FACULTY OF ECT
Computing Security Program

SAXONY EGYPT UNIVERSITY
FOR APPLIED SCIENCE AND TECHNOLOGY

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Subject: (ECT 141) Networks and Communication Technologies

Question 1: Simulating a Bus Topology with a Hub
Scenario: You are tasked with creating a small office network using a bus topology simulated through a hub in Cisco Packet Tracer. The network includes four PCs connected to a central hub.
Tasks:

1. In Cisco Packet Tracer, add four PCs and one hub to the workspace. Connect each PC to the hub using cables.
2. Assign the following IP addresses:
   PC0: 192.168.1.4
   PC1: 192.168.1.5
   PC2: 192.168.1.6
   PC3: 192.168.1.7
   Configure these IP addresses in Cisco Packet Tracer.
3. Use Simulation Mode to send a packet from PC0 (192.168.1.4) to PC3 (192.168.1.7).
4. Explain how the hub processes the packet and identify one key inefficiency of this setup related to bus topology behavior.

Question 2: Configuring a Star Topology with a Switch
Scenario: You are setting up a star topology network for a classroom using a switch in Cisco Packet Tracer. The network connects four PCs to demonstrate the switch's efficiency over a hub.
Tasks:

1. Add four PCs and one switch to the workspace. Connect each PC to the switch using straight-through cables. Draw a simple diagram of this setup.
2. Assign the following IP addresses:
   PC0: 192.168.1.4
   PC1: 192.168.1.5
   PC2: 192.168.1.6
   PC3: 192.168.1.7
   Configure these IP addresses in Cisco Packet Tracer.
3. In Simulation Mode, send a packet from PC0 (192.168.1.4) to PC3 (192.168.1.7).

Question 3: Implementing a Ring Topology
Scenario: You are implementing a ring topology network in Cisco Packet Tracer to connect four PCs via switches, showcasing the orderly data transmission in a small business network.
Tasks:

1. Add four switches (Switch0, Switch1, Switch2, Switch3) and four PCs (PC0, PC1, PC2, PC3) to the workspace. Connect the switches in a ring (e.g., Switch0 to Switch1, Switch1 to Switch2, Switch2 to Switch3, Switch3 to Switch0), and attach one PC to each switch (PC0 to Switch0, PC1 to Switch1, PC2 to Switch2, PC3 to Switch3) using cables.
2. Assign IP addresses to the PCs:
   PC0: 192.168.1.1
   PC1: 192.168.1.2
   PC2: 192.168.1.3
   PC3: 192.168.1.4
   Configure these IP addresses in Cisco Packet Tracer.
3. In Simulation Mode, send a packet from PC0 to PC3 and describe the path it takes through the switches as observed in Simulation Mode.
4. Discuss one advantage of the ring topology in this setup and one challenge of maintaining this topology in a larger network.

Question 4: Designing a Mesh Topology
Scenario: You are designing a mesh topology in Cisco Packet Tracer to connect four PCs via switches, showcasing redundancy and multiple data paths in a small business network.
Tasks:

1. Add four switches and four PCs to the workspace. Connect the switches in a mesh (e.g., Switch0 to Switch1 and Switch2, Switch1 to Switch0 and Switch3, etc.), and attach one PC to each switch.
2. Assign IP addresses:
   PC0: 192.168.1.10
   PC1: 192.168.1.11
   PC2: 192.168.1.12
   PC3: 192.168.1.13
   Configure these IP addresses in Cisco Packet Tracer.
3. In Simulation Mode, send a packet from PC0 to PC3 and describe the possible paths it can take as observed in Simulation Mode.
4. Discuss one advantage of redundancy in this setup and one challenge of scaling to a full mesh.

Question 5: Comparing Hub vs. Switch Performance in a Star Topology
Scenario: You are comparing the performance of a hub versus a switch in two identical star topology networks in Cisco Packet Tracer, each with four PCs, to analyze their traffic handling differences.
Tasks:

1. Create two networks:
   Network A: Four PCs connected to a hub.
   Network B: Four PCs connected to a switch.
   Draw simple diagrams of both Network A and Network B, labeling all devices.

2. Assign the same IP addresses to both networks:
   PC0: 192.168.1.4
   PC1: 192.168.1.5
   PC2: 192.168.1.6
   PC3: 192.168.1.7
   Configure these IP addresses in Cisco Packet Tracer for both networks.

3. In Simulation Mode, send a packet from PC0 to PC3 in both networks and describe the traffic flow in each case as observed in Simulation Mode.

4. Compare how the hub and switch handle the packet, focusing on traffic distribution, and explain why the switch is more efficient in reducing unnecessary traffic.