

Course: **Cloud and Network Security -C2 -2025**

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Week 1 Assignment 1:
Examine TCP/IP and OSI Models in Action

Table of Contents

Introduction	3
Objective:	3
Part 1: Examining HTTP Web Traffic	3
Step 1: Switching to Simulation Mode	3
Step 2: Generating HTTP Traffic	4
Part 2: Displaying TCP/IP Protocol Suite Elements	8
Challenge Questions	11
Conclusion	12

Introduction

In this lab, I explored the inner workings of network communication using Cisco Packet Tracer's Simulation Mode. The main objective was to understand how the TCP/IP protocol suite and the OSI reference model interact when data is sent and received over a network. I simulated a basic web browsing session between a client and a local web server to observe how data is encapsulated and decapsulated at each layer of the OSI model.

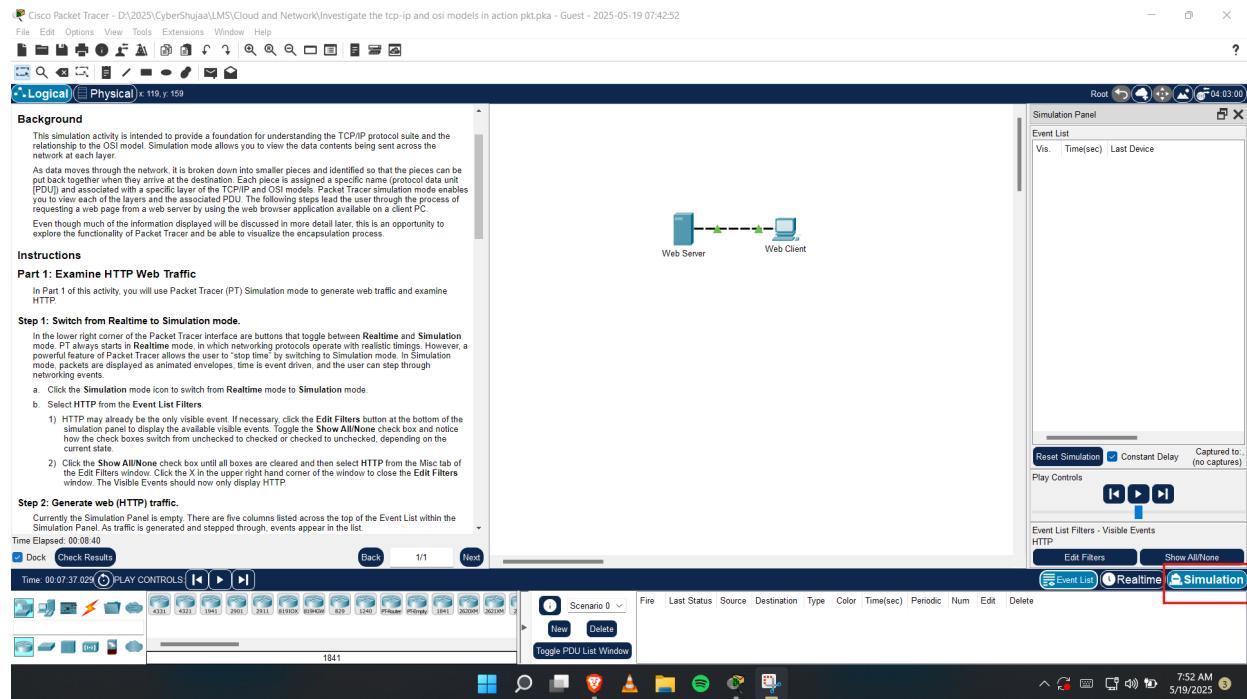
Objective:

To examine the operation of the TCP/IP protocol suite and the OSI model using Cisco Packet Tracer Simulation Mode. The focus is capturing and analyzing HTTP web traffic and viewing different protocol layers and encapsulation processes.

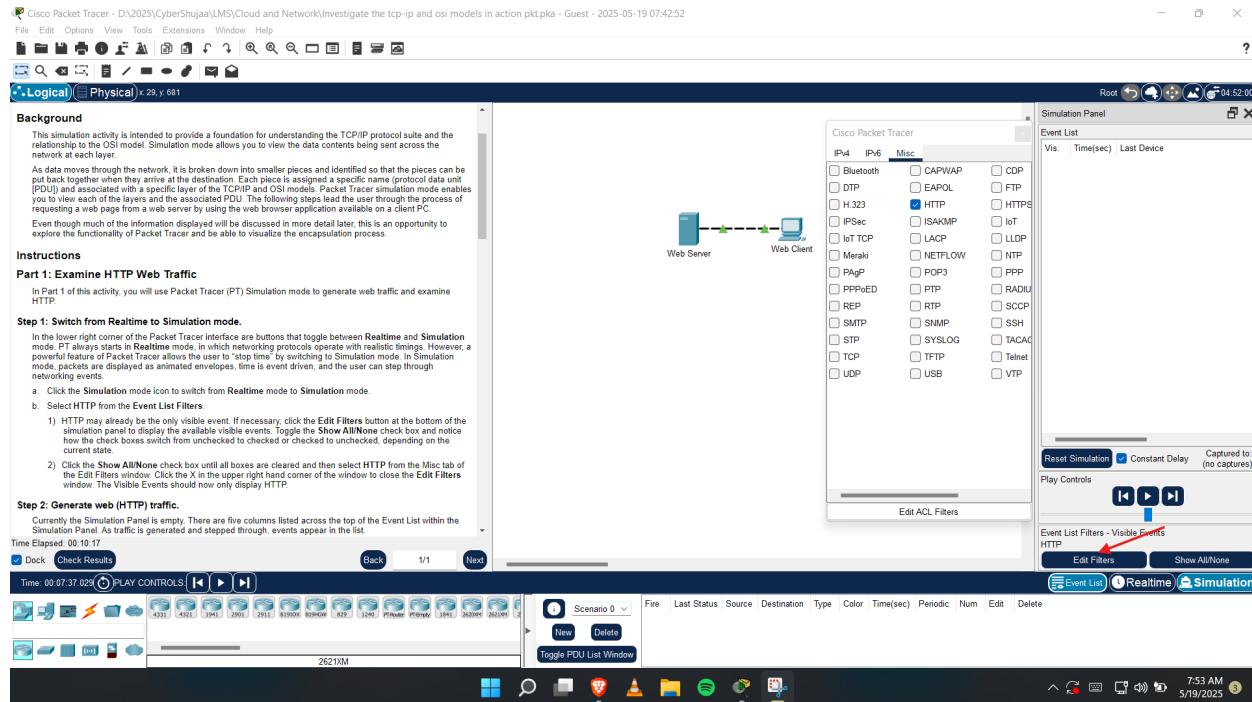
Part 1: Examining HTTP Web Traffic

Step 1: Switching to Simulation Mode

I started the lab by switching from Realtime to Simulation mode in Packet Tracer. This was important because Simulation mode allows us to see packets moving step-by-step across the network.

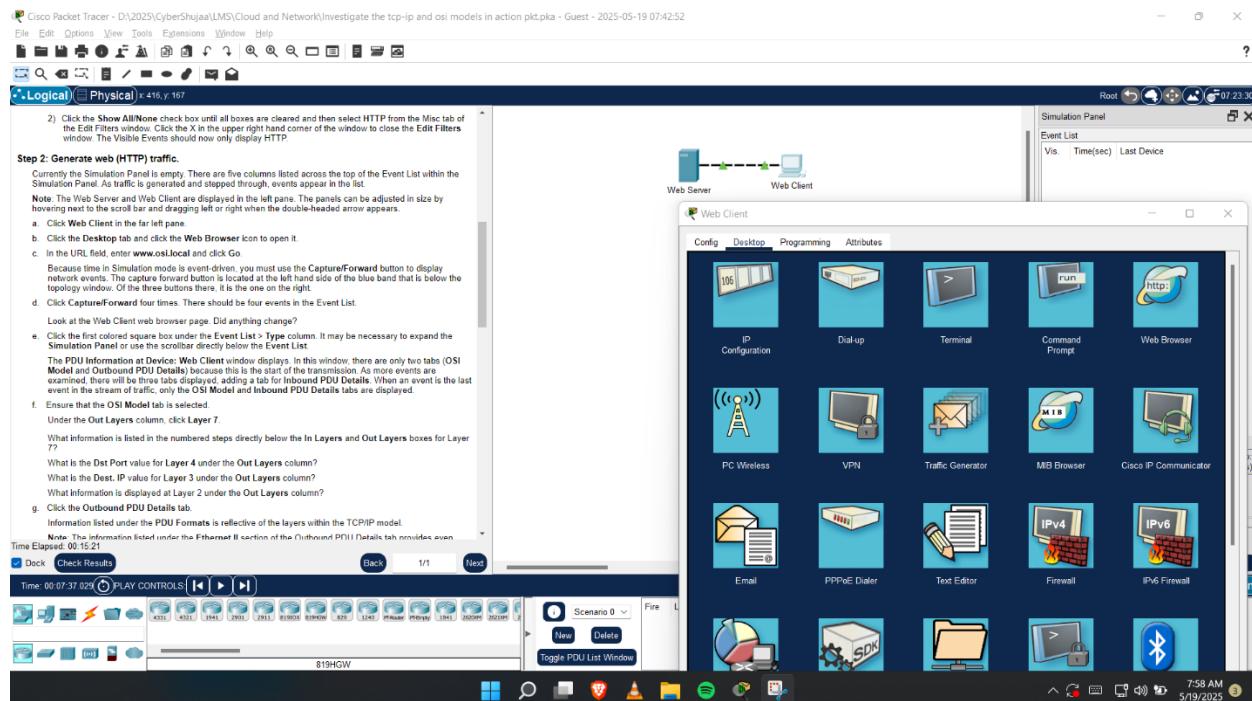


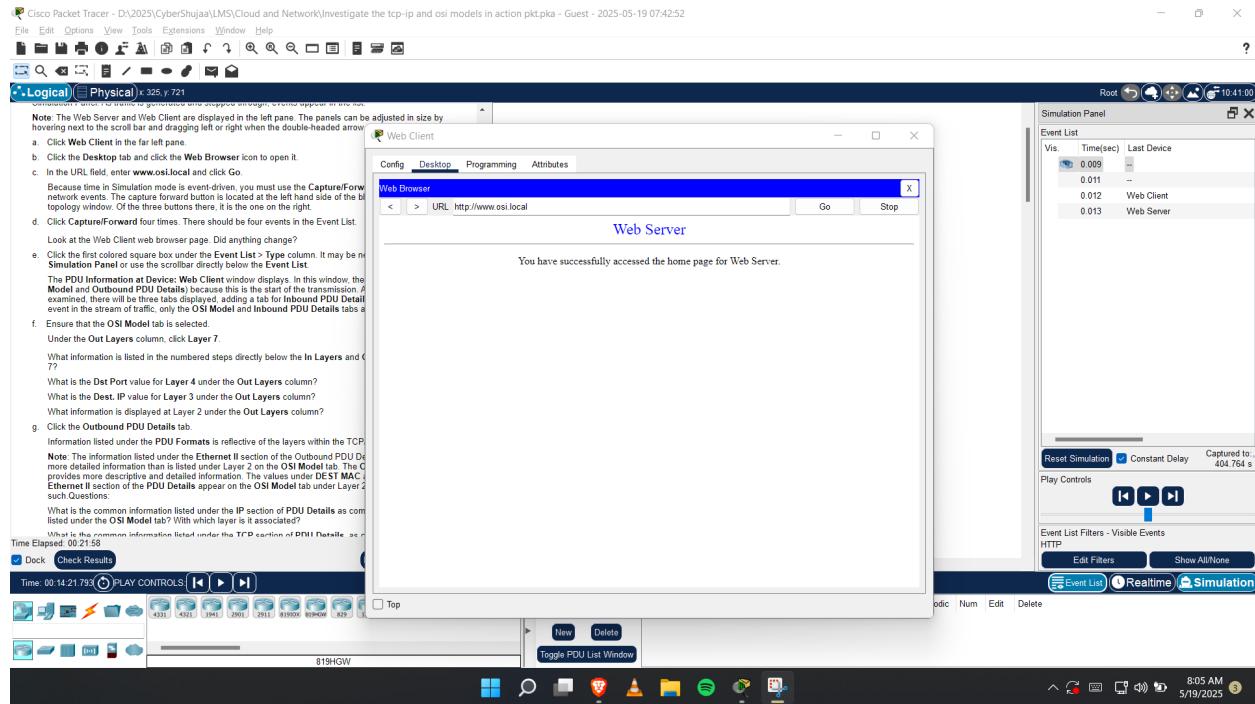
Then I filtered the event list to only show HTTP packets. This made it easier to focus on the web traffic without being distracted by other protocol events.



Step 2: Generating HTTP Traffic

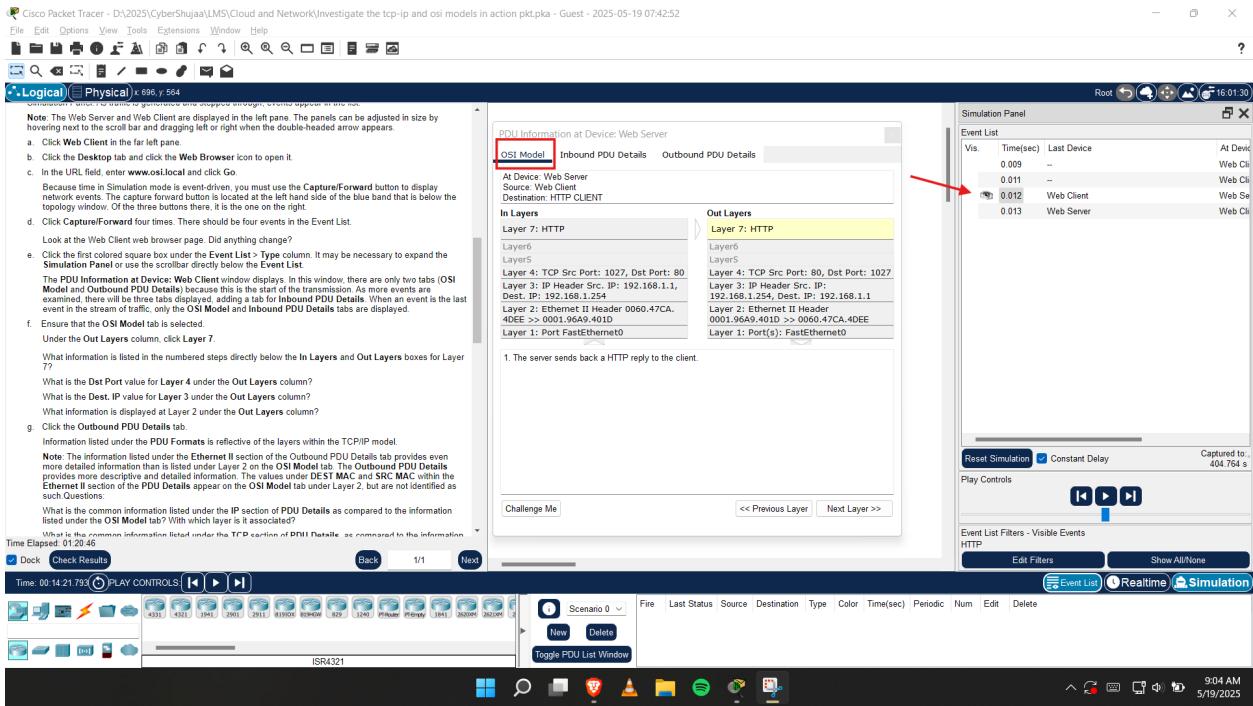
After opening the web browser on the Web Client and typing in `www.osi.local`, I clicked “Go” and used the **Capture/Forward** button to step through the generated events.



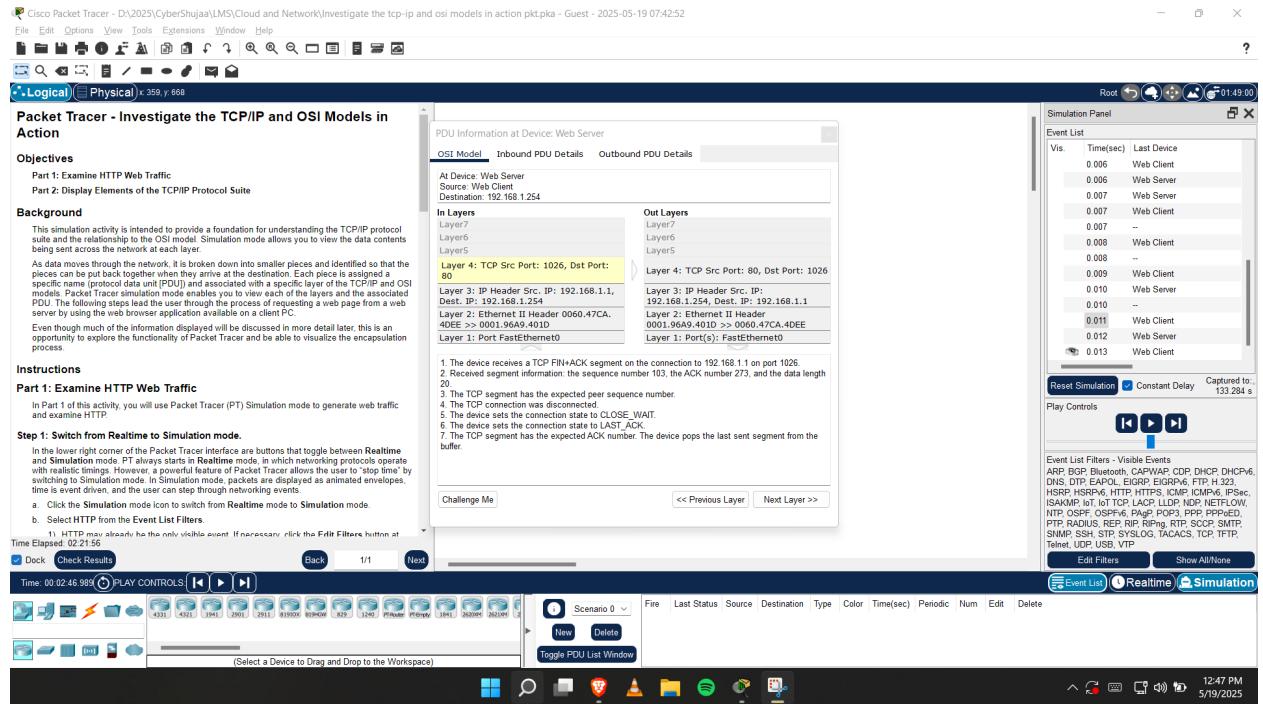


What I Observed:

- The first packet generated was the **HTTP GET request** from the client to the server.
- The OSI Model tab for this event showed how the data moved from **Layer 7 (Application)** down to **Layer 1 (Physical)**.

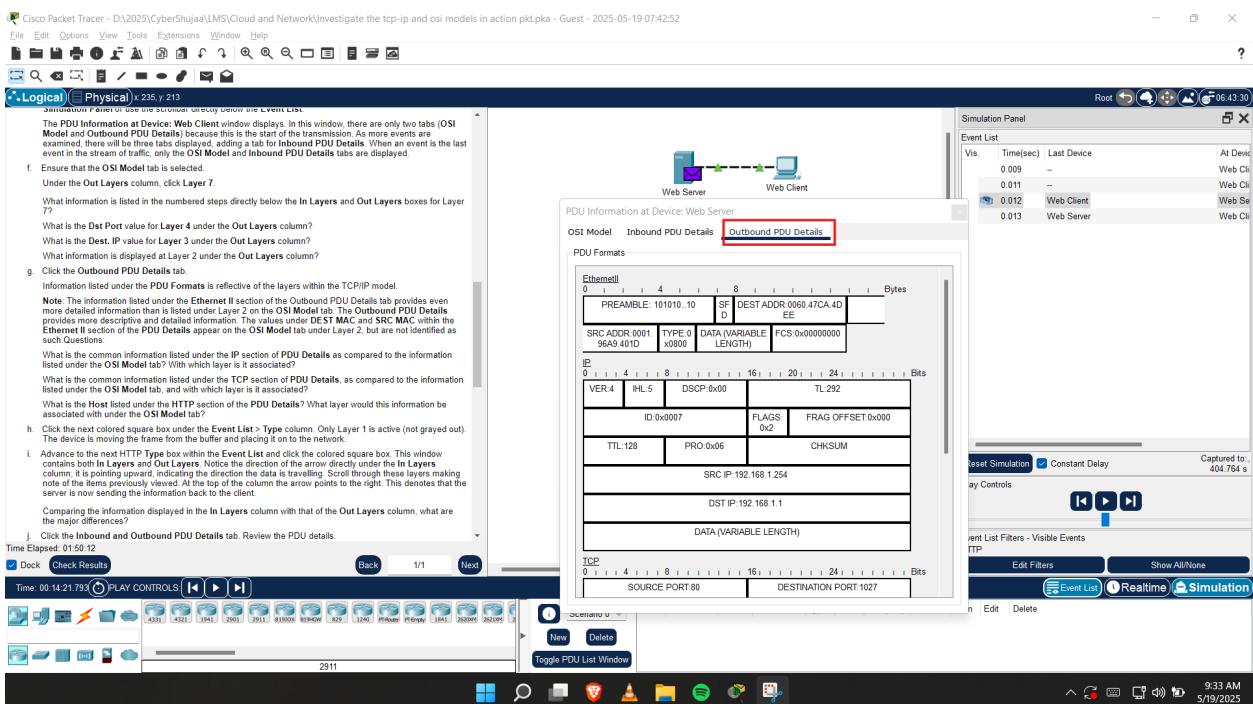


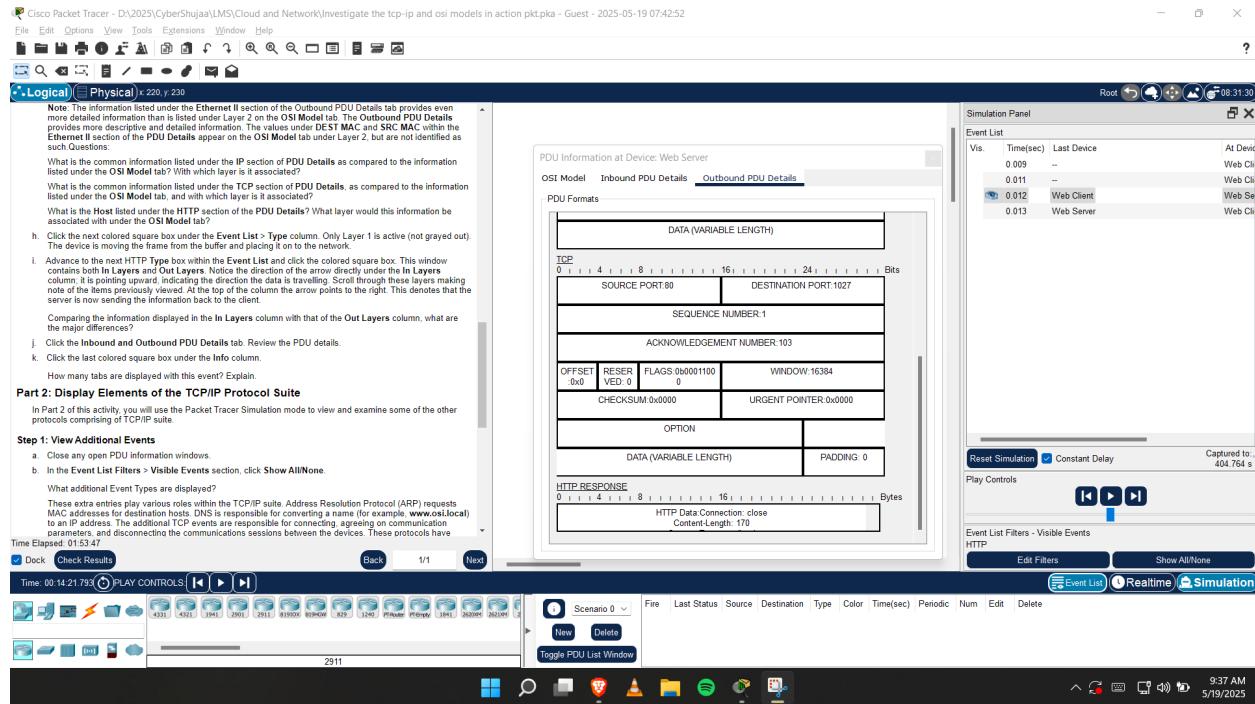
- Layer 7 (Application Layer):**
This layer showed the HTTP response to the client.
- Layer 4 (Transport Layer):**
The **Dst Port** was set to **80**, which is the default port for HTTP.
- Layer 3 (Network Layer):**
The **Destination IP address** was that of the web server.
- Layer 2 (Data Link Layer):**
The **MAC addresses** (SRC and DEST) were shown, representing the physical devices involved.



Outbound PDU Details:

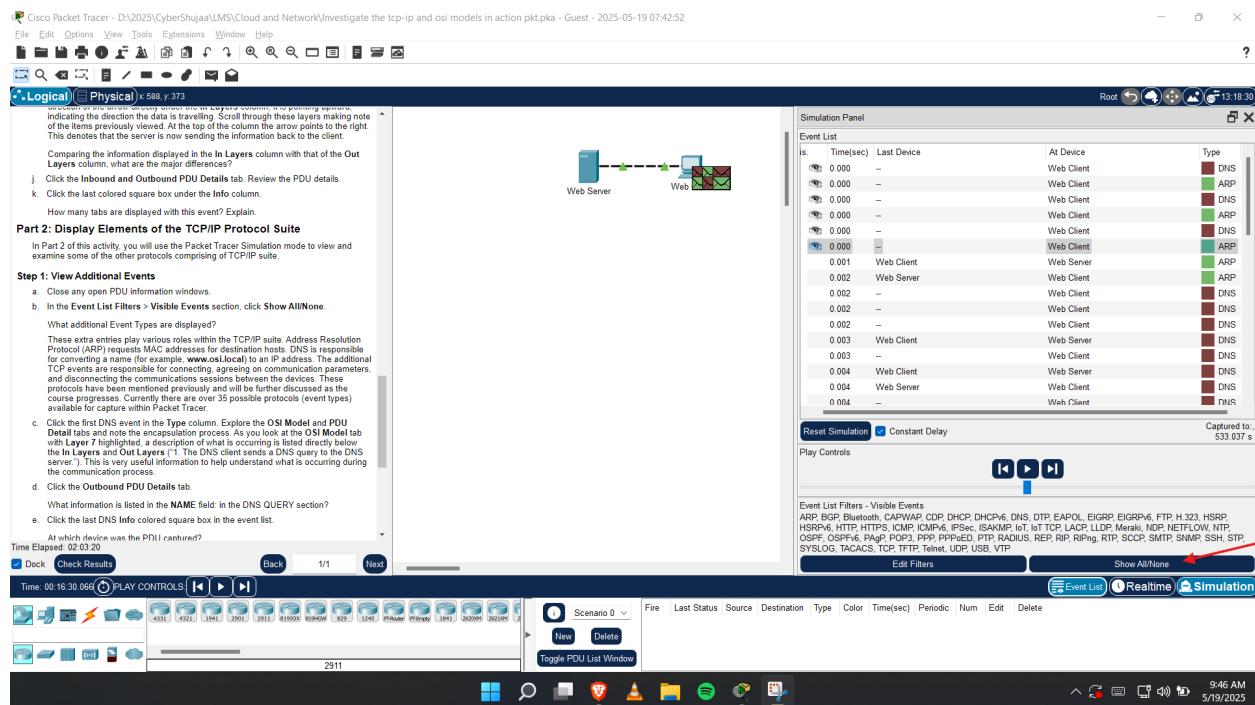
- Under **Ethernet II**, I saw the same MAC addresses again, confirming Layer 2 data.
- The **IP section** included source and destination IPs.
- In the **TCP section**, the destination port was still 80, linked to Layer 4.
- The **HTTP section** showed the Host: **www.osi.local**, which clearly connects to Layer 7.



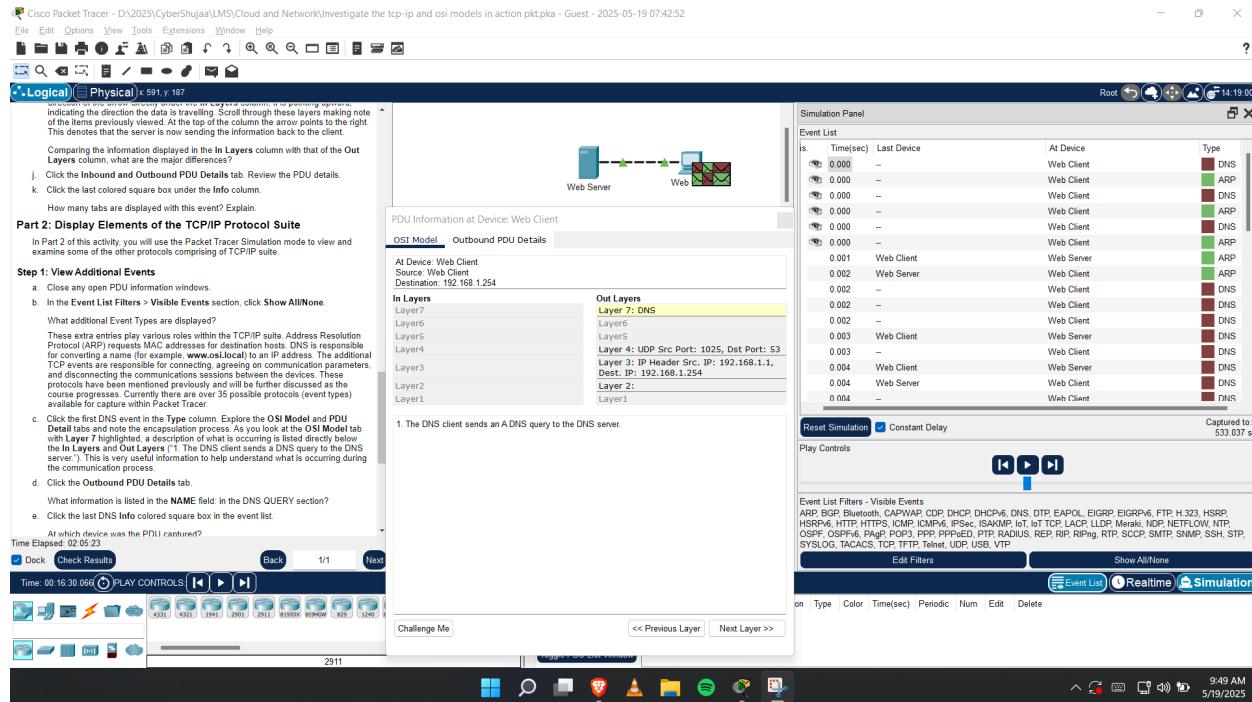


Part 2: Displaying TCP/IP Protocol Suite Elements

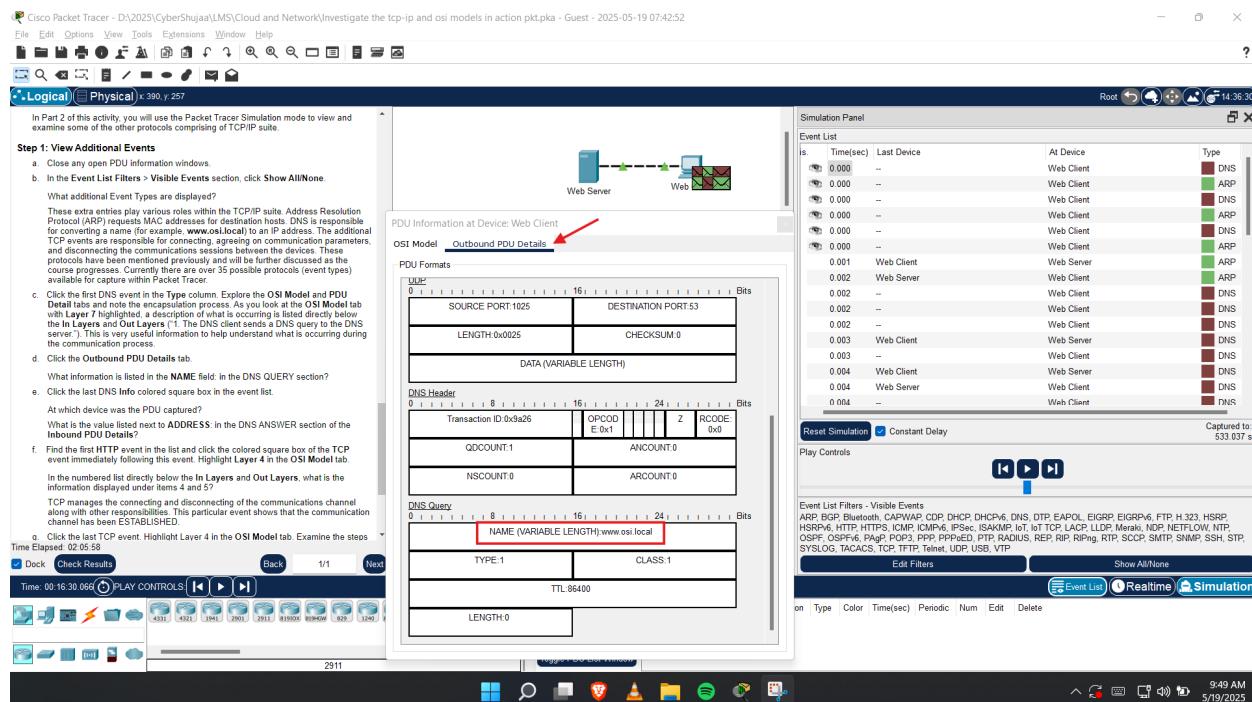
After closing the HTTP view, I enabled **all events** in the simulation to explore other protocols.



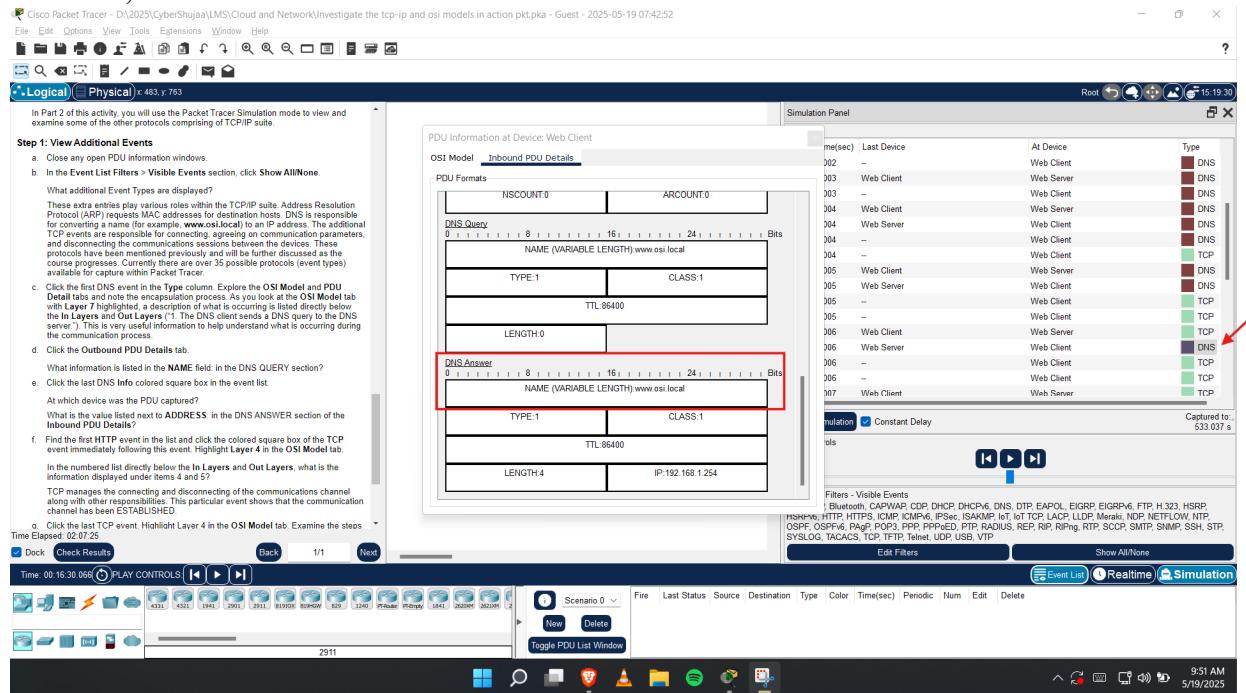
I then clicked on the first DNS event where we see the DNS client sends a DNS query to the DNS server as shown below.



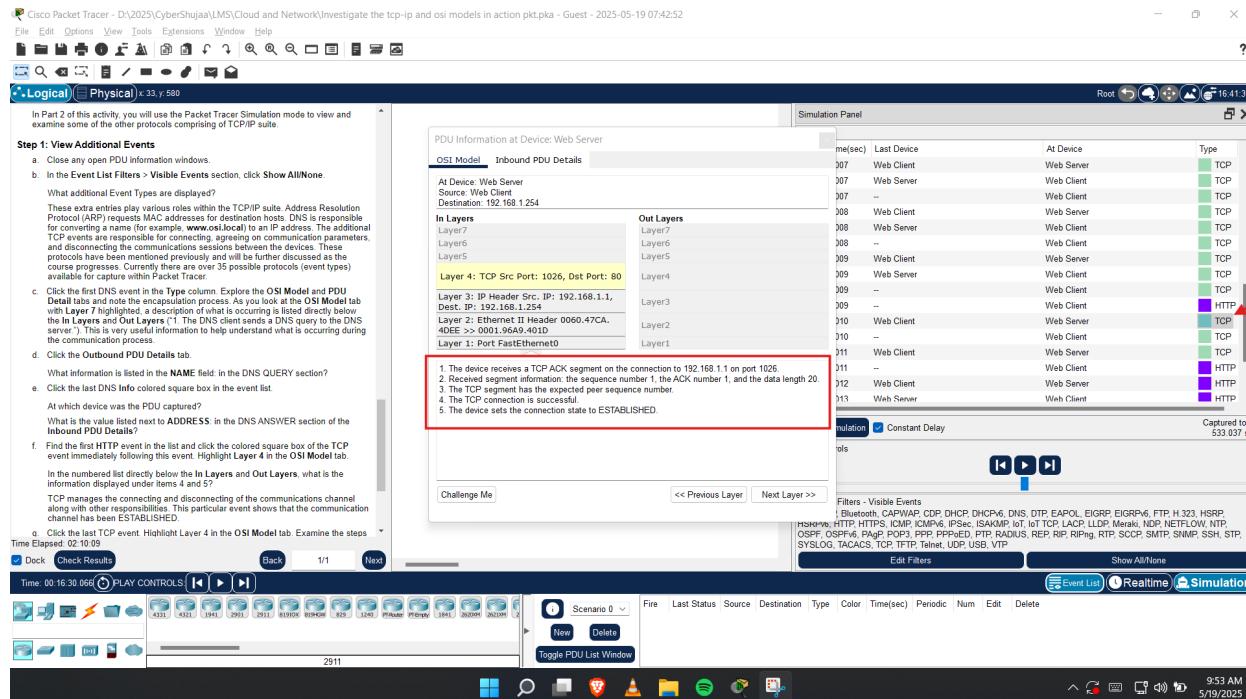
We proceed to the Outbound PDU details tab and we find the name listed in the NAME field that is in the DNS QUERY section.



And also, we can see the DNS answer from the last DNS event:



We then explored different events and, in this case, we clicked the TCP event and in this particular event, we see the TCP has been established and that the communication channel has been established.



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?

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

Time Elapsed: 02:14:1

Dock Check Results Back 1/1 Next

Time: 00:16:30.066 PLAY CONTROLS (◀ ▶ ▶) 2911

Scenario 0 New Delete Toggle PDU List Window

9:55 AM 5/19/2025

Challenge Questions

1. What port number is the Web Server listening on for the web request? Port 80, which is standard for HTTP.

Challenge Questions

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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?

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

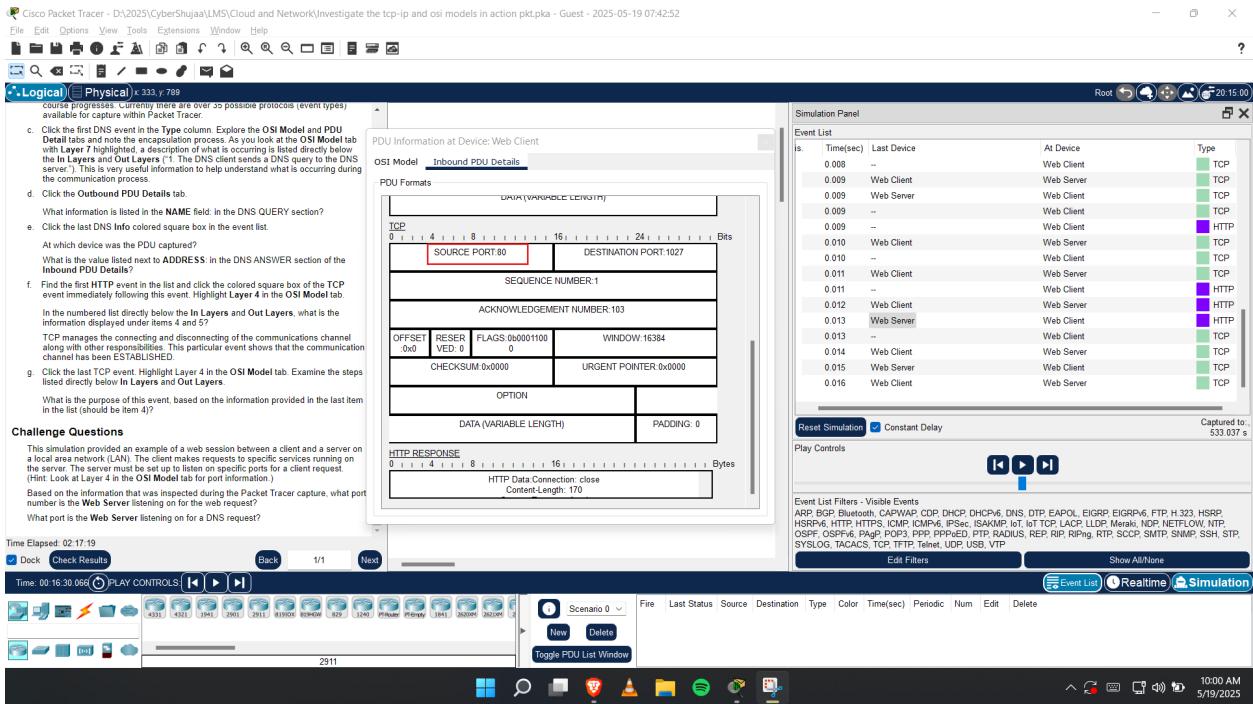
Time Elapsed: 02:13:39

Dock Check Results Back 1/1 Next

Time: 00:16:30.066 PLAY CONTROLS (◀ ▶ ▶) 2911

Scenario 0 New Delete Toggle PDU List Window

9:59 AM 5/19/2025



2. What port is the Web Server listening on for a DNS request?

Port 53, which is the default for DNS queries.

Conclusion

Completing this lab was a valuable learning experience. It gave me a clear view of how layered network models work together to enable communication between devices. Using the simulation tools, I followed the entire process of a client requesting a web page from DNS resolution and TCP session establishment to HTTP data transfer and TCP session teardown. I was able to see how data travels through each layer, and how different protocols play unique roles in that journey.