

**NST21022 - Practical for  
Network Switching and  
Routing**

**Department of Information  
and Communication  
Technology  
Faculty of Technology**



**Labsheet :9  
Reg. Number: SEU/IS/20/ICT/084  
Academic Year :2020/2021  
Practical No :9**

## Title: Introduction to Network Traffic

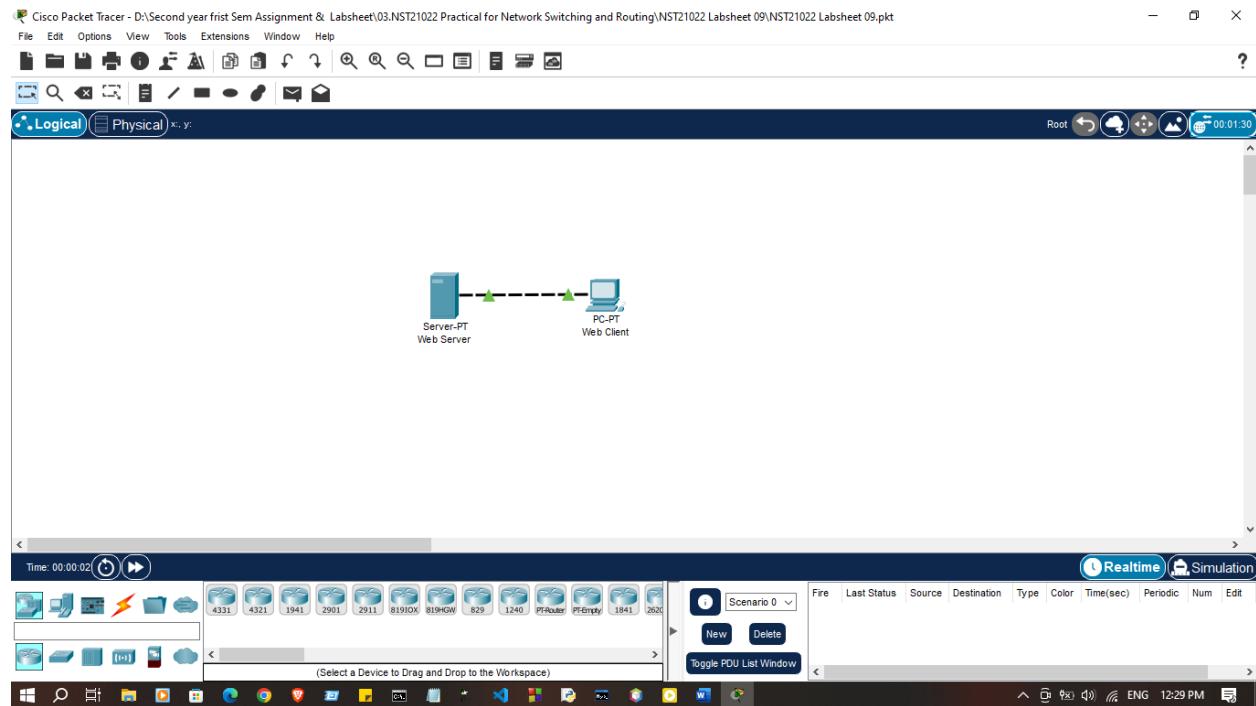
### Aim:

- Getting familiar with OSI and TCP/IP models

### Task:

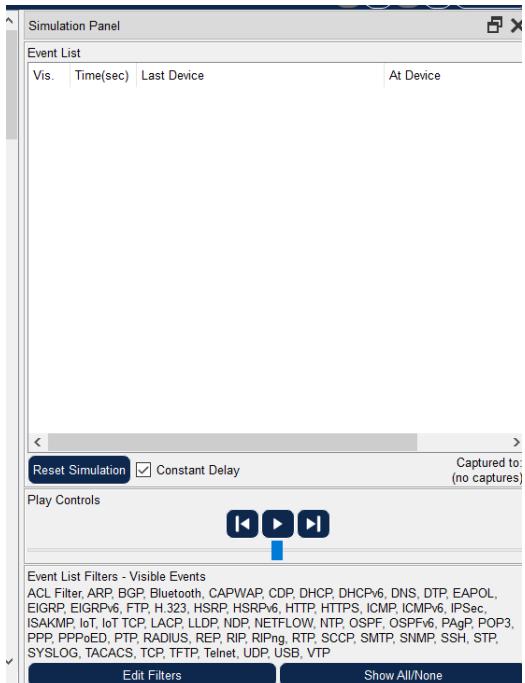
- Investigate OSI and TCP/IP models with Packet Tracer Simulation mode

### Use “NST21022 Lab sheet 09(pkt” file

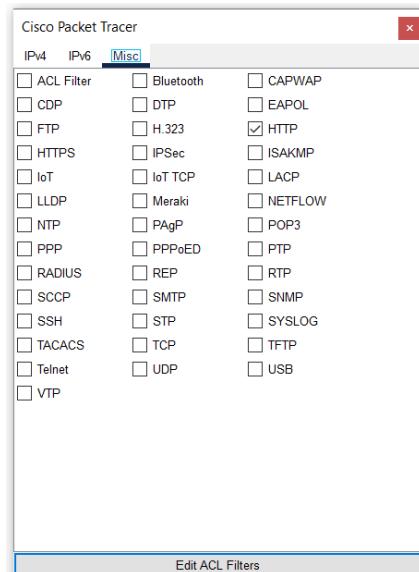


### Activities

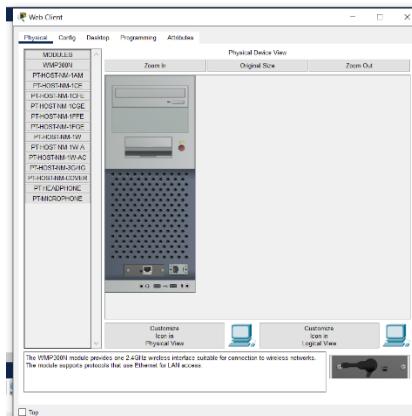
1. Open packet tracer file name “NST21022 lab sheet 09(pkt” and Click the Simulation mode icon to switch from Realtime mode to Simulation mode.



**2. Select HTTP from the Event List Filters.**



**3. Click Web Client in the far left pane.**



4. Click the Desktop tab and click the Web Browser icon to open it.



5. In the URL field, enter **www.server.com** and click Go.



6. Click Capture/Forward four times. There should be four events in the Event List

a) Look at the Web Client web browser page. Did anything change? And what?

Simulation Panel				
Event List				
Vis.	Time(sec)	Last Device	At Device	Type
	1925.974	--	Web Client	HTTP
	1925.975	--	Web Client	HTTP
	1925.976	Web Client	Web Server	HTTP
Visible	1925.977	Web Server	Web Client	HTTP

7. Click the first colored square box under the Event List > Type column. It may be necessary to expand the Simulation Panel or use the scrollbar directly below the Event List.

PDU Information at Device: Web Client

**OSI Model**    Outbound PDU Details

At Device: Web Client Source: Web Client Destination: HTTP CLIENT	
<b>In Layers</b>	<b>Out Layers</b>
Layer7	Layer 7: HTTP
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, Dest. IP: 192.168.1.254
Layer2	Layer 2: Ethernet II Header 00E0.F7D0.C7C2 >> 0040.0B37.7EB0
Layer1	Layer 1: Port(s):

1. The HTTP client sends a HTTP request to the server.

**Challenge Me**    << Previous Layer    Next Layer >>

#### 8. Ensure that the OSI Model tab is selected.

**OSI Model**    Outbound PDU Details

At Device: Web Client Source: Web Client Destination: HTTP CLIENT	
<b>In Layers</b>	<b>Out Layers</b>
Layer7	Layer 7: HTTP
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, Dest. IP: 192.168.1.254
Layer2	Layer 2: Ethernet II Header 00E0.F7D0.C7C2 >> 0040.0B37.7EB0
Layer1	Layer 1: Port(s):

1. The destination IP address is in the same subnet. The device sets the next-hop to destination.

- a) What information is listed in the numbered steps directly below the In Layers and Out Layers boxes for Layer 7?

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, Dest. IP: 192.168.1.254  
Layer 2: Ethernet II Header 00E0.F7D0.C7C2 >> 0040.0B37.7EB0  
Layer 1: Port(s):

b) What is the Dst Port value for Layer 4 under the Out Layers column?

Layer 4: TCP Src Port: 1025, Dst Port: 80

c) What is the Dst IP value for Layer 3 under the Out Layers column?

Layer 3: IP Header Src. IP: 192.168.1.1, Dest. IP: 192.168.1.254

d) What information is displayed at Layer 2 under the Out Layers column?

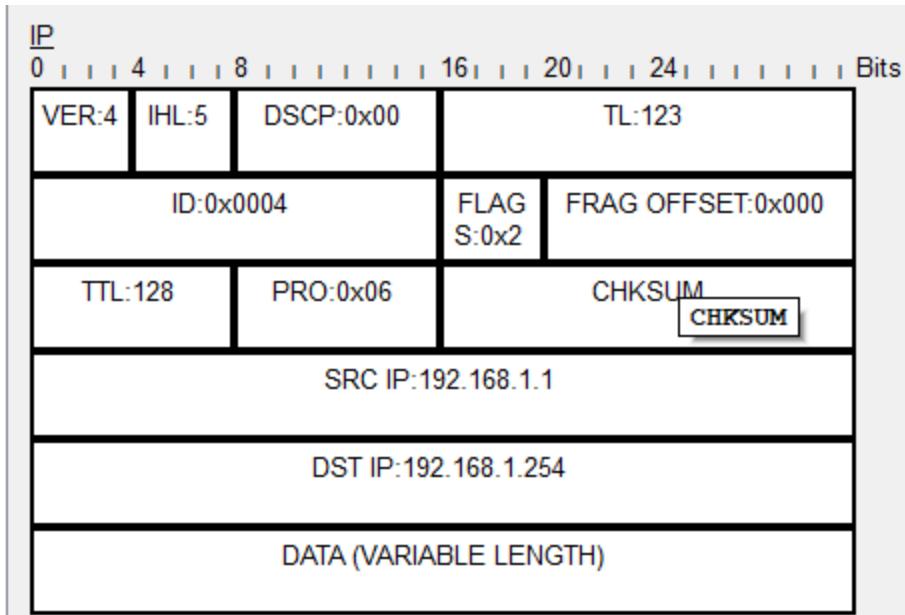
Layer2  
Layer1

Layer 2: Ethernet II Header 00E0.F7D0.C7C2 >> 0040.0B37.7EB0  
Layer 1: Port(s):

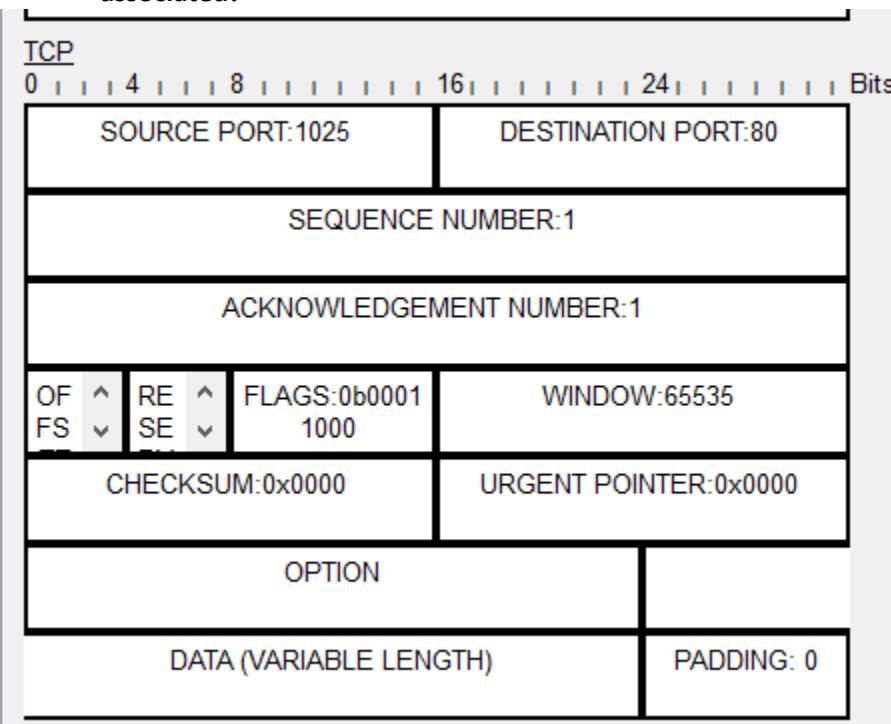
1. The next-hop IP address is a unicast. The ARP process looks it up in the ARP table.
2. The next-hop IP address is in the ARP table. The ARP process sets the frame's destination MAC address to the one found in the table.
3. The device encapsulates the PDU into an Ethernet frame.

9. Click the Outbound PDU Details tab. Information listed under the PDU Formats is reflective of the layers within the TCP/IP model.

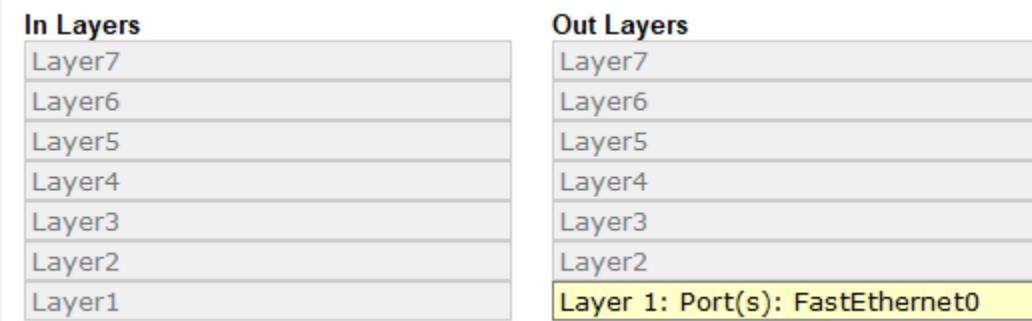
a) What is the common information listed under the IP section of PDU Details as compared to the information listed under the OSI Model tab? With which layer is it associated?



b) 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?



10. Click the next colored square box under the Event List > Type column. Only Layer 1 is active (not grayed out). The device is moving the frame from the buffer and placing it on to the network.



11. Advance to the next HTTP Type box within the Event List and click the colored square box. This window contains both In Layers and Out Layers. Notice the direction of the arrow directly under the In Layers column; it is pointing upward, indicating the direction the data is travelling. Scroll through these layers making note of the items previously viewed. At the top of the column the arrow points to the right. This denotes that the server is now sending the information back to the client.

- a) Comparing the information displayed in the In Layers column with that of the Out Layers column, what are the major differences?

**Simulation Panel**

**PDU Information at Device: Web Server**

**Event List**

Vis.	Time(sec)	Last Device
	1925.974	-
	1925.975	-
Visible	1925.977	Web Client
		Web Server

**OSI Model**   **Inbound PDU Details**   **Outbound PDU Details**

**In Layers**

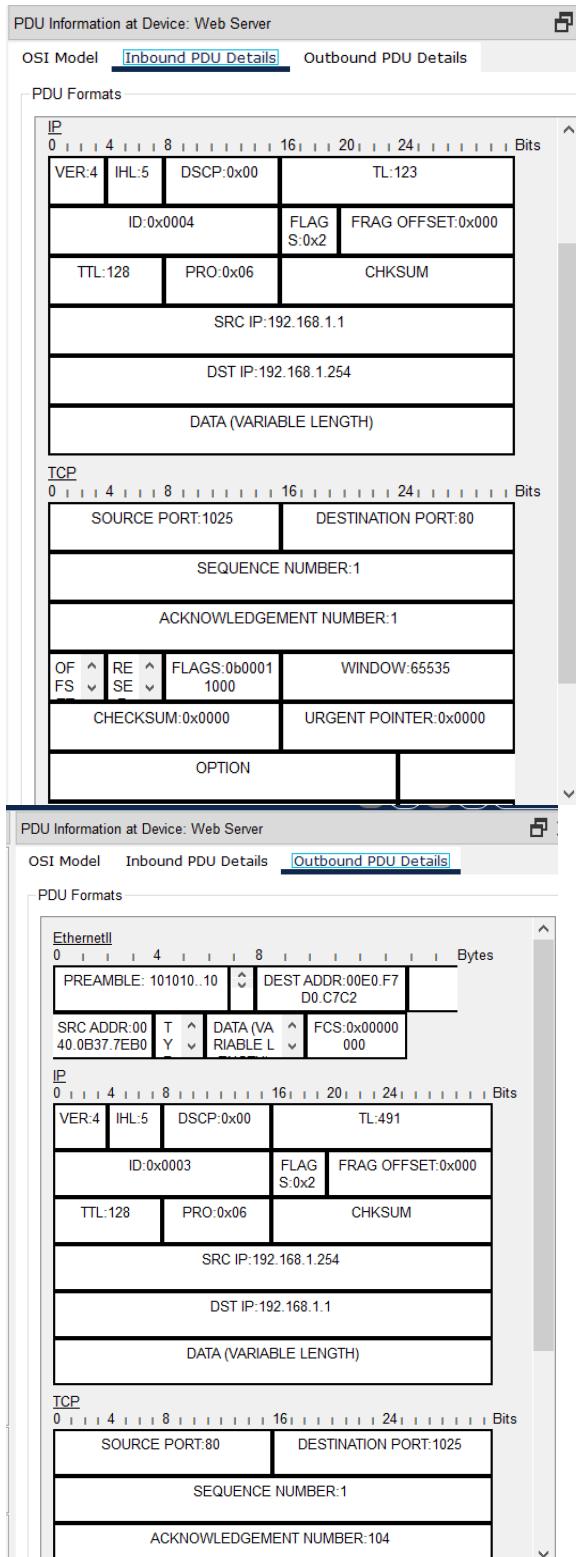
- Layer 7: HTTP
- Layer6
- Layer5
- Layer 4: TCP Src Port: 1025, Dst Port: 80
- Layer 3: IP Header Src. IP: 192.168.1.1, Dest. IP: 192.168.1.254
- Layer 2: Ethernet II Header 00E0.F7D0.C7C2 >> 00E0.0B37.7EB0
- Layer 1: Port FastEthernet0

**Out Layers**

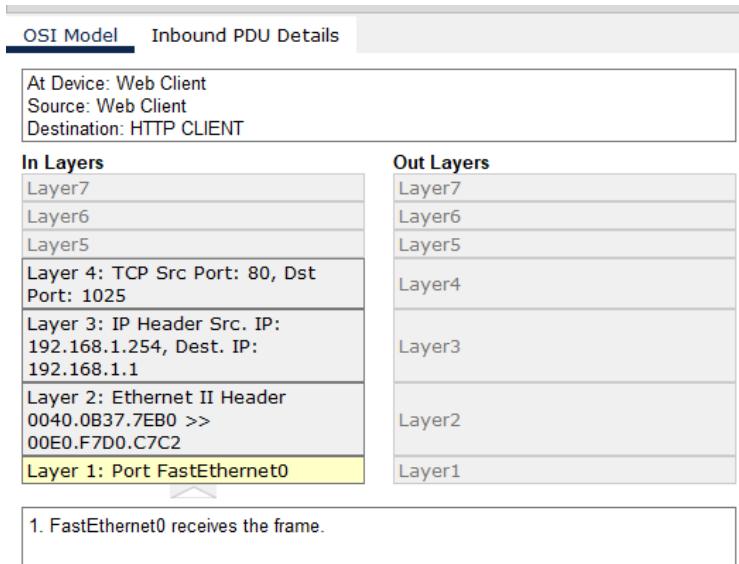
- Layer 7: HTTP
- Layer6
- Layer5
- Layer 4: TCP Src Port: 80, Dst Port: 1025
- Layer 3: IP Header Src. IP: 192.168.1.254, Dest. IP: 192.168.1.1
- Layer 2: Ethernet II Header 00E0.0B37.7EB0 >> 00E0.F7D0.C7C2
- Layer 1: Port(s): FastEthernet0

1. FastEthernet0 receives the frame.

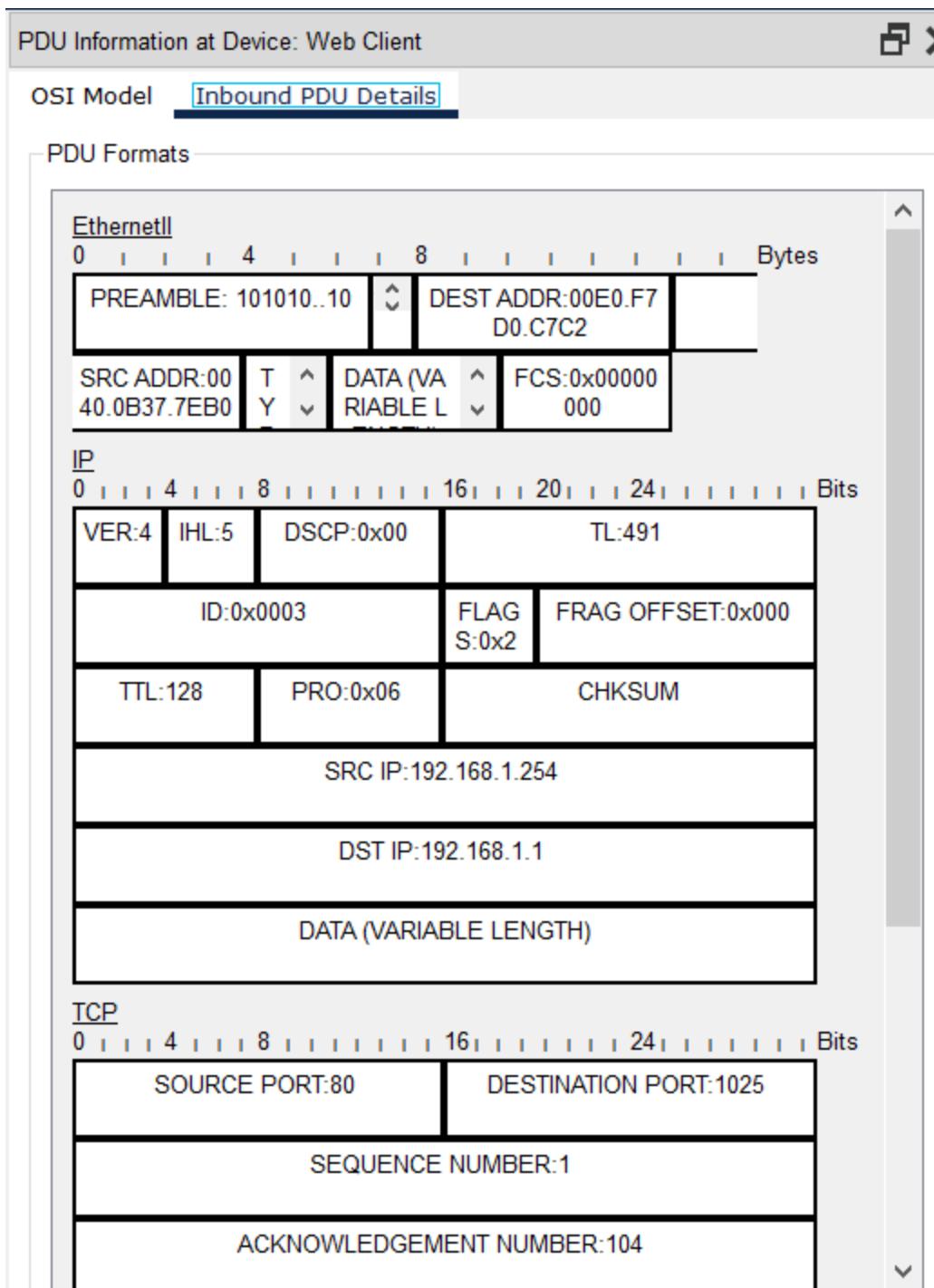
12. Click the Inbound and Outbound PDU Details tab. Review the PDU details.



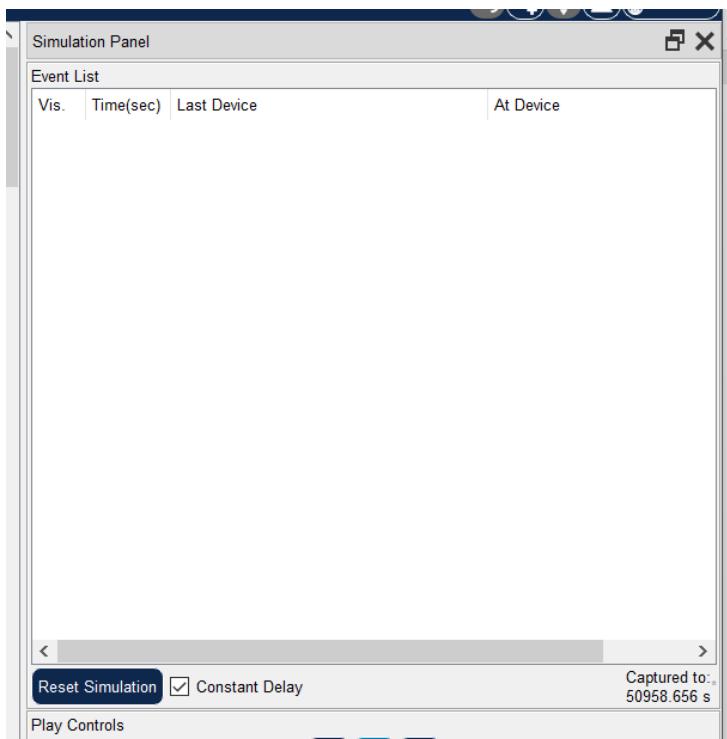
13. Click the last colored square box under the Info column.



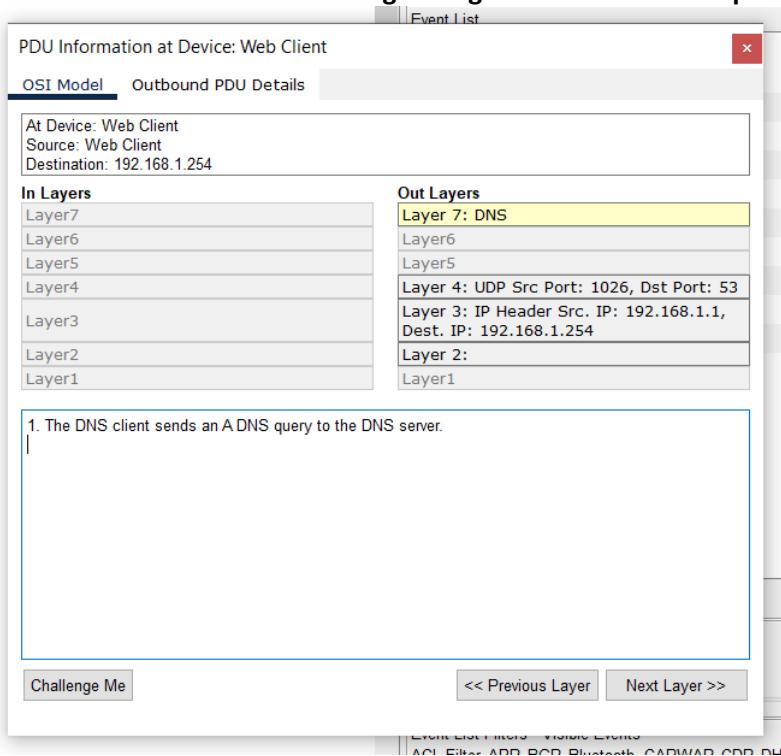
14. **Close any open PDU information windows.**



15. In the Event List Filters > Visible Events section, click Show All/None.
- a) What additional Event Types are displayed?

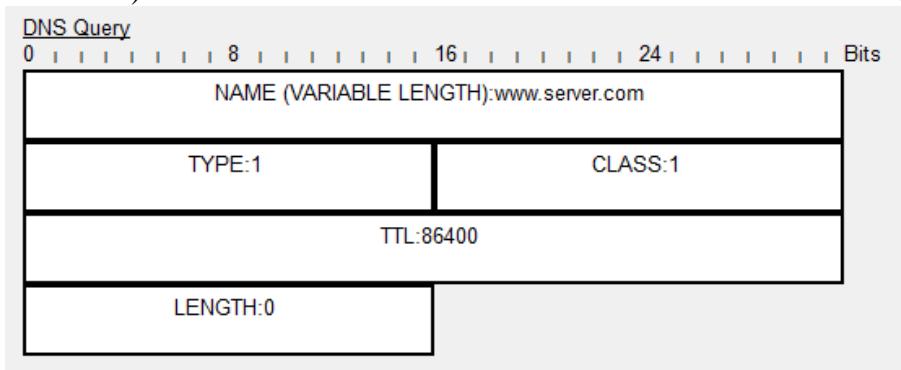


16. Click the first DNS event in the Type column. Explore the OSI Model and PDU Detail tabs and note the encapsulation process. As you look at the OSI Model tab with Layer 7 highlighted, a description of what is occurring is listed directly below the In Layers and Out Layers (“1. The DNS client sends a DNS query to the DNS server.”). This is very useful information to help understand what is occurring during the communication process.



17. Click the Outbound PDU Details tab.

a) What information is listed in the NAME field: in the DNS QUERY section?



18. Click the last DNS Info colored square box in the event list.

a) At which device was the PDU captured?

The screenshot shows the NetworkMiner interface. The left pane displays the OSI Model and Inbound PDU Details tabs. The Inbound PDU Details tab is selected, showing details about the captured packet: At Device: Web Client, Source: Web Client, Destination: 192.168.1.254. The right pane shows the In Layers and Out Layers sections. The In Layers section lists layers from Layer 1 to Layer 7, with Layer 1 highlighted in yellow. The Out Layers section lists layers from Layer 1 to Layer 7. Below the layers is a text area containing the note "1. FastEthernet0 receives the frame." At the bottom are buttons for Challenge Me, << Previous Layer, and Next Layer >>.

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

DNS Answer		Bits
0	8	16
NAME (VARIABLE LENGTH):www.server.com		
TYPE:1		CLASS:1
	TTL:86400	
LENGTH:4		IP:192.168.1.254

19. 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.

a. In the numbered list directly below the In Layers and Out Layers, what is the information displayed under items 4 and 5?

In Layers
Layer7
Layer6
Layer5
Layer4
Layer3
Layer2
Layer1

Out Layers
Layer 7:
Layer6
Layer5
Layer 4: TCP Src Port: 1026, Dst Port: 80
Layer 3: IP Header Src. IP: 192.168.1.1, Dest. IP: 192.168.1.254
Layer 2: Ethernet II Header 00E0.F7D0.C7C2 >> 0040.0B37.7EB0
Layer 1: Port(s): FastEthernet0

20. Click the last TCP event. Highlight Layer 4 in the OSI Model tab. Examine the steps listed directly below In Layers and Out Layers.

b. What is the purpose of this event, based on the information provided in the last item in the list (should be item 4)?

## Discussion

- In this lab session, we explored the OSI and TCP/IP models using Packet Tracer's Simulation mode to understand how data flows through a network. By investigating these models, we gained insights into the different layers involved in network communication, such as how the OSI model's seven layers correspond to specific functions, and how the TCP/IP model streamlines these functions into four layers. Through Packet Tracer's simulation, we observed how data packets move from one device to another, passing through each layer of the models. This practical investigation helped solidify our understanding of the OSI and TCP/IP models' roles in network communication and data transmission.