

## TCP/IP Networking, 2018, Quiz 7

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 every question there is exactly one correct answer. For all questions except the last one: 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** In a fully connected network, which of the following algorithms always converge to the correct distance regardless of initial conditions ? We assume there is no link failure during the computation.

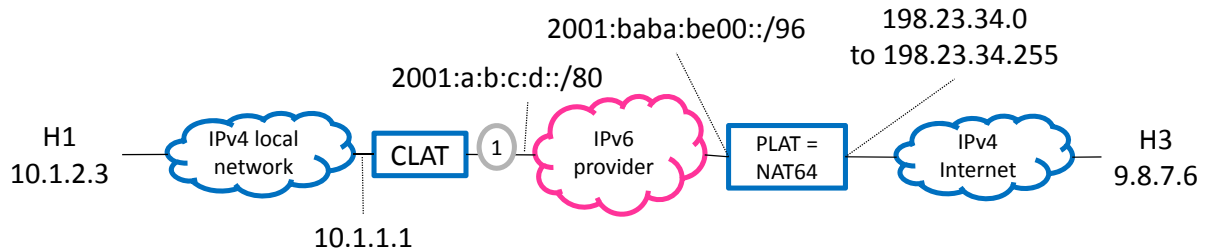
- |   |  |
|---|--|
| <input type="checkbox"/> A centralized Bellman-Ford but not distributed Bellman-Ford. | <input type="checkbox"/> C neither centralized nor distributed Bellman-Ford.         |
| <input type="checkbox"/> B distributed Bellman-Ford but not centralized Bellman-Ford. | <input checked="" type="checkbox"/> D both centralized and distributed Bellman-Ford. |

**Question 2** The DNS server of EPFL changes the IPv4 address of `ssc.epfl.ch`. How will DNS servers outside EPFL learn the new address ?

- A The DNS server of EPFL sends a DNS-UPDATE to the DNS servers of the domain `.ch`, who then in turn send a DNS-UPDATE to the root DNS servers.
- B After expiration of the TTL in the cached record, by contacting the EPFL DNS server.
- C The DNS server of EPFL sends a DNS-UPDATE to the DNS servers of the domain `.ch`, who then in turn send a DNS-UPDATE to all DNS servers who cached the records of `ssc.epfl.ch`.
- D Never, because only the DNS servers of EPFL keep a copy of this record and the other servers don't need to be informed.

**Question 3** Both H1 and H3 are IPv4-only hosts. H1 and H3 communicate via IPv6 using 464XLAT, as shown on the figure. The address block 2001:a:b:c:d::/80 is allocated to the CLAT to represent hosts such as H1. The address block 2001:baba:be00::/96 is used by PLAT to represent the IPv4 internet. The block 198.23.34/24 is used by PLAT to represent hosts such as H1.

H1 sends one UDP message that fits in one IPv4 packet to H3; we observe the IP packet resulting from this at observation point 1. Say which is true for this IP packet.

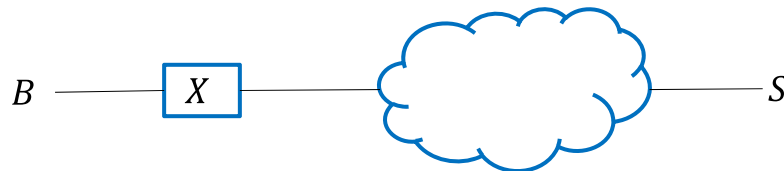


- A It is an IPv4 packet and its IP destination address is 9.8.7.6.
- B It is an IPv6 packet and its “NEXT HEADER” field is equal to 4 (i.e. its payload is an encapsulated IPv4 packet).
- C It is an IPv6 packet and its IP destination address is 2001:baba:be00::908:706.
- D It is an IPv4 packet and its IP destination address is an IPv4 address in the range 198.23.34.0 to 198.23.34.255.

**Question 4** May a router re-assemble the fragments of a fragmented IP packet ?

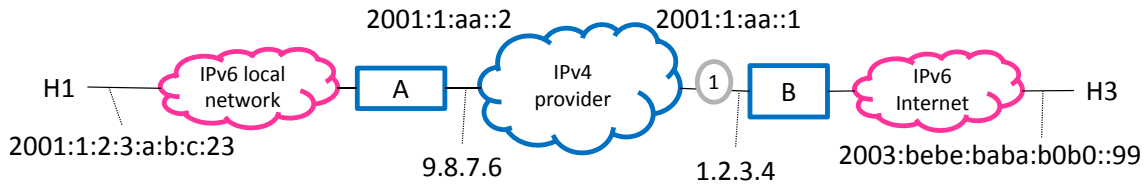
- A Yes with IPv4, yes with IPv6.  C Yes with IPv4, no with IPv6.
- B No with IPv4, no with IPv6.  D No with IPv4, yes with IPv6.

**Question 5** Bart (*B*) opens one single TCP connection in order to download one file using HTTP from the server *S*. The server *S* uses a single TCP connection to perform the transfer, and so does Bart’s device. However, there is a middlebox *X* in-between. How many TCP connections are involved in the transfer of the file ? *X* is either a NAT or a web proxy; the cloud represents switches and routers.



- A 1 when *X* is a NAT, 2 when *X* is a web proxy.
- B 2 when *X* is a NAT, 2 when *X* is a web proxy.
- C 1 when *X* is a NAT, 1 when *X* is a web proxy.
- D 2 when *X* is a NAT, 1 when *X* is a web proxy.

**Question 6** Both H1 and H3 are IPv6-only hosts. They communicate via IPv6, however H1's local router A does not have native IPv6 access on its wide-area side. Instead, A receives IPv4 public access and uses a tunnel broker: A is the tunnel client and B is the tunnel server (see figure). The IPv6 address at A's end of the tunnel is 2001:1:aa::2 and the IPv6 address at B's end of the tunnel is 2001:1:aa::1.



H1 sends one UDP message that fits in one IPv4 packet to H3. We observe the IP packet resulting from this at observation point 1. Say which is true.

1. We see an IPv4 packet with "PROTOCOL" field equal to 41 (i.e. its payload is an encapsulated IPv6 packet).
2. The IPv4 destination address is 1.2.3.4

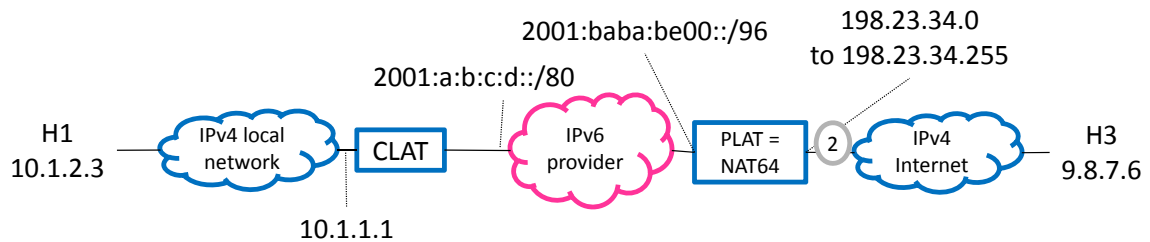
Both.       2 and not 1.       1 and not 2.       None.

**Question 7** May a router fragment an IP packet ?

- Yes with IPv4, no with IPv6.       Yes with IPv4, yes with IPv6.  
 No with IPv4, no with IPv6.       No with IPv4, yes with IPv6.

**Question 8** Both H1 and H3 are IPv4-only hosts. H1 and H3 communicate via IPv6 using 464XLAT, as shown on the figure. The address block 2001:a:b:c:d::/80 is allocated to the CLAT to represent hosts such as H1. The address block 2001:baba:be00::/96 is used by PLAT to represent the IPv4 internet. The block 198.23.34/24 is used by PLAT to represent hosts such as H1.

H1 sends one UDP message that fits in one IPv4 packet to H3; at H1, the source port number is 3333 and the destination port number is 1212. We observe the IP and UDP packet headers for the packet resulting from this at observation point 2. Say which is true.



- A The source port number must be 3333 but the destination port number can be different from 1212.
- B The source port number can be different from 3333 and the destination port number can be different from 1212.
- C The source port number must be 3333 and the destination port number must be 1212.
- D The source port number can be different from 3333 but the destination port number must be 1212.

**Question 9** Lisa downloads a web page from an https URL using QUIC over a single QUIC connection. After the initial QUIC/TLS handshake, the transfer of the web page starts. The page contains multiple objects; the web server implementation uses one QUIC stream per object. One QUIC packet is lost during the transfer; this packet contains stream data of the first object of the page and no stream data of other objects; no other packet is lost in either direction. May it happen that the second object is displayed on Lisa's screen before the loss is repaired ?

- A No, because the second and following objects must wait until the loss is repaired and the transfer of the first object is completed.
- B It depends whether the transfer is over IPv4 or IPv6.
- C Yes.
- D It depends whether ECN is used.

**Question 10** A router  $R$  performs proxy ARP for all IPv4 addresses in the range 2.2.0.0 to 2.2.255.255. A host  $H$ , onlink with  $R$ , sends an ARP request for the IPv4 address 2.2.3.4.

- A  $R$  responds with its own MAC address.
- B  $R$  should not respond to  $H$ .
- C  $R$  responds with the broadcast MAC address.
- D  $R$  responds with the MAC address of the system that has IP address 2.2.3.4.

CORRECTED

**Question 11** In Breton, “Merry Christmas” is

A Craciun Fericit

C Feliçan Kristnaskon

B Bon Nadal

D Nedeleg Laouen

(This question is not graded !)

CORRECTED

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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
- Question 11:  A  B  C  D

This was your last quiz with us. As a small sweetening for the pain endured, don't forget to help yourself to some Christmas cookies at the door when leaving the room !

CORRECTED