CO323 - Lab 02
Basic Routing and Investigating the OSI Model

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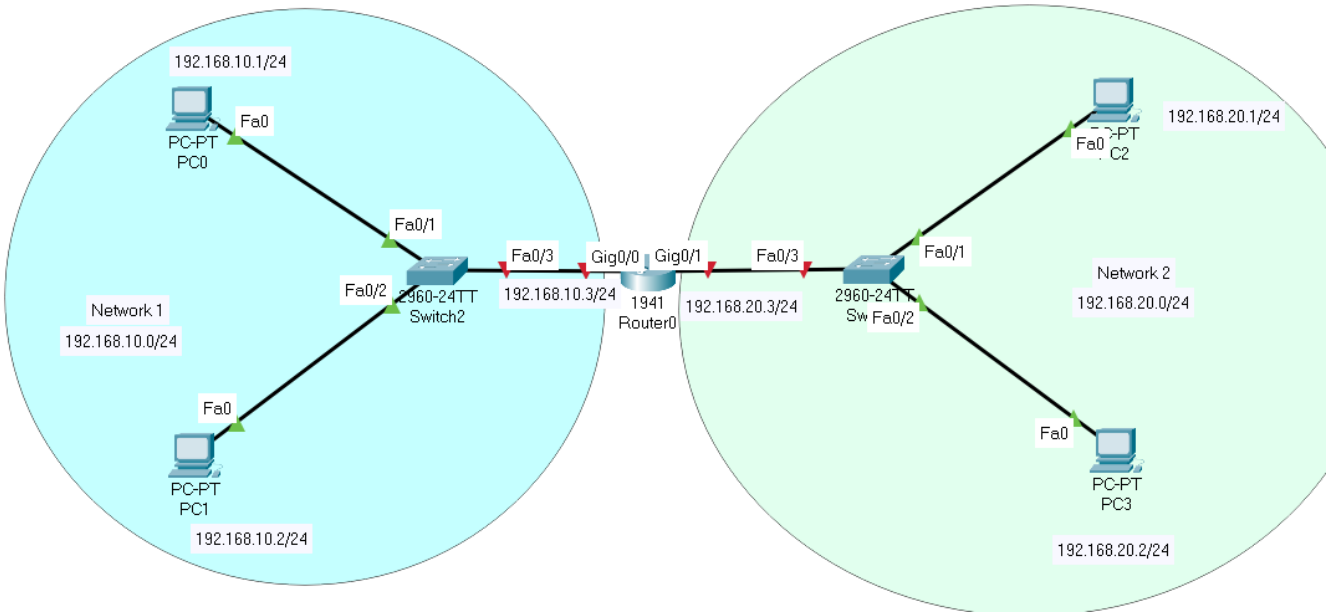
1) Create the network topology shown below.

a) Assign IP addresses appropriately and label the network properly. Take a screenshot of the labeled network.



b) Try to ping from PC1 to PC2. What do you notice? If you can not ping, explain the reason briefly.

-We cannot ping from PC1 to PC2.The reason is that they are in different networks. If we want to connect between two different networks we need routing. Since the router is not configured to do any routing we cannot ping. If we want to communicate, we have to assign ip to the gateway router.

c) What is the configuration that needs to be done to route the traffic properly? Fix that and verify that you can ping. Take a screenshot of the ping response.

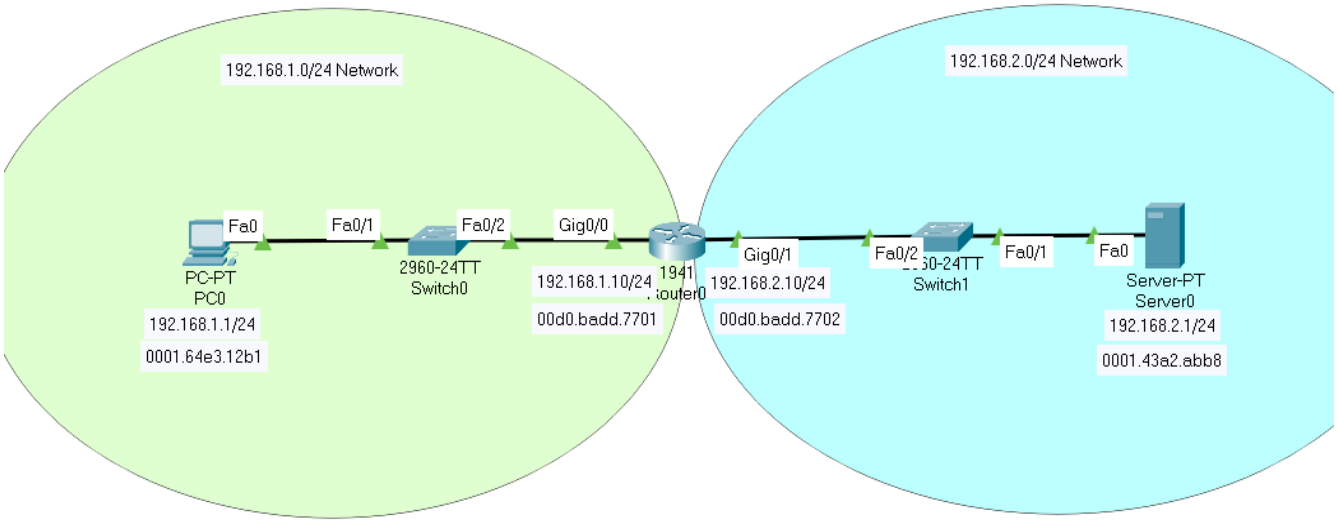
-We need to configure ip addresses for the ports of the gateway router in such a way that those ips are from the two different networks and we have to turn up those ports.(administratively up)

```
C:\>ping 192.168.20.1

Pinging 192.168.20.1 with 32 bytes of data:

Reply from 192.168.20.1: bytes=32 time=2ms TTL=127
Reply from 192.168.20.1: bytes=32 time=5ms TTL=127
Reply from 192.168.20.1: bytes=32 time<1ms TTL=127
Reply from 192.168.20.1: bytes=32 time<1ms TTL=127

Ping statistics for 192.168.20.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 5ms, Average = 1ms

C:\>
```

2) Create the network below. (No VLANs involved)

a) Assign IP addresses appropriately.

b) Label the network as shown in the figure below. Take a screenshot of the labeled network.



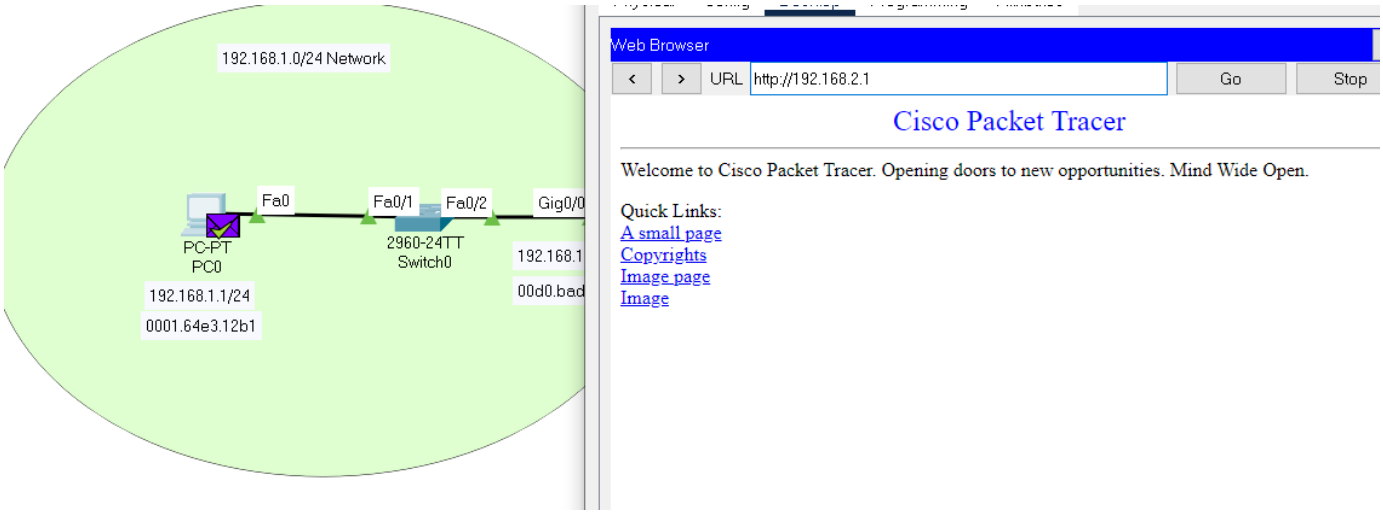
c) Do the remaining configurations to ping successfully from PC0 to Server0. Take a screenshot of the output.

-Ip addresses are assigned to ports in the router.
-Ping reply:

```
C:\>ping 192.168.2.1

Pinging 192.168.2.1 with 32 bytes of data:

Reply from 192.168.2.1: bytes=32 time<1ms TTL=127
Reply from 192.168.2.1: bytes=32 time<1ms TTL=127
Reply from 192.168.2.1: bytes=32 time<1ms TTL=127
Reply from 192.168.2.1: bytes=32 time<1ms TTL=127

Ping statistics for 192.168.2.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

d) Check the Buffer Filtered Events Only in “Options => Preferences => Miscellaneous” to prevent buffer overflows during the simulation.

- Then, create a filter for HTTP packets in the simulation.
- Start the simulation. Open a web browser in PC0 and type the server’s IP address in the browser’s address bar.
- Wait until the simulation is over. Your output should be similar to the figure shown below. Stop the simulation.



e) Click on one of the purple-colored boxes found in the captured events to see more details on each event.

f) Click on the first event at PC0.

- How many layers in the OSI model have been utilized? Name them.

  -4 Layers have been utilized.
  -Those are Physical , Data link , Network and Transport Layers.

- What are the source and destination ports in the transport layer?

  -Source Port : 1027
  -Destination Port : 80

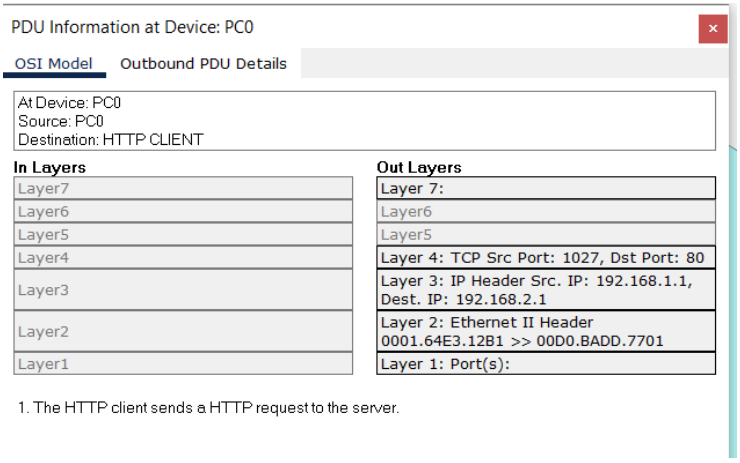
- What are the source and destination IP addresses?

  -Source IP: 192.168.1.1
  -Destination IP:192.168.2.1

- What are the source and destination MAC addresses? What is the source device? What is the destination device? (Look at the labeled network diagram)

  -Source MAC:0001.64e3.12b1- This is the PC0
  -Destination MAC: 00d0.badd.7701 - This is the gateway router

- Take a screenshot of the OSI model.



g) Click on the event at Switch0.

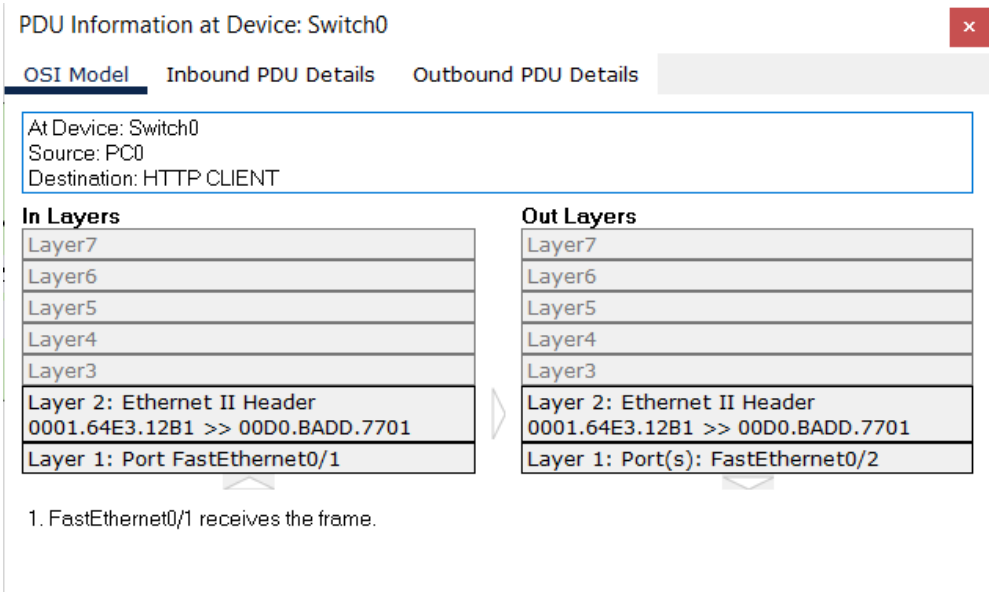
- How many layers in the OSI model have been used? Name them.

  -2 Layers.
  -Physical Layer and Data Link layers

- What are the input and output ports in the physical layer?

  -Input port : FastEthernet 0/1(The port which is connected to PC0)
  -Output port : FastEthernet 0/2(The port which is connected to default gateway router)

- Take a screenshot of the OSI model



h) Click on the event at Router0.

- How many layers in the OSI model have been used? Name them.

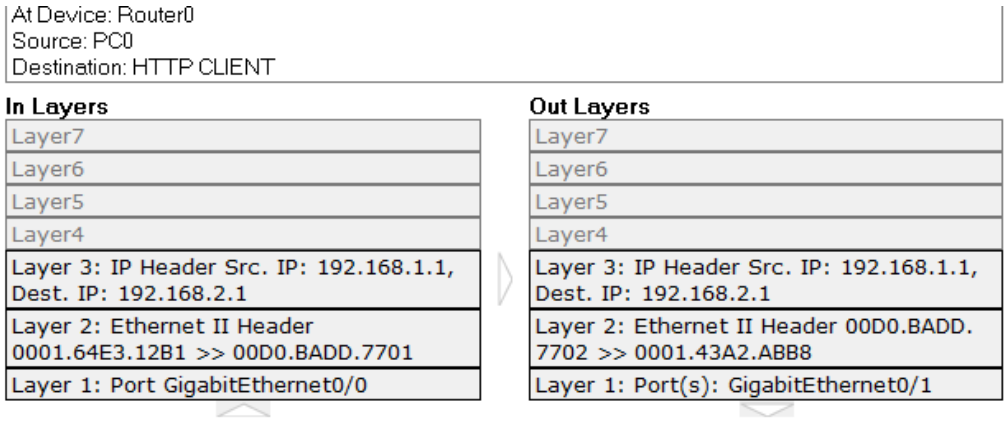
  -3 Layers.
  -Those are physical , data link and network layers.

- Click on Layer 2 of In-layer to see what happens in that layer.

  -Destination mac address of the frame matches the mac address of the router.

● Notice how MAC addresses are changed at the router. Take a screenshot of the OSI model.

-Destination mac address of the frame is changed to output port's mac address of the router.



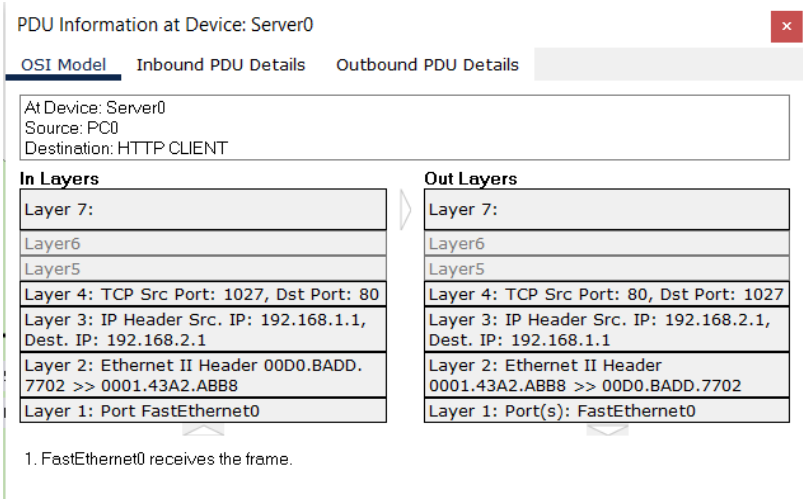
i) Click on the event at Server0.

● How many layers in the OSI model have been used? Name them.

-4 Layers have been utilized.

-Those are Physical , Data link , Network and Transport Layers.

● Take a screenshot of the OSI model. Explain how the input PDU is read and parsed at the server and converted to an output PDU. Explain what happens at each layer.



-In Layer:
*The server receives the input http request from the port FastEthernet 0.
*Then the server looks at the Ethernet frame and sees the MAC address. Server observers that the http request is meant for it because the destination mac address is similar to the mac address of the server.
*Next, the server strips out the ethernet header and looks at the ip packet.It sees the destination ip is similar to its ip so it accepts the packet.
*Next, the server strips out the ip header and looks at the tcp segment.It sees the destination port as 80 decides the packet as a web request so it directs the tcp segment to the OS and OS will take care of application layer management.

-Out Layer:
*Transport layer will create a new tcp segment to send as the http request.Server places source port as 80 and the destination port as the randomly generated port by PC0.(which was in the http request tcp segment)Then this segment is forwarded to the network layer.
*.In this layer ip header is added. In that ip header destination ip is set as the default gateway router port and the source ip is set as the server ip.Then this packet is forwarded to the data link layer.
*In this layer an ethernet header is added. Source mac address is added as the server mac and the destination mac is added as the gateway router mac port. Then this ethernet header is forwarded to the physical layer.
*In the physical layer all the information of the header is turned into bits and bytes and they are outputted to the FastEthernet 0 port of the server.