than 1 answer box is marked  $\Rightarrow 0$  point.

**Question 1** One source  $S$  sends data to one IP multicast group  $m$ . Say what is true.

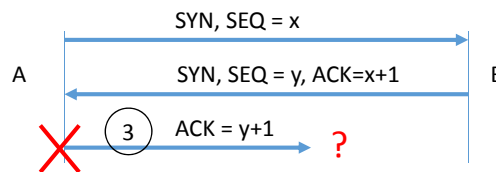
1. In order to be able to send to  $m$ ,  $S$  needs to join the multicast group  $m$  by using IGMP/MLD.
2. If there are receivers of multicast group  $m$  in different subnets,  $S$  needs to send multiple copies of every packet, one per destination subnet.

- |   |   |
|---|---|
| <input type="checkbox"/> A 1 and 2.         | <input type="checkbox"/> C 2 and not 1. |
| <input type="checkbox"/> B Neither 1 nor 2. | <input type="checkbox"/> D 1 and not 2. |

**Question 2**  $A$  sends data to  $B$  using a sliding window protocol with window size  $W$  bits. The available bit-rate from  $A$  to  $B$  is  $c$  bits per second (full duplex) and the round-trip time is  $\tau$  seconds. What is the throughput that can be achieved by  $A$  if there is no loss ?

- |   |   |
|---|---|
| <input type="checkbox"/> A $\frac{1}{2} (c + \frac{W}{\tau})$ | <input type="checkbox"/> C $\min(c, \frac{\tau}{W})$          |
| <input type="checkbox"/> B $\min(c, \frac{W}{\tau})$          | <input type="checkbox"/> D $\frac{1}{2} (c + \frac{\tau}{W})$ |

**Question 3** The ACK marked as ③ in the figure is expected by  $B$  but is never received by  $B$  because  $A$  is malicious and does not intend to use the TCP connection. In which case does  $B$  retransmit the SYN-ACK ?



- |   |
|---|
| <input type="checkbox"/> A If $B$ does not implement SYN cookies. |
| <input type="checkbox"/> B If $B$ implement SYN cookies.          |
| <input type="checkbox"/> C In both cases.                         |
| <input type="checkbox"/> D In neither case.                       |

**Question 4** A sensor sends messages 1,2,3,4,5, in this order, to a controller, using TCP. Message 2 is lost during transmission. At time  $t$ , messages 1,3,4,5 were received by TCP at the controller, and message 2 is missing. Immediately after time  $t$ , the controller attempts to read as many messages as possible. Which messages will the controller be able to read ?

- |   |
|---|
| <input type="checkbox"/> A Message 1 only.  |
| <input type="checkbox"/> B Messages 1,3,4,5.  |
| <input type="checkbox"/> C With IPv6: messages 1,3,4,5; with IPv4: only message 1.  |
| <input type="checkbox"/> D With IPv4:y messages 1,3,4,5; with IPv6: only message 1. |



**Question 5** Say what is true about TCP.

1. With Fast Retransmit, the reception of at least  $n$  duplicate ACKS triggers a retransmission, where  $n$  is a pre-configured number.
2. Fast Retransmit detects all losses if the Retransmit Timer is much larger than the round trip time.

A Neither 1 nor 2.  
 B 1 and 2.

C 2 and not 1.  
 D 1 and not 2.

**Question 6** Say what is true.

1. A system can detect whether an IP packet is multicast by analyzing its IP destination address.
2. With source specific multicast, a receiver that joins by using IGMP/MLD needs to specify both the IP unicast address of the source and the IP multicast address of the group.

A 1 and 2.  
 B Neither 1 nor 2.

C 1 and not 2.  
 D 2 and not 1.

**Question 7** An application program at host  $A$  sends one single message of 2000 bytes to a program at  $B$ , using TCP (the logic of the application is such that a single message needs to be sent).  $B$  knows that a single message is sent by  $A$  but it does not know the actual size of the message. The application program at  $A$  opens a TCP connection to  $B$  and then sends this message by performing one single `send()` operation. The program at  $B$  accepts the incoming TCP connection request and then performs one single `read()`. At this point in time, can  $B$  be sure that it has received the entire message ?

A No with IPv4, yes with IPv6.  
 B Yes.

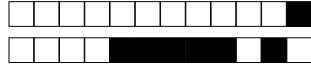
C No with IPv6, yes with IPv4.  
 D No.

**Question 8** A network path is subject to packet losses. Which method of repairing losses is more efficient, i.e. provides the larger capacity for the end-to-end path ?

- A Hop-by-hop, i.e. intermediate systems detect packet losses locally and retransmit.  
 B End-to-end, i.e. the source detects packet losses and retransmits.  
 C Both provide the same capacity.  
 D End-to-end is more efficient with IPv4 and hop-by-hop is more efficient with IPv6.

**Question 9** A web client application sends one query to a DNS server using UDP. The message is lost by the network. Say which is true.

- A The web client application will detect the loss and will retry.  
 B The DNS server will detect the loss and will ask the web client to retry.  
 C This is not possible because UDP is message-oriented.  
 D UDP will detect the loss and retransmit.



**Question 10** *A* sends data to *B* using a TCP connection. The window size is 4000 bytes. All data up to byte number 10 000 were acked by *B* i.e., the last ACK received by *A* is 10 001. *A* sends 4 packets of 1000 bytes each, starting with sequence number 10 001. Then *A* receives from *B* a TCP segment with ACK = 11 001 and SACK = 12 001 - 14 001. At this time, TCP at *A* does not yet declare that there is a loss. Furthermore, *A* has a large number of new data to transmit (“new data” means data with sequence number  $\geq 14 001$ ). Since TCP at *A* did not yet detect the loss, it decides to transmit new data. How much new data may now be transmitted by TCP at *A* ?

- A 4000 bytes starting from sequence number 14 001.
- B 2000 bytes starting from sequence number 14 001.
- C 1000 bytes starting from sequence number 14 001.
- D 3000 bytes starting from sequence number 14 001.



+1/4/57+



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This is the answer sheet: all answers are to be marked on this page to be taken into account. Do not return the other sheets.

To mark a box, please make it completely dark (a cross is not sufficient):

Do:

**Question 1:**  A  B  C  D

Don't:

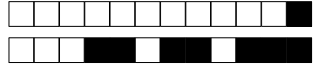
**Question 1:**  A  B  C  D

0	0	0	0	0	0
1	1	1	1	1	1
2	2	2	2	2	2
3	3	3	3	3	3
4	4	4	4	4	4
5	5	5	5	5	5
6	6	6	6	6	6
7	7	7	7	7	7
8	8	8	8	8	8
9	9	9	9	9	9

← Please encode your SCIPER number here and write your full name in the box below. ↓

Name, First Name: .....
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- Question 1:  A  B  C  D
- Question 2:  A  B  C  D
- Question 3:  A  B  C  D
- Question 4:  A  B  C  D
- Question 5:  A  B  C  D
- Question 6:  A  B  C  D
- Question 7:  A  B  C  D
- Question 8:  A  B  C  D
- Question 9:  A  B  C  D
- Question 10:  A  B  C  D



+1/6/55+