[CS 335A] Assignment 4 - Network Layer

To route or not to route?: that is not even a question!

Deadline: 12/12/2023
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Question 1 [10 pts]

Describe how **NAT** violates in four different ways core aspects-principles of the TCP/IP architecture.

Question 2 [10 pts]

Discuss key differences between the **distance vector vs. link-state algorithms** in terms of computational complexity and communication overhead?

Question 3 [10 pts]

Present how the **link-state algorithm** runs on router Δ in the network topology shown below
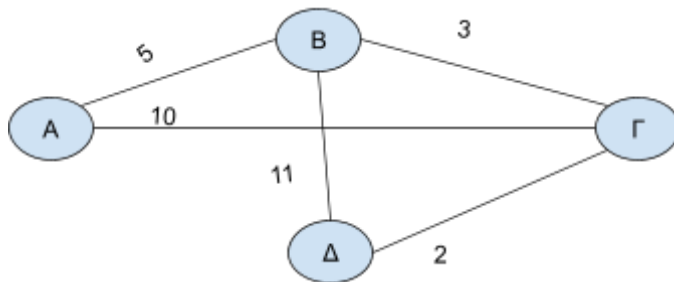
Question 4 [20 pts]

a. What are the main differences of **BGP** vs the link-state and distance-vector routing algorithms? **(10 pts)**
b. How does BGP help to improve the scalability in routing? iii) Provide an example that illustrates how a network administrator may "compromise" ("trade") between scalability and routing performance in the context of routing through **autonomous systems (ASs)**. **(10 pts)**

Question 5 [5 pts]
Which one of the following statements about BGP is FALSE?

        a) EIGP preference value is 20

        b) BGP uses three-way handshake

        c) BGP can not used in AS

        d) BGP uses TCP port 179

Question 6 [5 pts] (see the Tutorial -Network Layer)
When you run the "*show ip bgp*" command, what does the output "next hop of 0.0.0.0" in the routing table of the router indicate?

Question 7 [10 pts]
What are the well-known communities of the BGP community attribute?

Question 8 [10 pts]
   A. Do **internal BGP (iBGP) sessions** modify the next hop?
   B. Do **external BGP (eBGP)** sessions between confederations modify the next hop?

Question 9 [10 pts] (see the Tutorial -Network Layer)
Which is the maximum number of IP addresses in each **subnet** if the network 15.0.0.0/8 should be separated into 333 subnets with the same IP range?

Question 10 [10 pts] (see the Tutorial -Network Layer, Section: *Routing Policy* in the textbook)
Consider the network depicted below. Single-headed plain arrows point from providers to their customers (AS A is the provider of AS D), while double-headed dashed arrows connect peers (AS D and AS E are peers). Each AS in the network originates a unique prefix that it advertises to all its BGP neighbors. Each AS also applies the default selection and exportation BGP policies based on their customers, peers and providers.
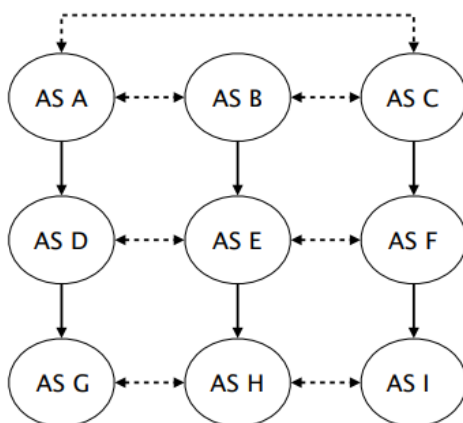
What path (sequence of ASes) is followed when AS G sends packets destined to the prefix originated by AS E? Justify your answer.

Submission:

1. Consolidate your report into a **single PDF** file, following the guidelines of the format
2. Send it to **klionta@csd.uoc.gr** with the **subject: 335a_assign4_AM** (deliverables with different subjects will not be accepted)