
Question 1: If all the links in the Internet guaranteed reliable delivery, why would TCP's reliable delivery **not** be redundant?

- A Because packet loss can still occur at the IP layer due to routing loops or equipment failures.
- B Because link-layer reliability only provides benefits to unreliable **transport protocols**.
- C Because link-layer reliability only provides benefits to unreliable **network protocols**.
- D Because TCP's reliable delivery provides error correction in addition.

Question 2: Regarding the total number of possible MAC, IPv4, and IPv6 addresses. Which statement is correct?

- A IPv4 < MAC < IPv6
- B MAC < IPv4 < IPv6
- C IPv4 < IPv6 < MAC
- D the maximum number is limited by the number of MAC addresses, regardless of the used IP version

Question 3: Consider two hosts: **A** (MAC address 1A:1A:1A:1A:1A:1A, IP address 10.0.0.1) and **B** (MAC address 2B:2B:2B:2B:2B:2B, IP address 10.0.0.2) that are both connected to different ports of **switch S** (MAC address 1F:1F:1F:1F:1F:1F). Additionally, assume that the ARP tables of both hosts are empty. When **host A** wants to initiate a TCP/IP connection with **host B**:

- A it sends an ARP packet with destination MAC address FF:FF:FF:FF:FF:FF.
- B it sends an ARP packet with destination MAC address 2B:2B:2B:2B:2B:2B.
- C it sends a TCP SYN packet with destination IP address 10.0.0.2.
- D it asks switch S for B's MAC address by sending sends an ARP packet with destination MAC address 1F:1F:1F:1F:1F:1F.

Question 4: Assume that **host B** (IP address 10.0.0.2) is connected to a local network via a switch. Host B has received an **ARP packet with source IP** address 10.0.0.1, **source MAC** address 1A:1A:1A:1A:1A:1A, and **destination MAC** address FF:FF:FF:FF:FF:FF. How does host B react?

- A It sends an ARP packet with destination MAC address 1A:1A:1A:1A:1A:1A and destination IP address 10.0.0.1.
- B It sends an ARP packet with destination MAC address 1A:1A:1A:1A:1A:1A and destination IP address 10.0.0.2.
- C It sends an ARP packet with destination MAC address FF:FF:FF:FF:FF:FF and destination IP address 10.0.0.1.
- D It does nothing and silently discards the received ARP packet.

Question 5: Suppose nodes A, B, and C each attach to the same **broadcast LAN** through their adapters. If A sends thousands of **IP datagrams** to B with each encapsulating frame addressed to the MAC address of B, will C's adapter process, or inspect, these frames?

- A Yes, it will, but it **will not** pass the IP datagrams to the network layer of C.
- B Yes, it will, and it **will** pass the IP datagrams to the network layer of C.
- C It will only process the first frame, but not the following ones.
- D No, it will not process, or inspect, any of these frames because the MAC address will not match.

Question 6: Consider two **hosts A** and **B** that are both connected to different ports of **switch S**. Assume that the two hosts have **already established a TCP connection** between each other. What happens at the switch each time a packet from host A to host B arrives?

- A The switching table is consulted to determine the port to which the packet's **destination MAC** address is attached.
- B The switching table is consulted to determine the port to which the packet's **destination IP** address is attached.
- C The switching table is consulted to determine the port to which the packet's **destination MAC** address is attached and reduces the time-to-live field in the packet by 1.
- D The switching table is consulted to determine the port to which the packet's **destination IP** address is attached and reduces the time-to-live field in the packet by 1.

Question 7: When a host retrieves a web page from www.ntnu.no, what is the **source MAC address** in the frames **received** by the web server?

- A the MAC address of **the host**.
- B the MAC address of **the interface of the router** in the subnet towards the **host**.
- C the MAC address of **the interface of the router** in the same subnet as the **web server**.
- D the MAC address of **the router** in the same subnet as the **host**.

Question 8: If all the links in the Internet implemented flow control, would TCP's flow control be redundant?

- A It **would not** be redundant because flow control in TCP considers the receiver's window, which can be smaller.
- B It would be redundant because the sender would already be limited to the link's capacity.
- C It would be redundant because the link layer can set ECN bits to inform TCP about congestion.
- D It **would not** be redundant because TCP also uses it to prevent network congestion.

Question 9: Hosts A and B are on different IP subnets, connected by a single router R.

- A: 10.0.0.11/24, default gateway 10.0.0.1 (R's MAC on A's LAN = RA:...)
- B: 10.0.1.22/24, default gateway 10.0.1.1 (R's MAC on B's LAN = RB:...)

All ARP caches are empty. A initiates a TCP connection to B (10.0.1.22). Which action happens first on the wire, and why?

- A** No ARP is needed because routing uses IP only.
- B** A broadcasts an ARP Request on its LAN for 10.0.0.1 to learn the default gateway's MAC before sending the first IP packet to B.
- C** A broadcasts an ARP Request for 10.0.1.22 across both LANs to learn B's MAC directly.
- D** The router broadcasts an ARP Request for 10.0.1.22 before A sends anything.

Question 10: Switch S connects hosts A, B, and C on the same Ethernet LAN. S's MAC table is empty. A already knows B's MAC (from a prior ARP) and sends an Ethernet frame to B. What does S do with this first frame, and what does C observe?

- A** S drops the frame because the destination MAC is not yet in the table.
- B** S sends the frame to the router for destination resolution.
- C** S learns A's source MAC on A's port, then floods the frame (unknown unicast) out all other ports. B and C both receive it; B's NIC accepts it, C's NIC drops it at L2.
- D** S forwards the frame only to B's port using its empty table plus the destination MAC.