

الجامعة الإسلامية للتكنولوجيا
UNIVERSITÉ ISLAMIQUE DE TECHNOLOGIE
ISLAMIC UNIVERSITY OF TECHNOLOGY
DHAKA, BANGLADESH
ORGANIZATION OF ISLAMIC COOPERATION



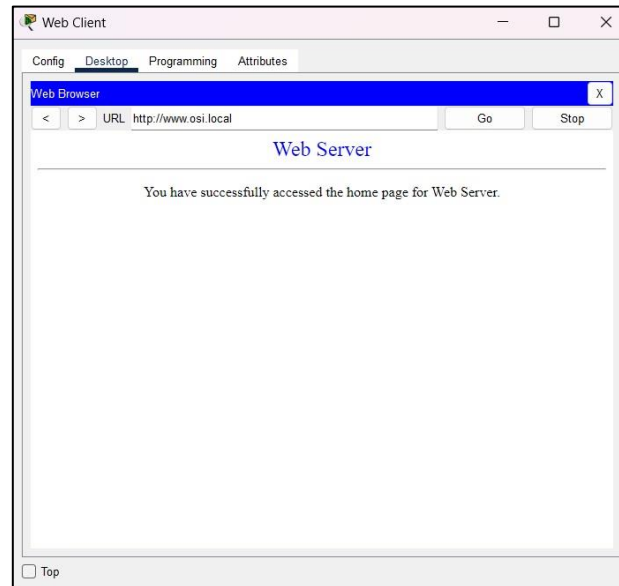
CSE 4412
Data Communication and Networking Lab
Lab-02 Report

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Program : B.Sc. in Software Engineering
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Task-01

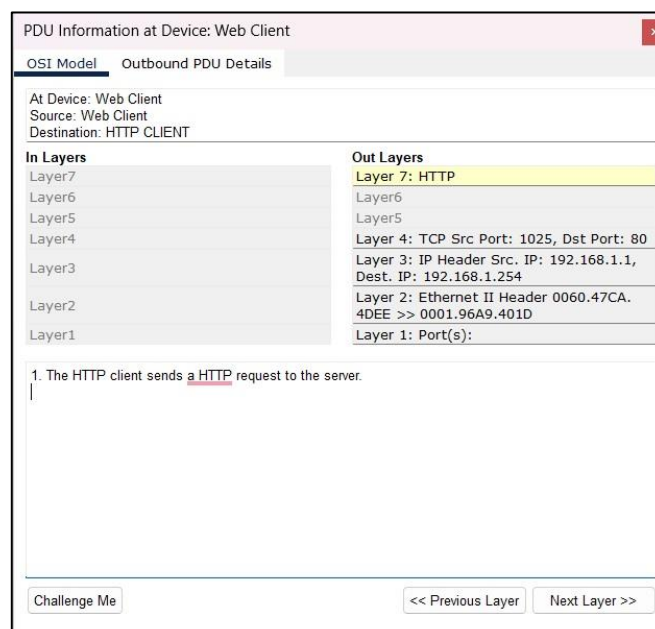
Q1: Click Capture/Forward four times. There should be four events in the Event List. Look at the Web Client web browser page. Did anything change?

Answer: Yes, the web browser changed to this:



Q2: Ensure that the OSI Model tab is selected. Under the Out Layers column, ensure that the Layer 7 box is highlighted. What is the text displayed next to the Layer 7 label? What information is listed in the numbered steps directly below the In Layers and Out Layers boxes?

Answer:



Q3: Click Next Layer. Layer 4 should be highlighted. What is the Dst Port value?

Answer: Dst port value is 80.

The screenshot shows a network analysis tool window titled "PDU Information at Device: Web Client". It has two tabs: "OSI Model" and "Outbound PDU Details". The "OSI Model" tab is active, displaying a list of layers from Layer 1 to Layer 7. Layer 4 is highlighted in yellow. To the right of the layer list, the details for Layer 4 are shown: "Layer 4: TCP Src Port: 1025, Dst Port: 80". Below the layer list, there is a text area with the following content: "1. Sent segment information: the sequence number 1, the ACK number 1, and the data length 102." At the bottom of the window, there are three buttons: "Challenge Me", "<< Previous Layer", and "Next Layer >>".

Q4: Click Next Layer. Layer 3 should be highlighted. What is the Dest. IP value?

Answer: Dest. IP is 192.168.1.254

The screenshot shows the same network analysis tool window as before, but now Layer 3 is highlighted in yellow. The details for Layer 3 are shown: "Layer 3: IP Header Src. IP: 192.168.1.1, Dest. IP: 192.168.1.254". The text area below the layer list now contains: "1. The destination IP address is in the same subnet. The device sets the next-hop to destination." The buttons at the bottom remain the same: "Challenge Me", "<< Previous Layer", and "Next Layer >>".

Q5: Click Next Layer. What information is displayed at this layer?

Answer:

The screenshot shows a window titled "PDU Information at Device: Web Client" with two tabs: "OSI Model" and "Outbound PDU Details". The "OSI Model" tab is active, displaying the following information:

At Device: Web Client
Source: Web Client
Destination: HTTP CLIENT

In Layers

Layer7
Layer6
Layer5
Layer4
Layer3
Layer2
Layer1

Out Layers

Layer 7: HTTP
Layer6
Layer5
Layer 4: TCP Src Port: 1025, Dst Port: 80
Layer 3: IP Header Src. IP: 192.168.1.1, Dst. IP: 192.168.1.254
Layer 2: Ethernet II Header 0060.47CA.4DEE >> 0001.96A9.401D
Layer 1: Port(s):

1. The next-hop IP address is a unicast. The ARP process looks it up in the ARP table.
2. The next-hop IP address is in the ARP table. The ARP process sets the frame's destination MAC address to the one found in the table.
3. The device encapsulates the PDU into an Ethernet frame.

Challenge Me << Previous Layer Next Layer >>

Q6: What is the common information listed under the IP section of PDU Details as compared to the information listed under the OSI Model tab? With which layer is it associated?

Answer: The common information are source IP address and destination IP address and layer 3 is associated with it.

The screenshot shows the "Outbound PDU Details" tab in the "PDU Information at Device: Web Client" window. It displays the "PDU Formats" section with the following details:

Ethernet II

PREAMBLE: 101010...10	SF D	DEST ADDR: 0001.96A9.401D
SRC ADDR: 0060.47CA.4DEE	TYPE: 0x0800	DATA (VARIABLE LENGTH)
FCS: 0x00000000		

IP

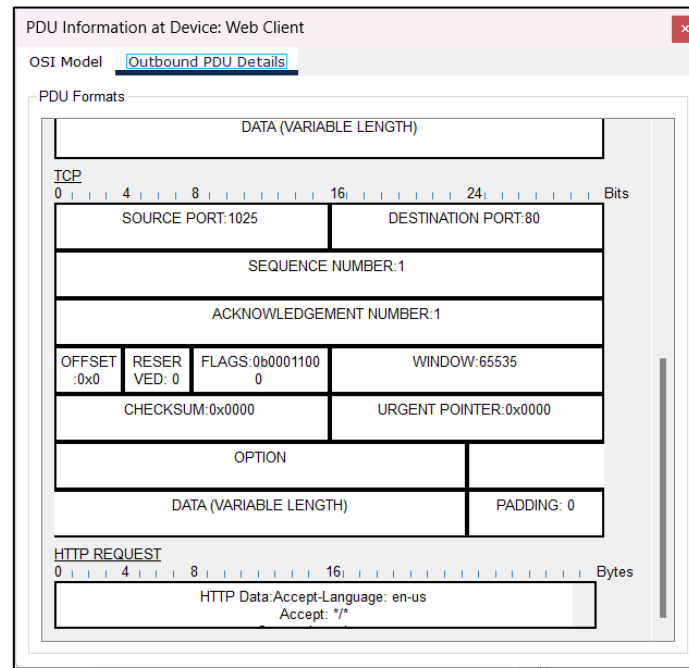
VER: 4	IHL: 5	DSCP: 0x00	TL: 122
ID: 0x0004		FLAGS: 0x2	FRAG OFFSET: 0x000
TTL: 128	PRO: 0x06	CHKSUM	
SRC IP: 192.168.1.1			
DST IP: 192.168.1.254			
DATA (VARIABLE LENGTH)			

TCP

0 4 8 16 24 Bits			
------------------	--	--	--

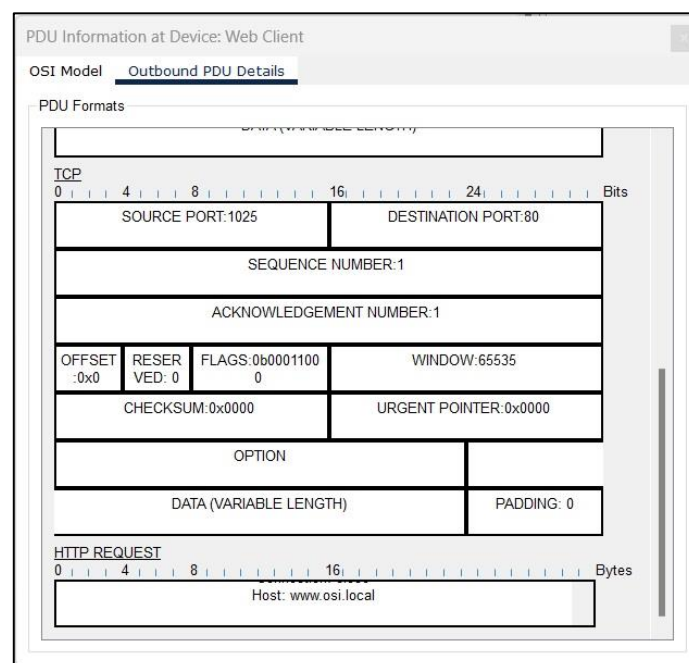
Q7: What is the common information listed under the TCP section of PDU Details, as compared to the information listed under the OSI Model tab, and with which layer is it associated?

Answer: The common information are source port and destination port and layer 4 is associated with it.



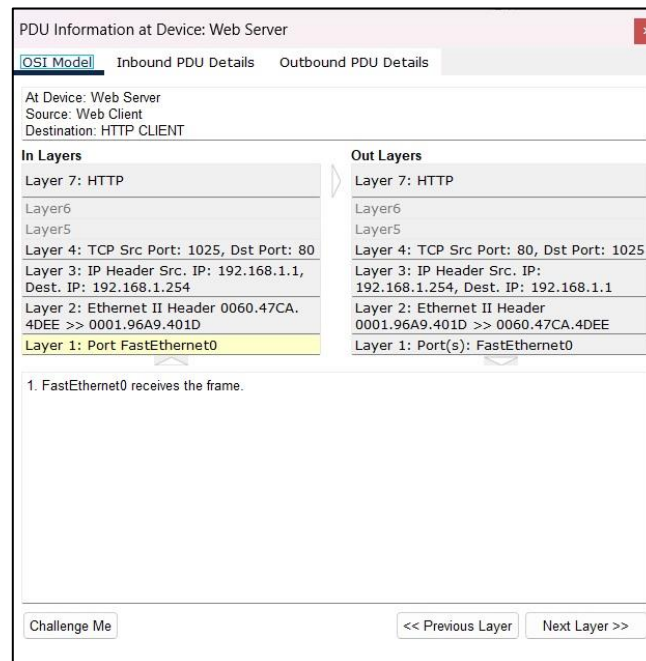
Q8: What is the Host listed under the HTTP section of the PDU Details? What layer would this information be associated with under the OSI Model tab?

Answer: Host is www.osi.local. And layer 7 is associated with this.



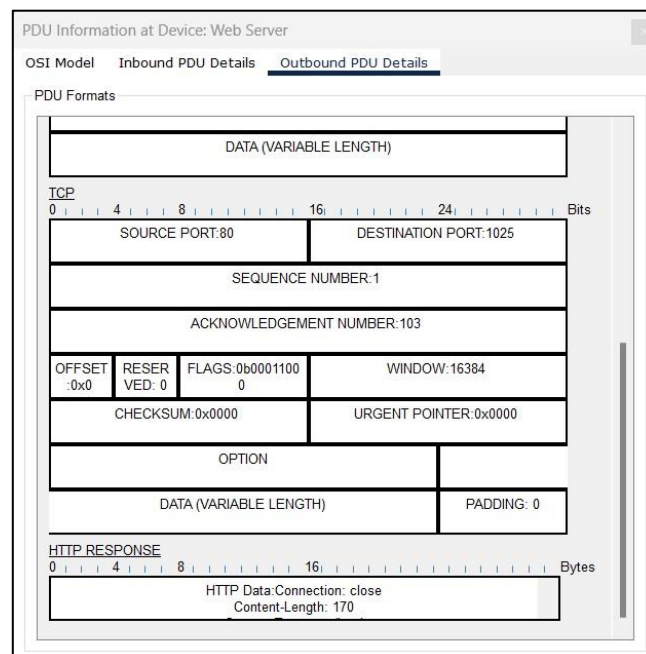
Q9: Comparing the information displayed in the In Layers column with that of the Out Layers column, what are the major differences?

Answer: We can see that the source IP and destination IP get swapped.



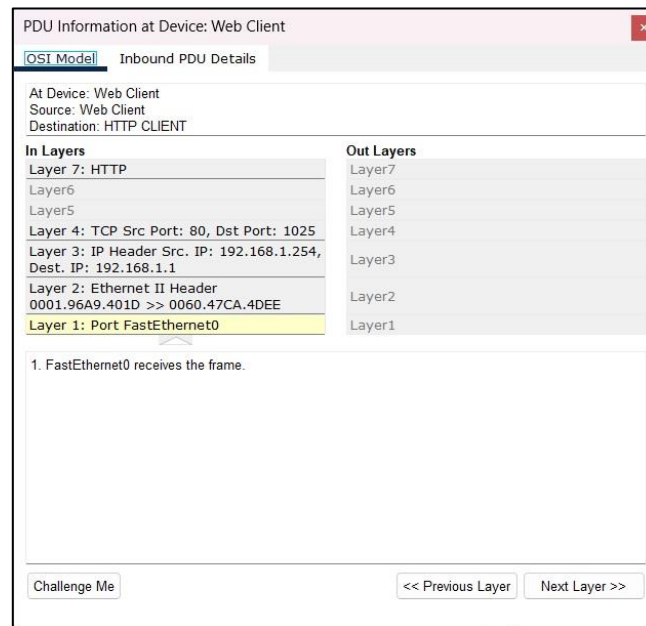
Q10: What is the first line in the HTTP message that displays?

Answer: HTTP Data:Connection:close



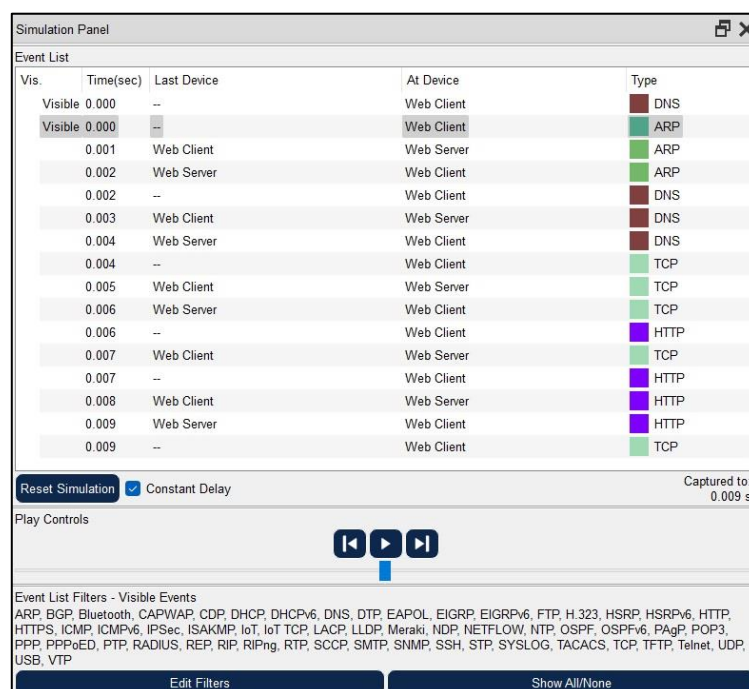
Q11: How many tabs are displayed with this event and why?

Answer: 2 tabs are displayed in this event. Because the web servers are replayed back web client who receives that.



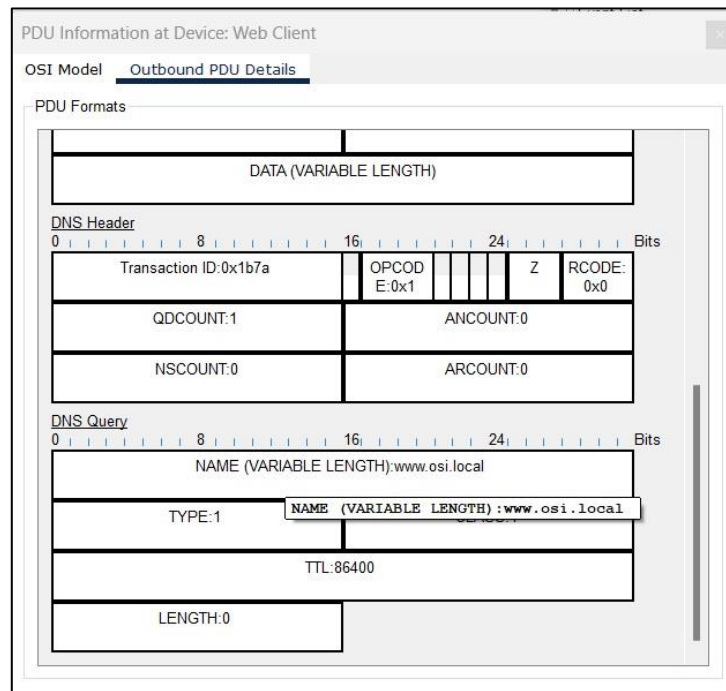
Q12: What additional Event Types are displayed?

Answer: DNS, ARP, TCP.



Q13: Click the Outbound PDU Details tab. What information is listed in the NAME: in the DNS QUERY section?

Answer: Name – www.osi.local



Q14: Click the last DNS Info colored square box in the event list. Which device is displayed?

Answer: Device – Web client.

Q15: What is the value listed next to ADDRESS: in the DNS ANSWER section of the Inbound PDU Details?

Answer: 192.168.1.254

Q16: Find the first HTTP event in the list and click the colored square box of the TCP event immediately following this event. Highlight Layer 4 in the OSI Model tab. In the numbered list directly below the In Layers and Out Layers, what is the information displayed under items 4 and 5?

Answer:

PDU Information at Device: Web Server

OSI Model Inbound PDU Details

At Device: Web Server
Source: Web Client
Destination: 192.168.1.254

In Layers	Out Layers
Layer7	Layer7
Layer6	Layer6
Layer5	Layer5
Layer 4: TCP Src Port: 1025, Dst Port: 80	Layer4
Layer 3: IP Header Src. IP: 192.168.1.1, Dst. IP: 192.168.1.254	Layer3
Layer 2: Ethernet II Header 0060.47CA.4DEE >> 0001.96A9.401D	Layer2
Layer 1: Port FastEthernet0	Layer1

1. The device receives a TCP ACK segment on the connection to 192.168.1.1 on port 1025.
2. Received segment information: the sequence number 1, the ACK number 1, and the data length 20.
3. The TCP segment has the expected peer sequence number.
4. The TCP connection is successful.
5. The device sets the connection state to ESTABLISHED.

Challenge Me << Previous Layer Next Layer >>

Q17: Click the last TCP event. Highlight Layer 4 in the OSI Model tab. Examine the steps listed directly below In Layers and Out Layers. What is the purpose of this event, based on the information provided in the last item in the list (should be item 4)?

Answer:

PDU Information at Device: Web Client

OSI Model Outbound PDU Details

At Device: Web Client
Source: Web Client
Destination: 192.168.1.254

In Layers	Out Layers
Layer7	Layer7
Layer6	Layer6
Layer5	Layer5
Layer4	Layer 4: TCP Src Port: 1025, Dst Port: 80
Layer3	Layer 3: IP Header Src. IP: 192.168.1.1, Dst. IP: 192.168.1.254
Layer2	Layer 2: Ethernet II Header 0060.47CA.4DEE >> 0001.96A9.401D
Layer1	Layer 1: Port(s): FastEthernet0

1. The device closes the TCP connection to 192.168.1.254 on port 80.
2. The device sets the connection state to FIN_WAIT_1.
3. The device sends a TCP FIN+ACK segment.
4. Sent segment information: the sequence number 103, the ACK number 273, and the data length 20.

Challenge Me << Previous Layer Next Layer >>

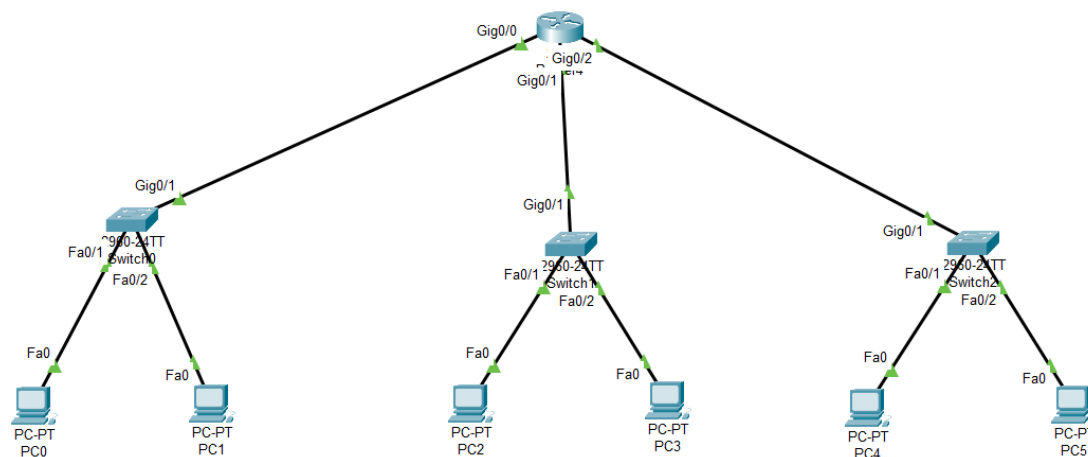
Q18: Based on the information that was inspected during the Packet Tracer capture, what port number is the Web Server listening on for the web request?

Answer: 80

Q19: What port is the Web Server listening on for a DNS request?

Answer: 53

Task-02



Step 1: Set the IP address

As I can connect a maximum of 25 hosts per network, in the last octet of the Subnet we will need 5 bits for the host address ($2^5=32$), and the first 3 bits of the last octet will be part of the network address.

Subnet: 255.255.255.224

IP range of the first subnetwork: 192.168.137.1 – 192.168.137.32

IP range of the second subnetwork: 192.168.137.33 – 192.168.137.64

IP range of the third subnetwork: 192.168.137.65 – 192.168.137.96

PC0

Physical Config Desktop Programming Attributes

IP Configuration

Interface FastEthernet0

IP Configuration

☐ DHCP ☒ Static

IPv4 Address 192.168.137.2

Subnet Mask 255.255.255.224

Default Gateway 192.168.137.1

DNS Server 0.0.0.0

IPv6 Configuration

☐ Automatic ☒ Static

IPv6 Address /

Link Local Address FE80::2E0:B0FF:FEF4:5D7A

Default Gateway

DNS Server

802.1X

☐ Use 802.1X Security

Authentication MD5

Username

Password

☐ Top

PC2

Physical Config Desktop Programming Attributes

IP Configuration

Interface FastEthernet0

IP Configuration

☐ DHCP ☒ Static

IPv4 Address 192.168.137.34

Subnet Mask 255.255.255.224

Default Gateway 192.168.137.33

DNS Server 0.0.0.0

IPv6 Configuration

☐ Automatic ☒ Static

IPv6 Address /

Link Local Address FE80::201:43FF:FEE1:1BD5

Default Gateway

DNS Server

802.1X

☐ Use 802.1X Security

Authentication MD5

Username

Password

☐ Top

PC4

Physical Config Desktop Programming Attributes

IP Configuration

Interface FastEthernet0

IP Configuration

☐ DHCP ☒ Static

IPv4 Address 192.168.137.66

Subnet Mask 255.255.255.224

Default Gateway 192.168.137.65

DNS Server 0.0.0.0

IPv6 Configuration

☐ Automatic ☒ Static

IPv6 Address /

Link Local Address FE80::250:FFF:FE88:78A2

Default Gateway

DNS Server

802.1X

☐ Use 802.1X Security

Authentication MD5

Username

Password

☐ Top

Step 2: Router Configuration

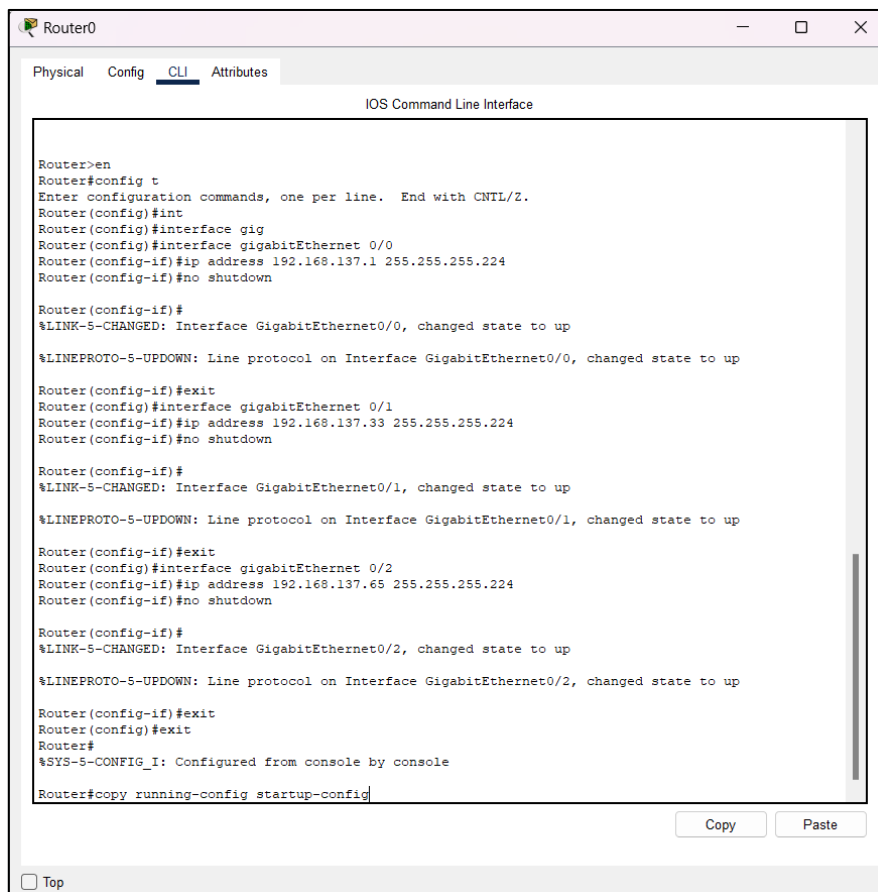
To configure the router, I clicked on the router and went to CLI. Then used the following commands:

```
Hostname# enable
Hostname# config t
Hostname(config)# interface gigabitEthernet 0/0
Hostname(config-if)# ip address 196.168.137.1 255.255.255.224
Hostname(config-if)# no shutdown
Hostname(config-if)# exit

Hostname(config)# interface gigabitEthernet 0/1
Hostname(config-if)# ip address 196.168.137.33 255.255.255.224
Hostname(config-if)# no shutdown
Hostname(config-if)# exit

Hostname(config)# interface gigabitEthernet 0/2
Hostname(config-if)# ip address 196.168.137.65 255.255.255.224
Hostname(config-if)# no shutdown
Hostname(config-if)# exit
```

Here is the screenshot of the commands:



The screenshot shows a web-based interface for a router named 'Router0'. The 'CLI' tab is selected, displaying the 'IOS Command Line Interface'. The terminal output shows the following sequence of commands and responses:

```
Router>en
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int
Router(config)#interface gig
Router(config)#interface gigabitEthernet 0/0
Router(config-if)#ip address 192.168.137.1 255.255.255.224
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

Router(config-if)#exit
Router(config)#interface gigabitEthernet 0/1
Router(config-if)#ip address 192.168.137.33 255.255.255.224
Router(config-if)#no shutdown

Router(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, changed state to up

Router(config-if)#exit
Router(config)#interface gigabitEthernet 0/2
Router(config-if)#ip address 192.168.137.65 255.255.255.224
Router(config-if)#no shutdown

Router(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/2, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/2, changed state to up

Router(config-if)#exit
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console
Router#copy running-config startup-config
```

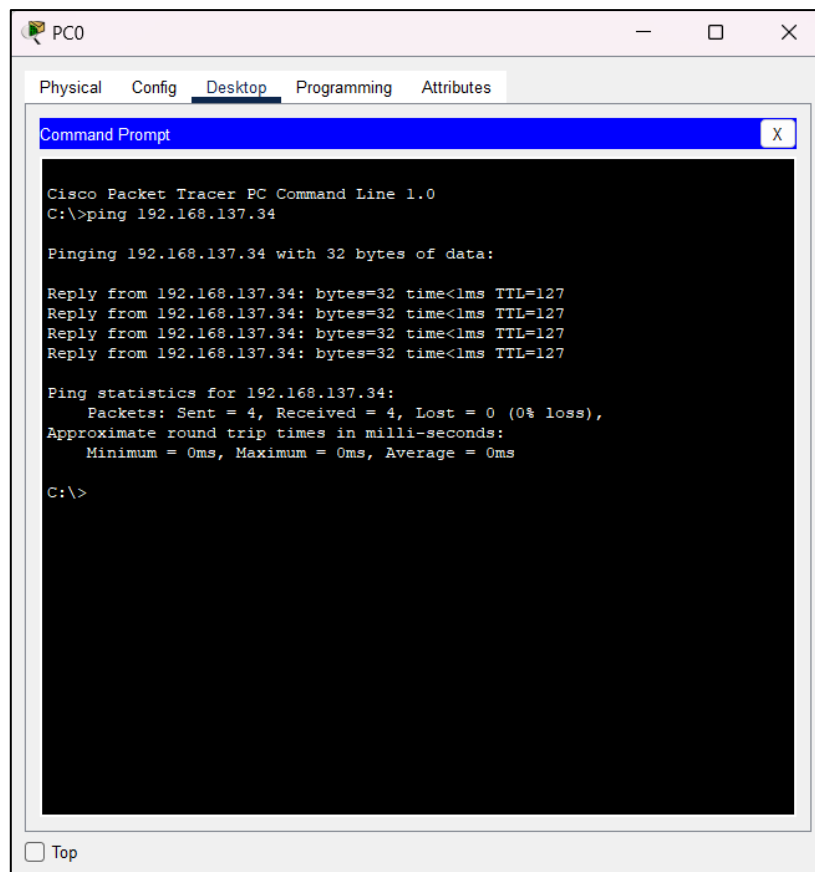
At the bottom of the terminal window, there are 'Copy' and 'Paste' buttons, and a 'Top' link.

Step 4: Using the ping command from the terminal

To ping, I clicked on PC0, went to Desktop, then Command Prompt. In the command prompt, I wrote:

```
Ping 192.168.137.34
```

Here is the screenshot of this step:



We can see that 4 packets were sent and 4 packets were received, 0 packets were lost.