BLM 3022 - Computer Networking Technologies

Lab 1 - A Basic Subnet-level Network Topology

The purpose of this assignment is to design and configure a basic subnet-level network topology using Cisco Packet Tracer, enabling two departments to communicate with each other between different subnets.

A small company has two departments (Department A and Department B), located in the same building. Your task is to create a subnet-level network topology that allows communication between the two department subnets using Cisco Packet Tracer.

Requirements:

1. The network should include a Cisco 1941 router, 2 Cisco 2960 switches, and 2 PCs for each department.
2. Two PCs in each department will be connected to their respective department switches, and two switches should be connected through the router.
3. All devices should be connected using appropriate cables (copper straight-through cables).
4. Configure IP addresses for all devices manually, using the following IP address ranges in:
   Department A: 192.168.1.0/24
   Department B: 192.168.2.0/24

   The /24 indicates a subnet mask, which allows for 254 usable IP addresses in each subnet (192.168.1.1 to 192.168.1.254 for Department A, and 192.168.2.1 to 192.168.2.254 for Department B). You should assign a specific subnet mask according to this information.
5. Ensure that devices within each department and between the two departments can communicate with each other by sending pings between the same subnet PCs and between PCs in different subnets.

Prepare a brief report (2-3 pages) explaining your network topology, device configurations, and briefly, how OSI layers function in this objective.

Submission:

You should submit two files:

1. Your Packet Tracer file (.pkt) named LAB1-studentid1-studentid2.pkt
2. The report in PDF named LAB1-studentid1-studentid2.pdf.

Evaluation:

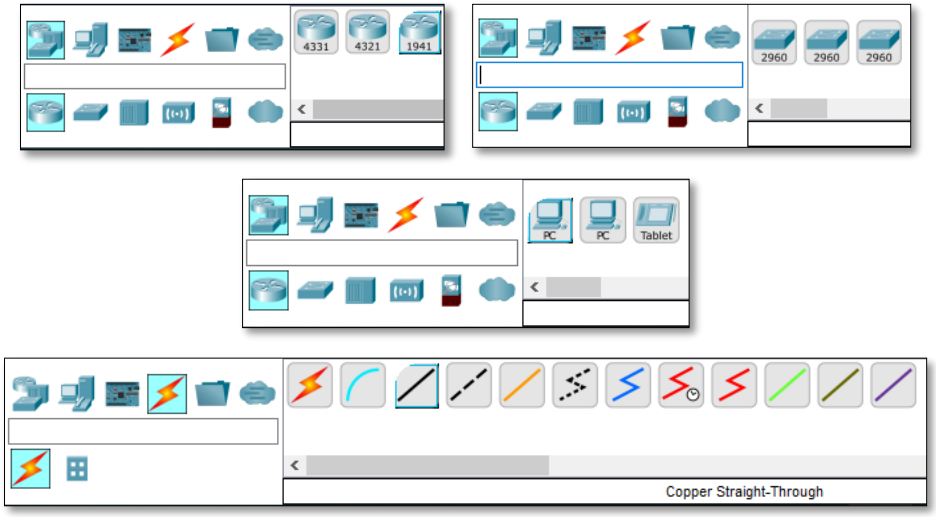
Both students will be asked general questions related to the network topology.

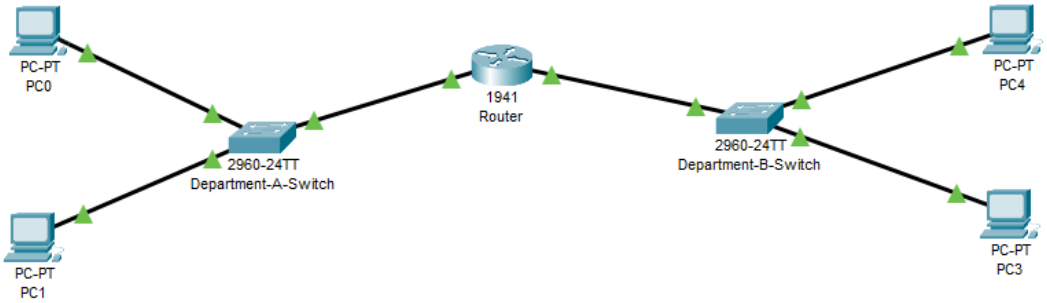
The lab will be evaluated based on the following criteria:

1. Network design and topology.
2. Proper device configuration and IP address assignment.
3. Clarity and organization of the report.
4. Understanding of basic networking concepts and device configurations.

Instructions:

1. Create a new file in Cisco Packet Tracer from File > New.
2. Rename the .pkt file in LAB1-studentid1-studentid2.pkt format by File > Save As.
3. Add and connect the appropriate devices (router, switches, and PCs) using the copper straight-through cables.
    1. Router -> 1941
    2. Switch -> 2960
    3. PC-PT





4. Configure the router by assigning Default Gateway IP addresses and subnet masks to the router's GigabitEthernet interfaces for both subnets.

    From the given IP address format, we can deduce the subnet mask:

    IPv4: 192.168.1.0/24

    In this case, 24 bits are used for the network, leaving 8 bits for the host portion. Knowing that IP address is adressable in 32 bits, we can say that remaining 8 bits starting from the least significant bits will be assigned for the devices in the subnet.

    Subnet Mask: 255.255.255.0

PCs in each subnet will be connected to the router through the respective default gateways activated in router for each subnet.

Department A Default Gateway: 192.168.1.1

Department B Default Gateway: 192.168.2.1

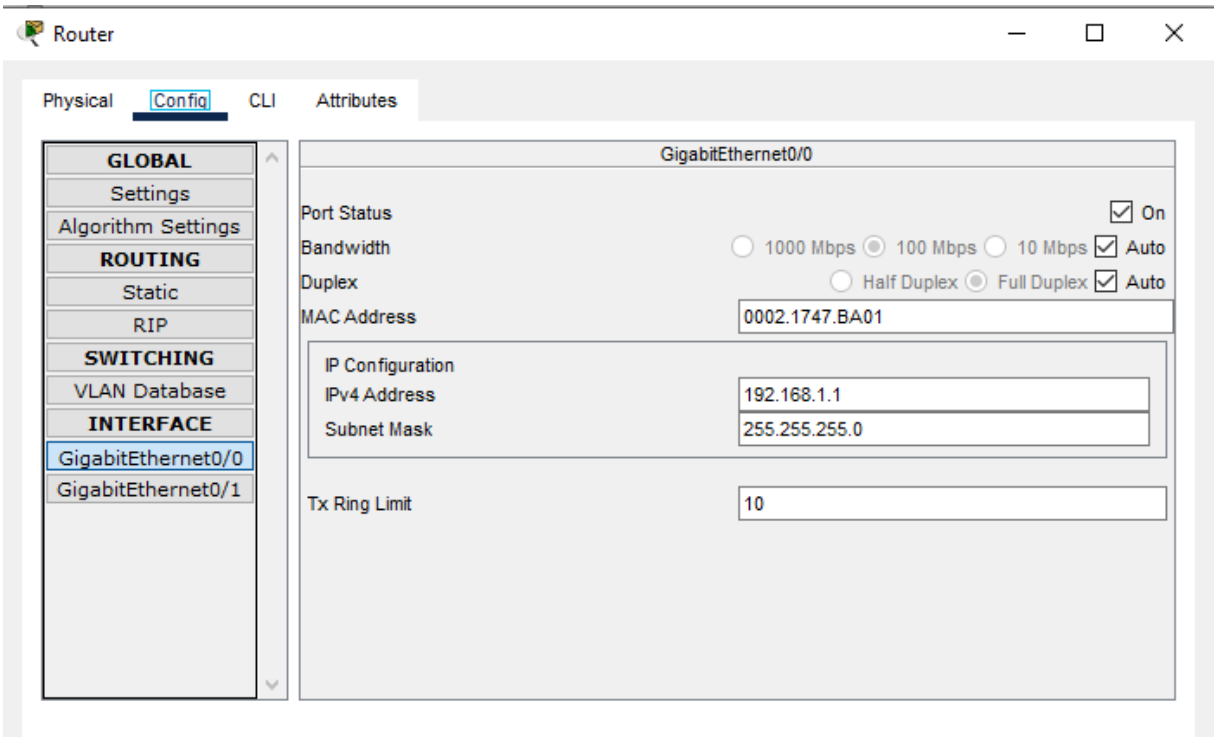
Click on Router > Config > Interface > GigabitEthernet 0/0

IPv4 Address: 192.168.1.1

Subnet Mask: 255.255.255.0

Set “Port Status” ON

Apply the same configuration for GigabitEthernet 0/1 for Department B IP address.



Also see that after the configuration of each block in the GUI, Equivalent IOS Commands appear in the CLI window below.

Equivalent IOS Commands

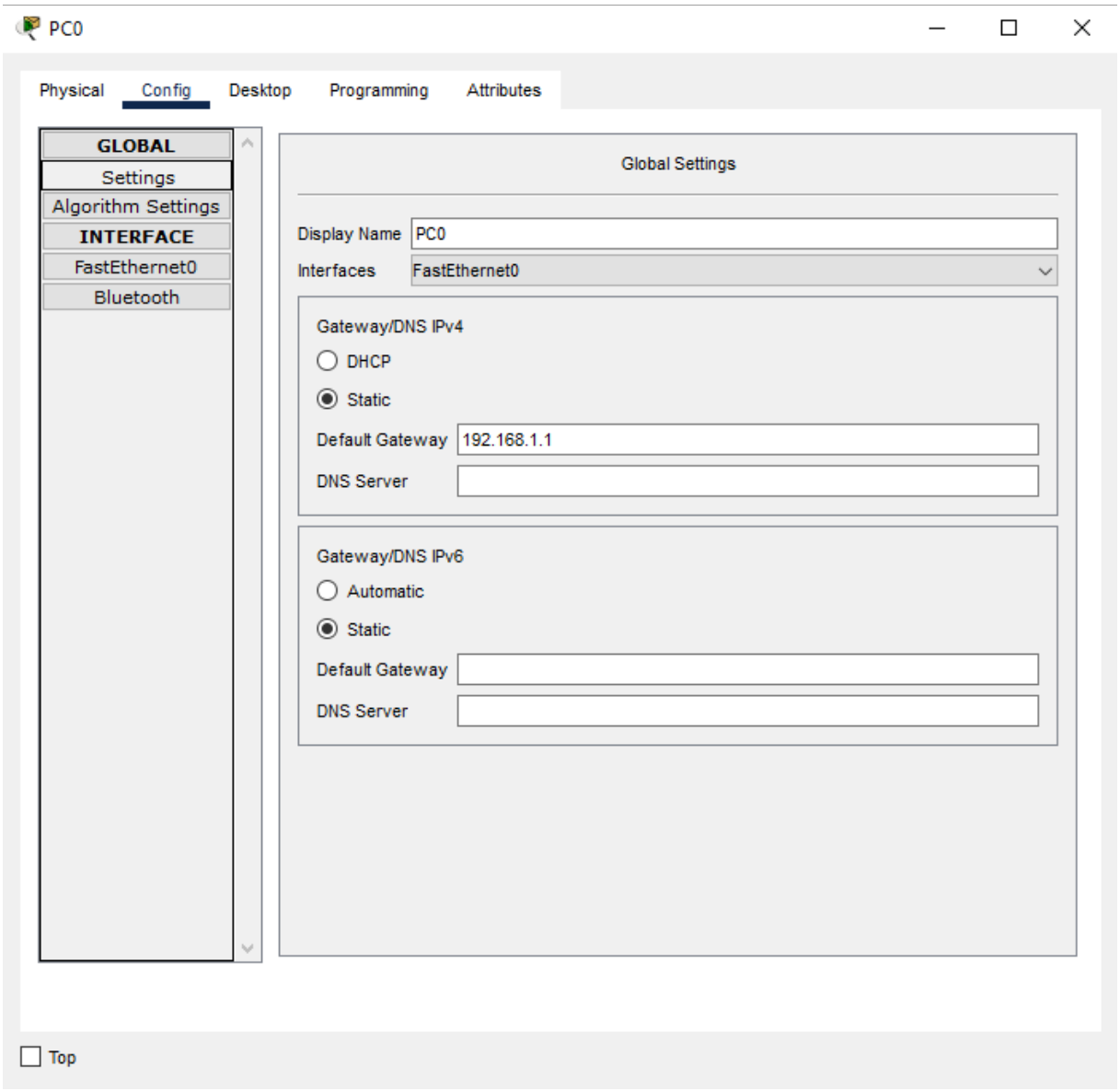
```
Router(config)#interface GigabitEthernet0/0
Router(config-if)#ip address 192.168.1.1 255.255.255.0
Router(config-if)#no shutdown
Router(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up
```

5. Assign IP addresses and default gateways manually to each PC in the network.

   Click on PC > Config > Global > Settings

Set “Default Gateway” as 192.168.1.1 for PCs in Department A,
Set “Default Gateway” as 192.168.2.1 for PCs in Department B.



While still in PC Config go to Interface > FastEthernet0 and assign IPv4 address for PCs:

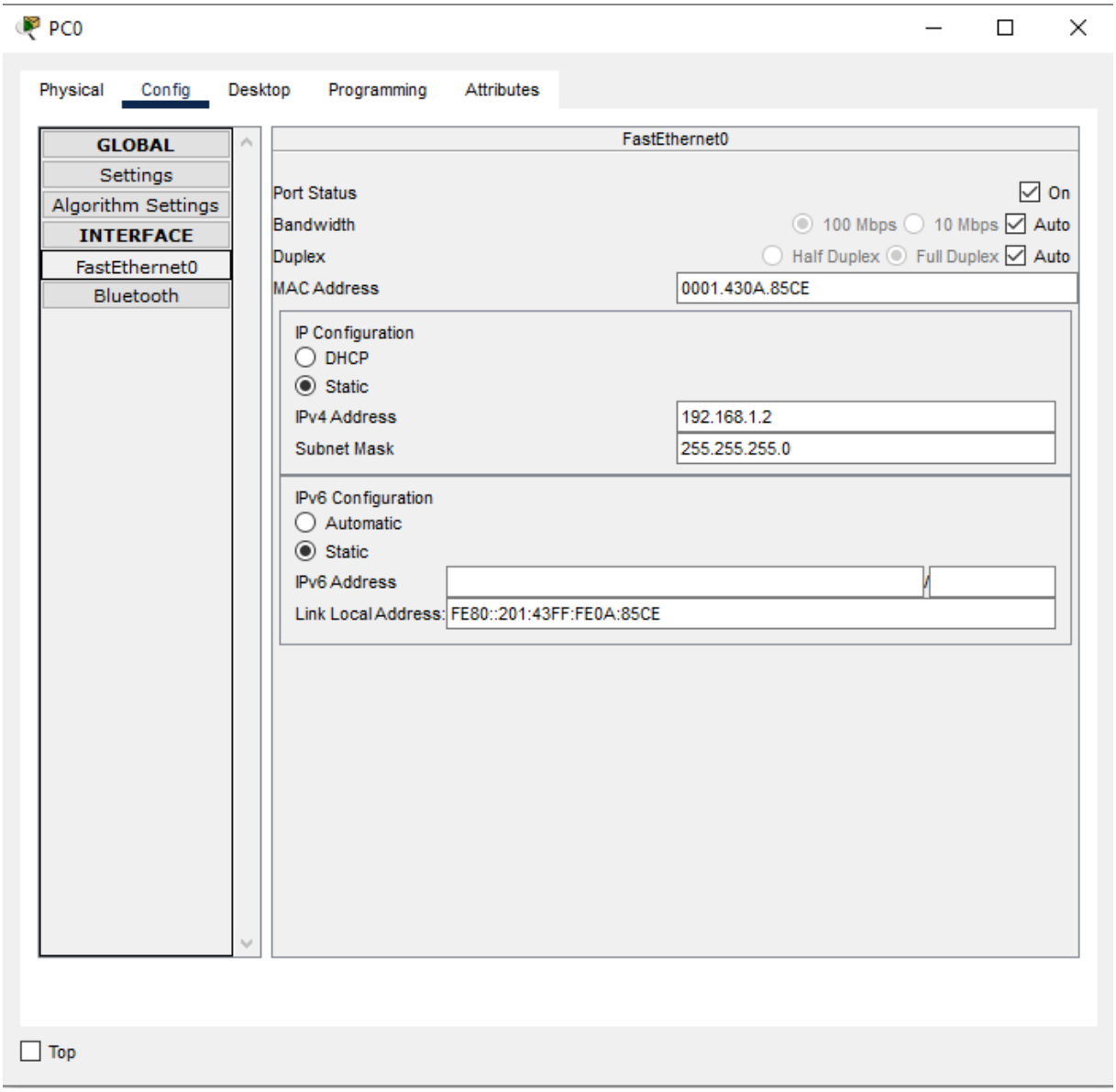
Department A PCs:

1) IPv4: **192.168.1**.2
   Subnet Mask: 255.255.255.0
2) IPv4: **192.168.1**.3
   Subnet Mask: 255.255.255.0

Department B PCs:

1) IPv4: **192.168.2**.2
   Subnet Mask: 255.255.255.0
2) IPv4: **192.168.2**.3
   Subnet Mask: 255.255.255.0

Also set the Port Status ON.



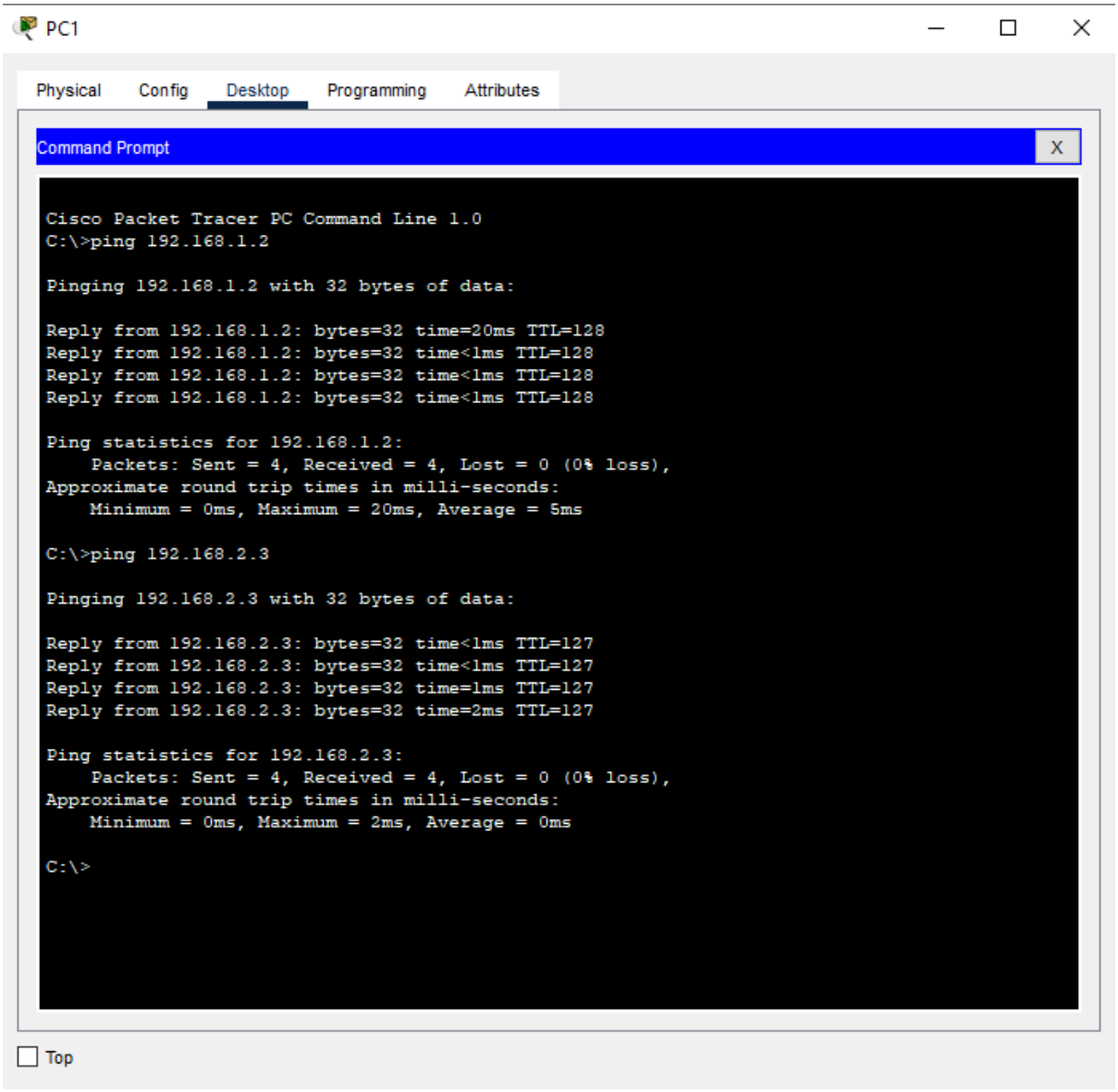
6. Test the network to ensure all devices can communicate within their respective departments and between the departments.

   You should be able to send ping requests between devices in the same department, as well as between devices in different departments.

   To perform the ping test, click on a PC > Desktop > Command Prompt:

   In the Command Prompt, type "ping" followed by the IP address of the target device.

   For example, if you want to test the connection between a PC in Department A (192.168.1.2) and a PC in Department B (192.168.2.2), type "ping 192.168.2.2" on the PC with the IP address 192.168.1.2.



Verify that you receive a response from the target device, indicating successful communication.

Alternatively you can use the Simple PDU to ensure the connectivity.

Simple PDU tool in Cisco Packet Tracer sends an ICMP packet, similarly to the ping command, allowing you to test network connectivity between devices.

After selecting Simple PDU, first click on the source device and then the target device.

You will see a message appearing at the bottom indicating either it is failed or was successful.