



INVESTIGATE THE TCP/IP AND OSI MODEL REPORT



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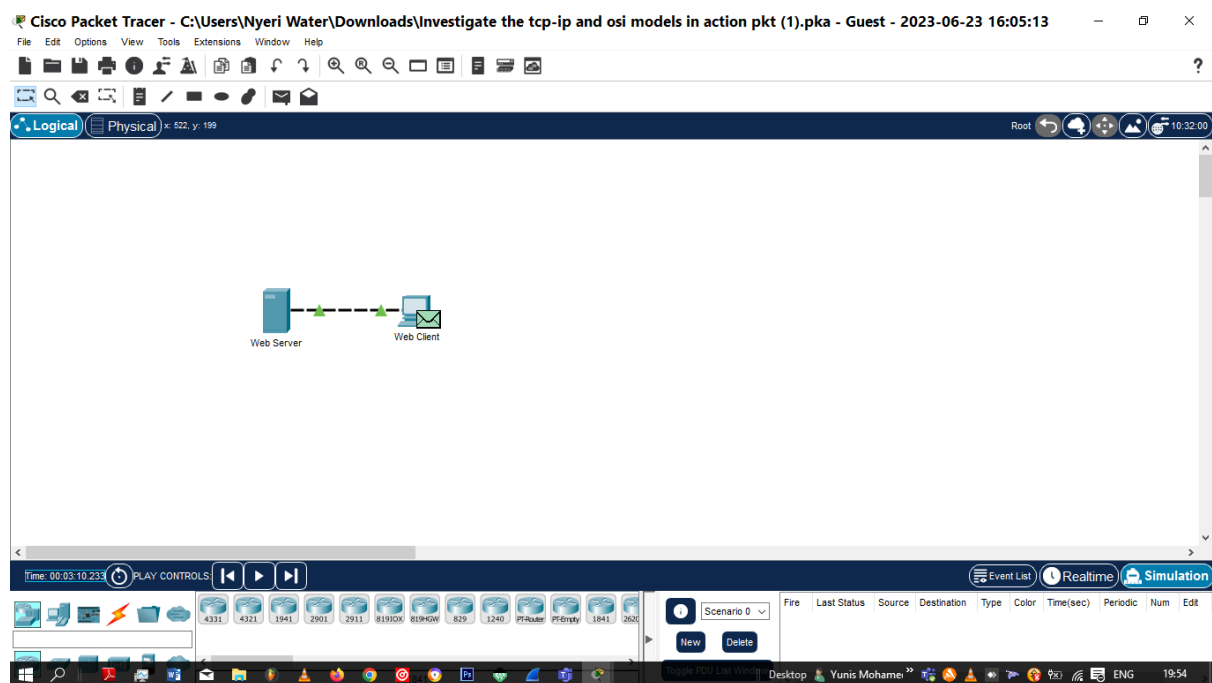
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Introduction

This report presents the findings of an investigation into the TCP/IP and OSI models using Packet Tracer. The objective of this investigation was to gain a comprehensive understanding of the underlying principles and functioning of these models in the context of computer networks. By utilizing Packet Tracer's capabilities, various network scenarios were created, network devices were configured, and data packet flows were observed in real-time. Through this investigation, the layered structure of the TCP/IP and OSI models will be examined, protocols within each layer analysed, the following sections of this report will present a detailed analysis of the investigation and the key insights gained from it.

Investigate the TCP/IP and OSI Models in Action

Network used for this investigation:



Part 1: Examine HTTP Web Traffic

In Part 1 of this activity, you will use Packet Tracer (PT) Simulation mode to generate web traffic and examine HTTP.

Step 1: Switch from Real-time to Simulation mode.

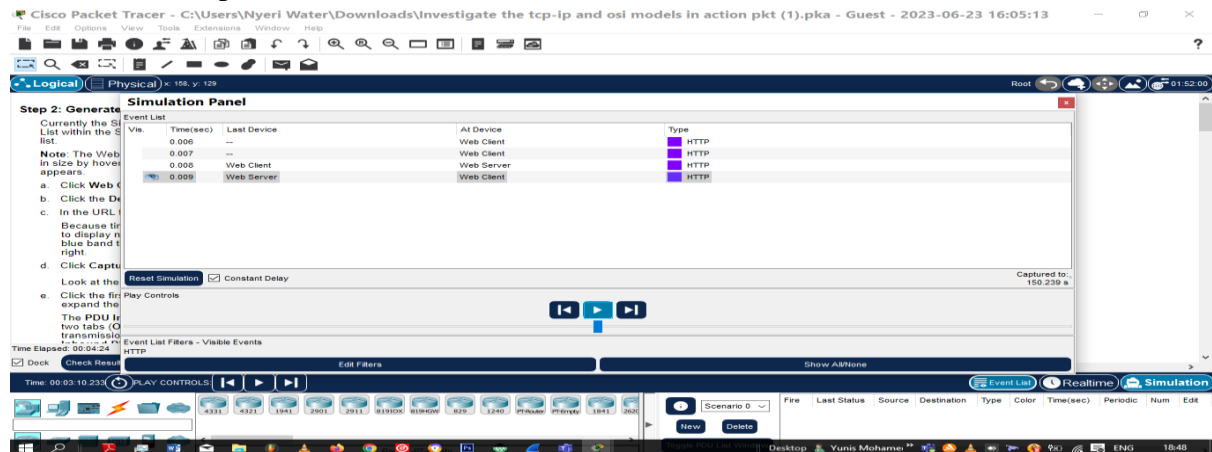
- Click the Simulation mode icon to switch from Real-time mode to Simulation mode.
- Select HTTP from the Event List Filters.

Click the Show All/None check box until all boxes are cleared and then select HTTP from the Misc. tab of the Edit Filters window. Click the X in the upper right hand corner of the window to close the Edit Filters window. The Visible Events should now only display HTTP.

Step 2: Generate web (HTTP) traffic.

Currently the Simulation Panel is empty. There are five columns listed across the top of the Event List within the Simulation Panel. As traffic is generated and stepped through, events appear in the list.

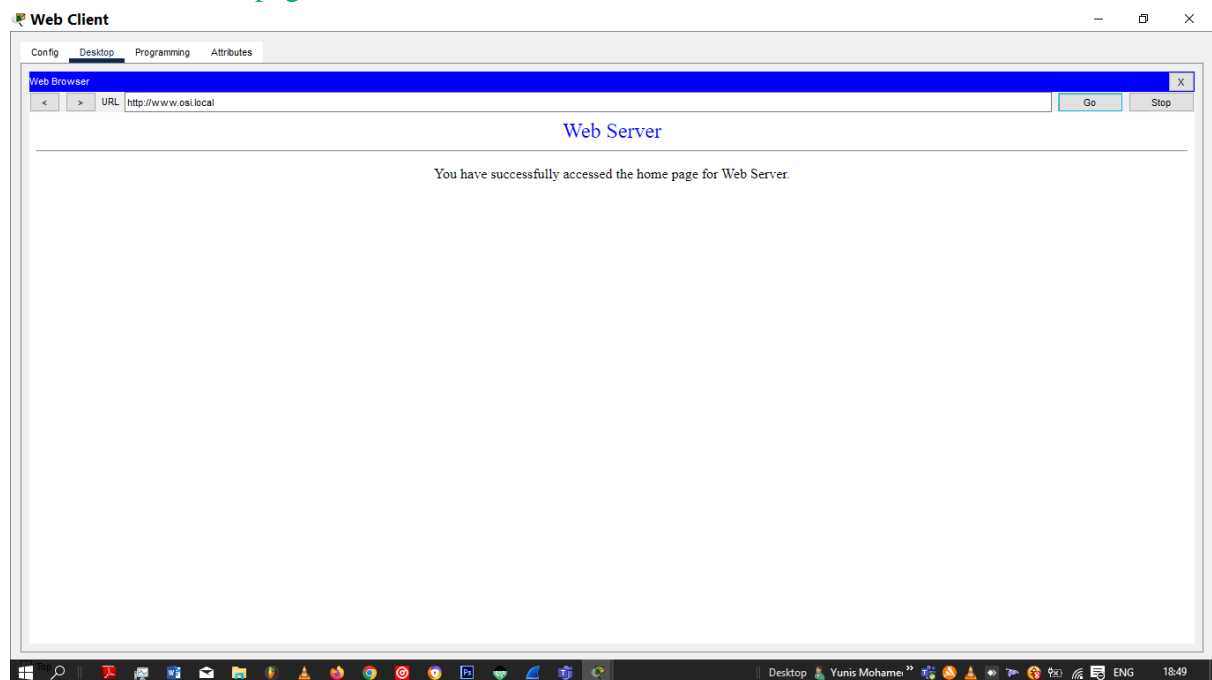
- Click the Desktop tab and click the Web Browser icon to open it.
- In the URL field, enter `www.osi.local` and click Go.
- Click Capture/Forward four times. There should be four events in the Event List.



Question:

Look at the Web Client web browser page. Did anything change?

Yes the http protocol is added to the link URL. A message indicating that I have successfully accessed the Homepage for the webserver.



- Click the first coloured 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. The PDU Information at Device: Web Client window displays. In this window, there are only two tabs (OSI Model and Outbound PDU Details) because this is the start

of the transmission. As more events are examined, there will be three tabs displayed, adding a tab for Inbound PDU Details. When an event is the last event in the stream of traffic, only the OSI Model and Inbound PDU Details tabs are displayed.

- e) Under the Out Layers column, click Layer 7.

Questions:

What information is listed in the numbered steps directly below the In Layers and Out Layers boxes for Layer 7? **The HTTP client sends a HTTP request to the server.**

What is the Dst Port value for Layer 4 under the Out Layers column? **Port 80.**

What is the Dest. IP value for Layer 3 under the Out Layers column? **192.168.1.154.**

What information is displayed at Layer 2 under the Out Layers column? **Ethernet II Header 0060.47CA.4DEE >> 0001.96A9.401D.**

The screenshot displays the Cisco Packet Tracer interface. The main window shows the 'PDU Information at Device: Web Client' dialog box. The 'OSI Model' tab is selected, showing the 'In Layers' and 'Out Layers' columns. The 'Out Layers' column is expanded, showing the following information:

- Layer 7: HTTP
- Layer 6
- Layer 5
- 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 0060.47CA.4DEE >> 0001.96A9.401D
- Layer 1: Port(s)

The 'Event List' tab is also visible, showing a single event: '1. The HTTP client sends a HTTP request to the server.'

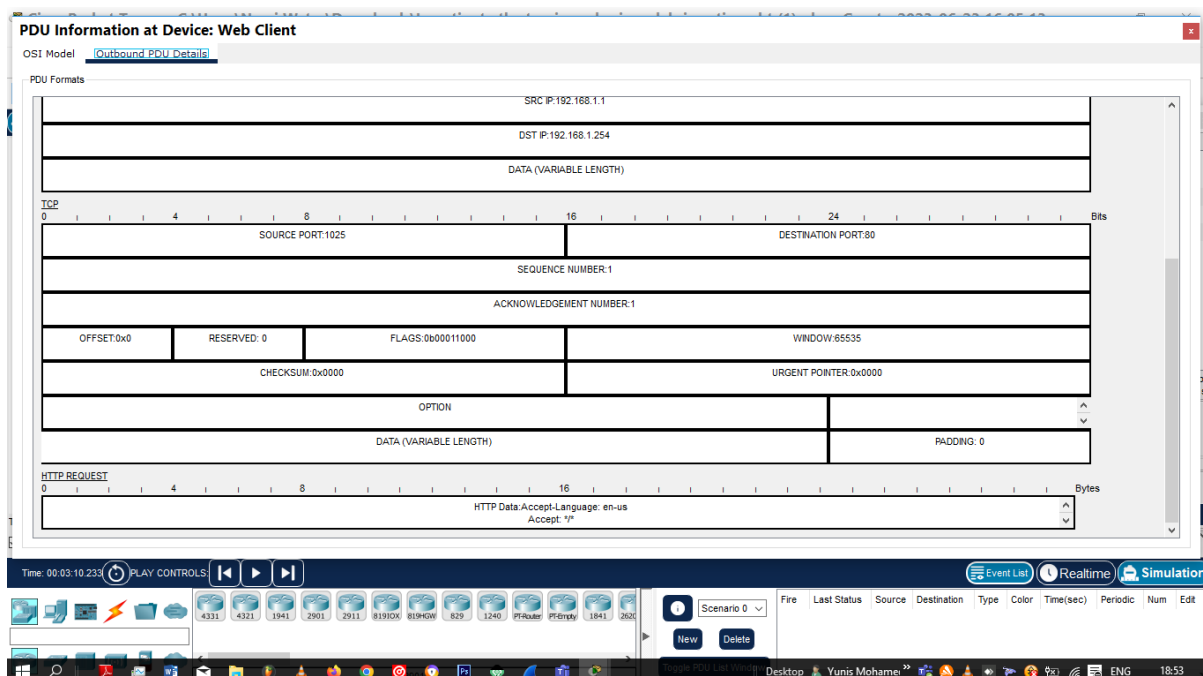
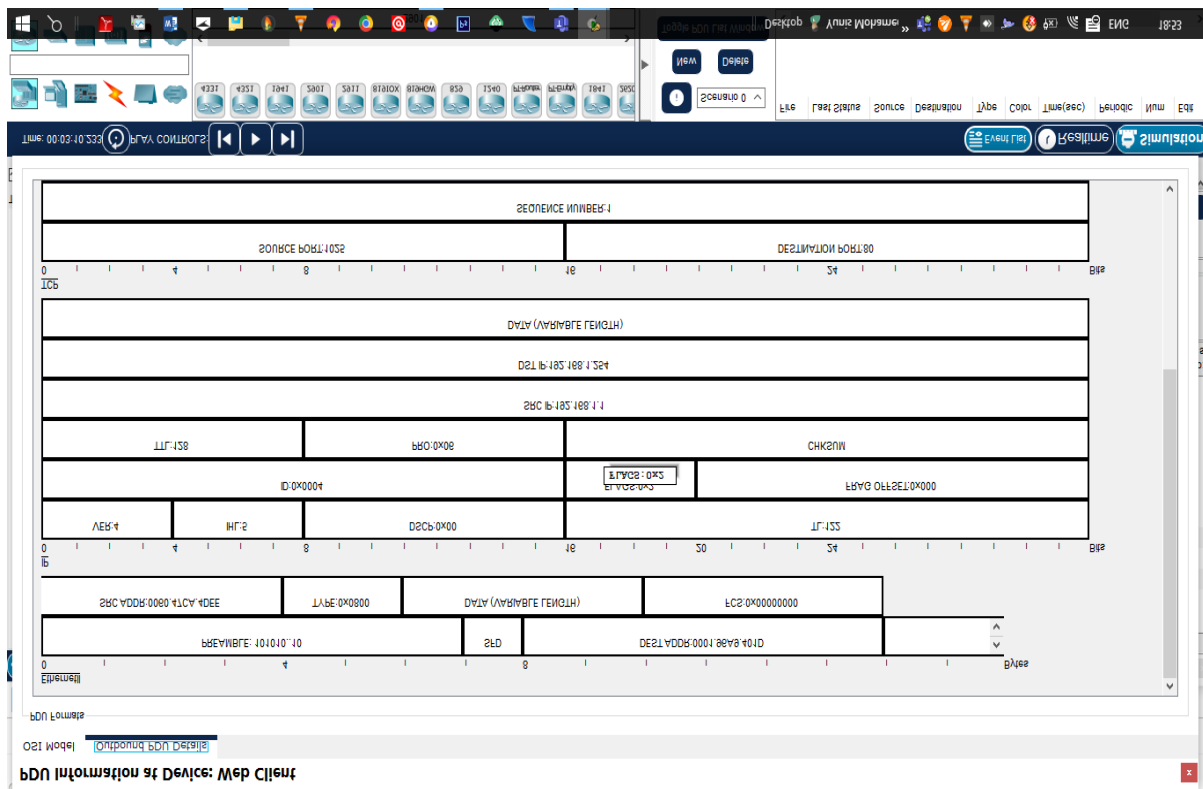
- f) Click the Outbound PDU Details tab. Information listed under the PDU Formats is reflective of the layers within the TCP/IP model. Note: The information listed under the Ethernet II section of the Outbound PDU Details tab provides even more detailed information than is listed under Layer 2 on the OSI Model tab. The Outbound PDU Details provides more descriptive and detailed information. The values under DEST MAC and SRC MAC within the Ethernet II section of the PDU Details appear on the OSI Model tab under Layer 2, but are not identified as such.

Questions:

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? **Source IP and Destination IP. Layer 3 in OSI Model.**

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? **Source port 1026 and destination port 80. Layer 4 in OSI Model.**

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? www.osi.local. Layer 7.



- g) Advance to the next HTTP Type box within the Event List and click the coloured 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.

Question:

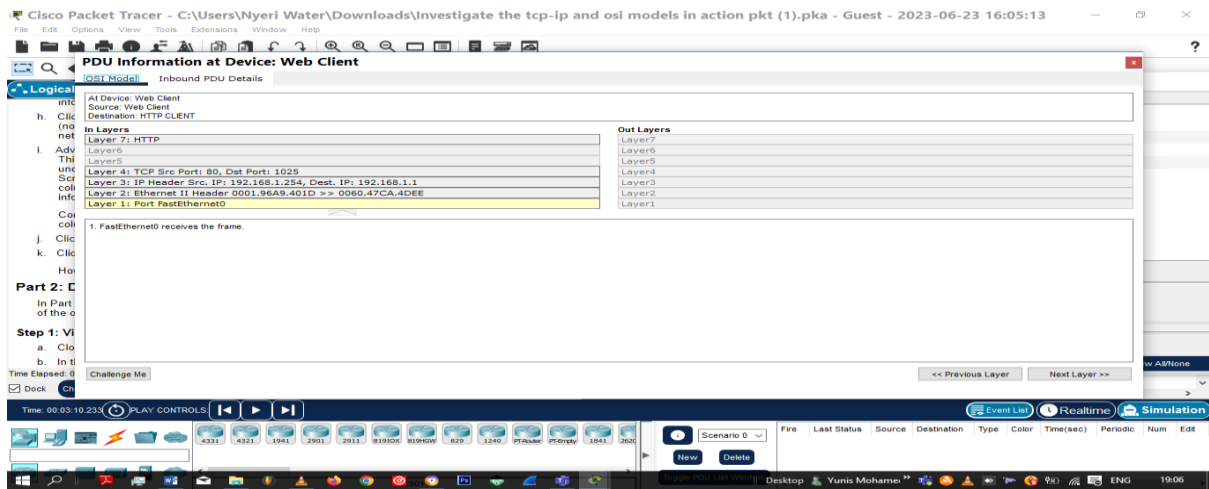
Comparing the information displayed in the In Layers column with that of the Out Layers column, what are the major differences? ===== In.

In layer	Out layer
Layer 4 TCP Src Port is 1025	Layer 4 TCP Src Port is 80
Layer 4 TCP Dst Port is 80	Layer 4 TCP Src Port is 1025
Layer 3 IP Header Src IP is 192.168.1.1	Layer 3 IP Header Src IP is 192.168.1.254
Layer 3 IP Header Dst IP is 192.168.1.254	Layer 3 IP Header Dst IP is 192.168.1.1
Layer 2 Ethernet Header 0060.47CA.4DEE >> 0001.96A9.401D	Layer 2 Ethernet Header 0001.96A9.401D >> 0060.47CA.4DEE

- h) Click the last coloured square box under the Info column.

Question:

How many tabs are displayed with this event? Explain. There are two tabs, the OSI model and the inbound PDU detail tab. This means the web server replies to the web client and the web client receives the reply, hence no more communication between the server and client.



Part 2: Display Elements of the TCP/IP Protocol Suite

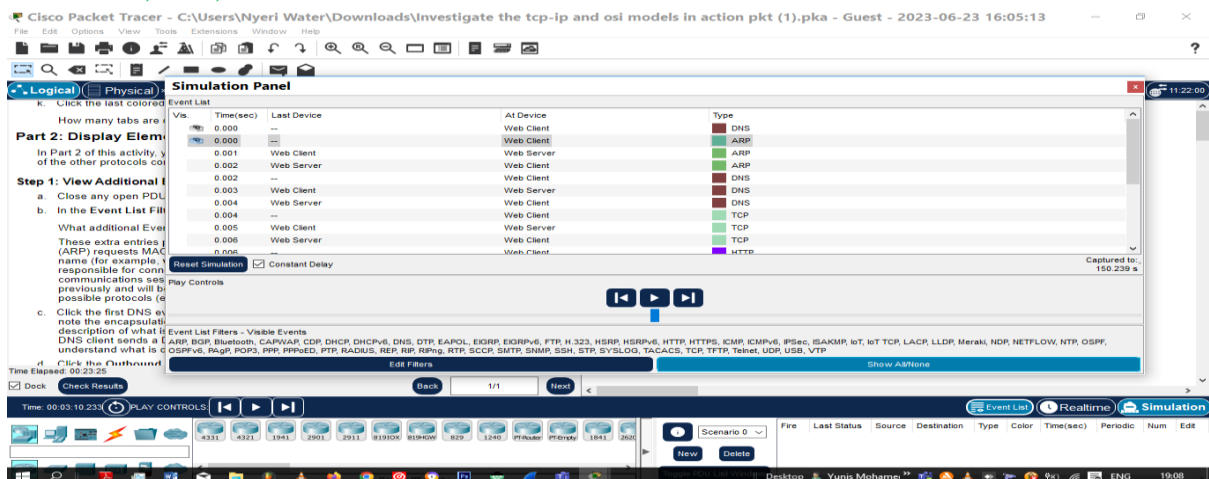
In Part 2 of this activity, you will use the Packet Tracer Simulation mode to view and examine some of the other protocols comprising of TCP/IP suite.

Step 1: View Additional Events

- Close any open PDU information windows.
- In the Event List Filters > Visible Events section, click Show All/None.

Question:

What additional Event Types are displayed? ARP, BGP, Bluetooth, CAPWAP, CDP, DHCP, DHCPv6, DTP, EAPOL, EIGRP, EIGRPv6, FTP, H.323, HSRP, HSRPv6, HTTPS, HTTPS, ICMP, ICMPv6, IPsec, ISAPMP, IoT, TCP, LACP, LLDP, Meraki, NDP, NETFLOW, NTP, OSPF, OSPFv6, PAgP, POP3, PPP, PPPoE, PTP, RADIUS, REP, RIP, RIPng, RTP, SCCP, SMTP, SSH, STP, SYSLOG, TACACS, TCP, TFTP, TELNET, UDP, USB, VTP



- Click the Outbound PDU Details tab.

Question: What information is listed in the NAME field: in the DNS QUERY section?
www.osi.local.

Cisco Packet Tracer - C:\Users\Nyeri Water\Downloads\Investigate the tcp-ip and osi models in action pkt (1).pka - Guest - 2023-06-23 16:05:13

File Edit Options View Tools Extensions Window Help

Logical Physical 345

Step 1: View Additional Event

a. Close any open PDU info

b. In the Event List Filters

What additional Event Ty

These extra entries play (ARP) requests MAC add name (for example, www responsible for connectin communications sessions previously and will be fur possible protocols (event

c. Click the first DNS event

note the encapsulation pr description of what is occ DNS client sends a DNS understand what is occur

d. Click the Outbound PDU

What information is listed

e. Click the last DNS Info

At which device was the

What is the value listed n

Details?

Time Elapsed: 00:26:08

Check Results

Time: 00:03:10.233 PLAY CONTROLS

Scenario 0

New Delete

Fire Last Status Source Destination Type Color Time(sec) Periodic Num Edit

Desktop Yunis Mohame

ENG 19:10

PDU Information at Device: Web Client

OST Model Outbound PDU Details

PDU Formats

LENGTH:0x0025 CHECKSUM:0

DATA (VARIABLE LENGTH)

DNS Header

Transaction ID:0xc1c1 Opcode:0x1 Z RCODE:0x0

QDCOUNT:1 ANCOUNT:0

NSCOUNT:0 ARCOUNT:0

DNS Query

NAME (VARIABLE LENGTH):www.osi.local

TYPE:1 CLASS:1

TTL:86400

LENGTH:0

d) Click the last DNS Info coloured square box in the event list.

Questions:

At which device was the PDU captured? **Web client.**

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File Edit Options View Tools Extensions Window Help

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previously and will possible protocols

c. Click the first DNS

note the encapsul description of what DNS client sends understand what i

d. Click the Outbour

What information

e. Click the last DNS

At which device w

What is the value

Details?

f. Find the first HTTP

immediately follow

In the numbered li displayed under it

TCP manages the other responsibilit ESTABLISHED.

g. Click the last TCP

directly below In L

Time Elapsed: 00:27:46

Check Results

Time: 00:03:10.233 PLAY CONTROLS

Scenario 0

New Delete

Fire Last Status Source Destination Type Color Time(sec) Periodic Num Edit

Desktop Yunis Mohame

ENG 19:12

PDU Information at Device: Web Client

OST Model Inbound PDU Details

At Device: Web Client

Source: Web Client

Destination: 192.168.1.254

In Layers

Layer 7: DNS

Layer6

Layer5

Layer4: UDP Src Port: 53, Dst Port: 1025

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

Layer 2: Ethernet II Header 0001.96A9.401D >> 0060.47CA.4DEE

Layer 1: Port FastEthernet0

Out Layers

Layer7

Layer6

Layer5

Layer4

Layer3

Layer2

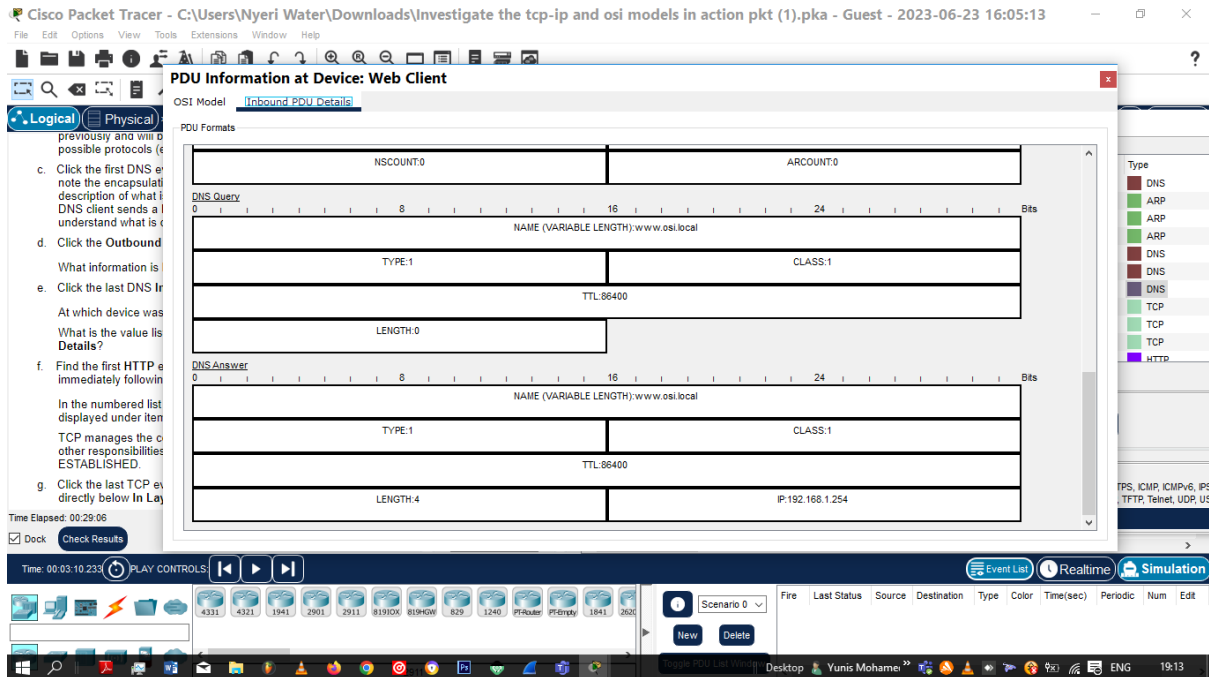
Layer1

1. FastEthernet0 receives the frame.

Challenge Me

<< Previous Layer Next Layer >>

What is the value listed next to ADDRESS: in the DNS ANSWER section of the Inbound PDU Details? **192.168.1.254.**



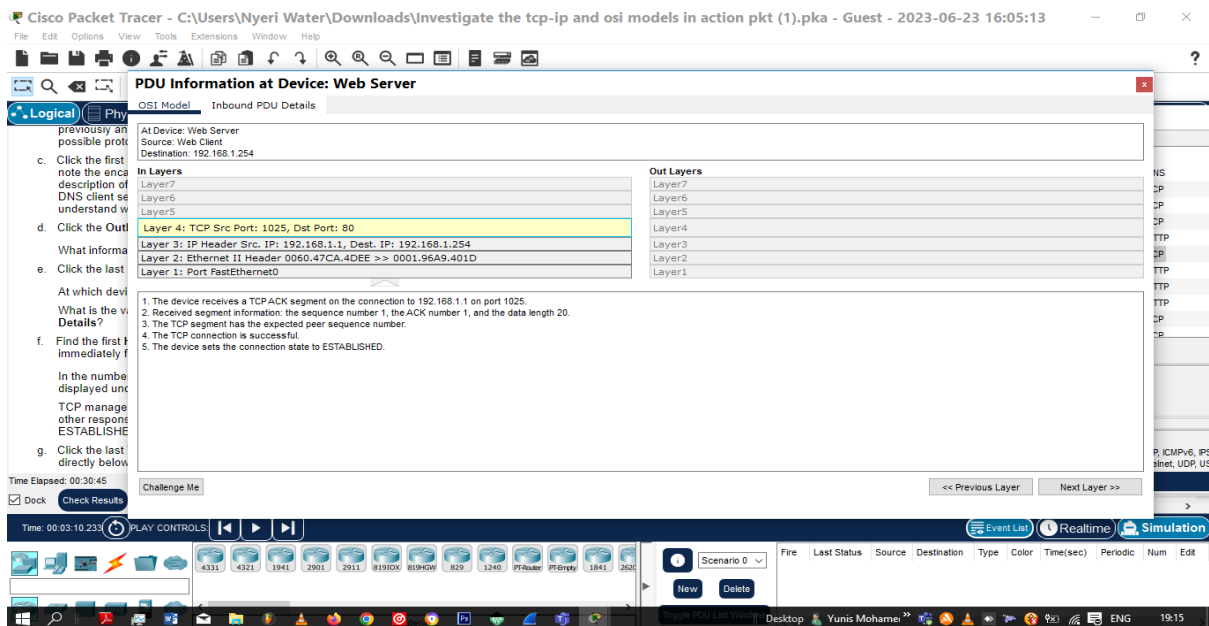
- e) Find the first HTTP event in the list and click the coloured square box of the TCP event immediately following this event. Highlight Layer 4 in the OSI Model tab.

Question:

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

4. The TCP connection is successful.

5. The device sets the connection state to ESTABLISHED



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

Question:

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

The webserver closes its connection with the client.

Cisco Packet Tracer - C:\Users\Nyeri Water\Downloads\Investigate the tcp-ip and osi models in action pkt (1).pka - Guest - 2023-06-23 16:05:13

At which details? f. Find the first immediate In the num displayed TCP mana other resp ESTABLIS g. Click the la directly be What is the (should be

Challenge Qu This simulation area network (server must be OSI Model tab Based on the i the Web Serv Time Elapsed: 00:32:11 Dock Check Results

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

Out Layers
Layer7
Layer6
Layer5
Layer4
Layer3
Layer2
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 104, the ACK number 273, and the data length 20.
3. The TCP segment has the expected peer sequence number.
4. The device sets the connection state to CLOSED.

Challenge Me << Previous Layer Next Layer >>

Time: 00:03:10.233 PLAY CONTROLS Scenario 0 Fire Last Status Source Destination Type Color Time(sec) Periodic Num Edit

Desktop Yunis Mohame

Challenge Questions

This simulation provided an example of a web session between a client and a server on a local area network (LAN). The client makes requests to specific services running on the server. The server must be set up to listen on specific ports for a client request. (Hint: Look at Layer 4 in the OSI Model tab for port information.)

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? Port 80.

Cisco Packet Tracer - C:\Users\Nyeri Water\Downloads\Investigate the tcp-ip and osi models in action pkt (1).pka - Guest - 2023-06-23 16:05:13

At which details? f. Find the first HTTP event immediately following the TCP manages the conn other responsibilities. TH ESTABLISHED. g. Click the last TCP event directly below In Layers What is the purpose of it (should be item 4)?

Challenge Questions This simulation provided an area network (LAN). The cli server must be set up to list OSI Model tab for port info Based on the information the Web Server listening on What port is the Web Serv Time Elapsed: 00:38:44 Dock Check Results

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

Out Layers
Layer7
Layer6
Layer5
Layer4
Layer3
Layer2
Layer1

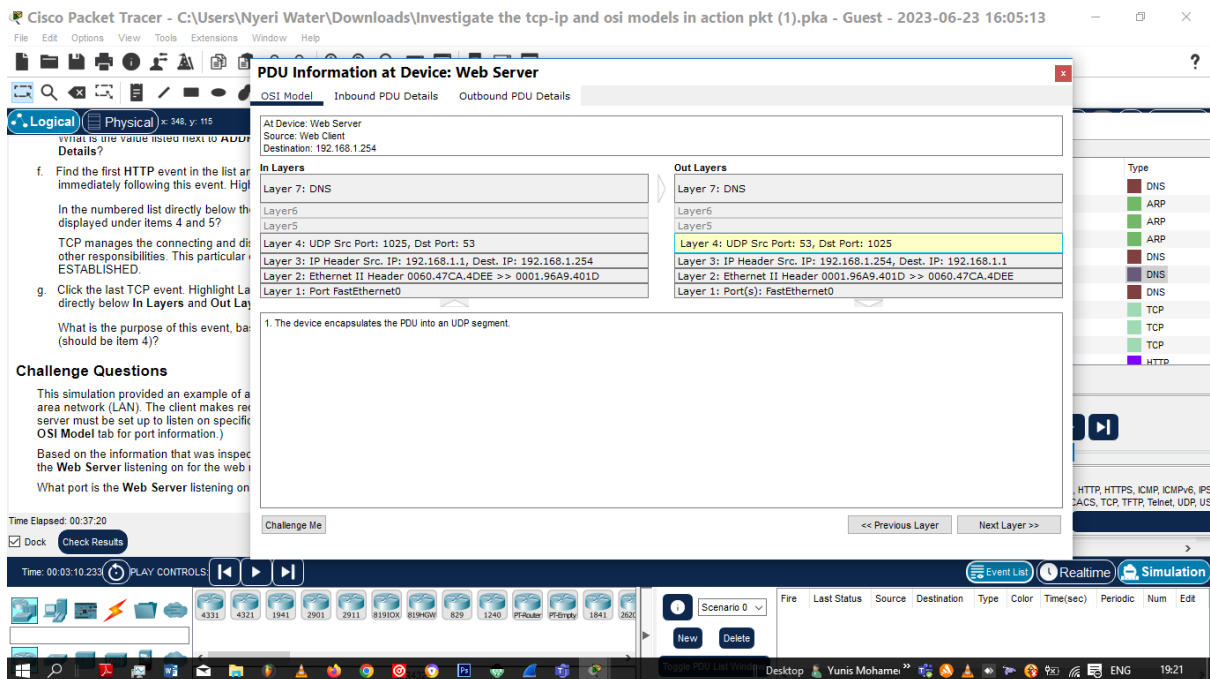
1. FastEthernet0 receives the frame

Challenge Me << Previous Layer Next Layer >>

Time: 00:03:10.233 PLAY CONTROLS Scenario 0 Fire Last Status Source Destination Type Color Time(sec) Periodic Num Edit

Desktop Yunis Mohame

What port is the Web Server listening on for a DNS request? **Port 53.**



Conclusion

Through investigating the TCP/IP and OSI models using Packet Tracer, I have learnt the importance of the TCP/IP and OSI models as conceptual frameworks for designing and implementing network protocols. By delving into the details of each layer of the TCP/IP and OSI models, I have gained a deeper appreciation for the division of responsibilities and the hierarchical nature of network protocols. I have learnt that each layer performs specific functions, building upon the services provided by the layer below it, ultimately resulting in the successful transmission and delivery of data. Additionally, the lab has highlighted the significance of protocols within each layer. Protocols such as TCP, UDP, IP, Ethernet, and many others play crucial roles in facilitating reliable communication, addressing, and routing of data packets. In conclusion, investigating the TCP/IP and OSI models in Packet Tracer has been a valuable learning experience. It has allowed me to grasp the intricacies of network communication, appreciate the significance of each layer and protocol, and comprehend the overall architecture of computer networks.