National University of Computer and Emerging Sciences (Lahore Campus)

Quiz 5: Network Layer - Control Plane (Chapter 5)

Name: _____ **Roll No:** _____ **Section:** BSE-6B1 (Spring 2026)

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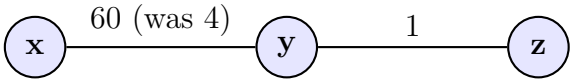
1. (5 points) **Distance Vector Analysis**

   Consider the 3-node linear topology below. Bellman-Ford Distance Vector routing is used. Link costs are: $c(x, y) = 4, c(y, z) = 1$. At t_0, the network is stabilized. At t_1, the link cost $c(x, y)$ dramatically increases to 60. Router y detects this change immediately. Router z does not see the link $x - y$ directly. Assume Poison Reverse is **NOT** enabled.

   1. Calculate the Distance Vector entries $D_y(x)$ and $D_z(x)$ for steps t_1, t_2, t_3.
   2. Why does the network not stabilize (What is this problem called)? Give one way it can be prevented?

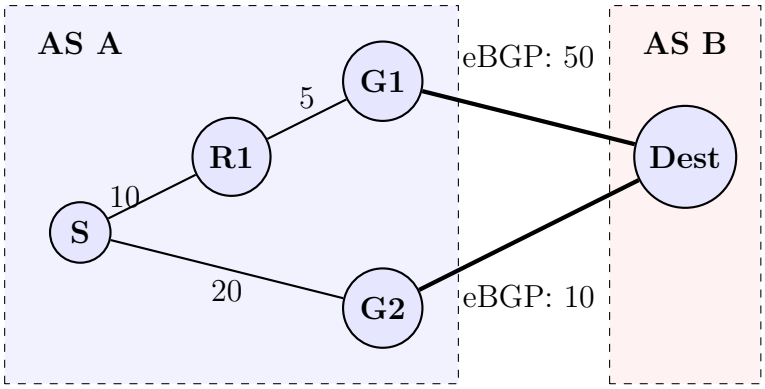


2. (5 points) **Hot vs. Cold Potato Routing Calculation**

   AS A needs to send a packet to destination IP in AS B. AS A has two gateways ($G1, G2$) connected to AS B. The IGP (Intra-AS) costs within AS A are shown in the diagram. The eBGP costs (latency) on the links between AS A and AS B are also shown.

   - **Hot Potato Routing:** Minimize intra-AS cost.
   - **Cold Potato Routing:** Minimize total cost (Intra + Inter).

   Calculate the path and total cost for the source node S for both routing strategies. What is the efficiency penalty (Total Cost Difference) of using Hot Potato routing in this specific topology?



3. (5 points) **Dijkstra's Algorithm and Forwarding tables**

   Compute the Forwarding Table for Node **E** (not the source A) using Dijkstra's algorithm. Note the directed edges and asymmetric costs. Run Dijkstra's algorithm originating at Node **E**. Provide the resulting Forwarding Table for Node E. (Format: Destination — Next Hop).