ĐẠI HỌC QUỐC GIA THÀNH PHỐ HỒ CHÍ MINH
TRƯỜNG ĐẠI HỌC BÁCH KHOA
KHOA KHOA HỌC VÀ KỸ THUẬT MÁY TÍNH

MẠNG MÁY TÍNH THỰC HÀNH - CO3094

Báo cáo:

Lab4b

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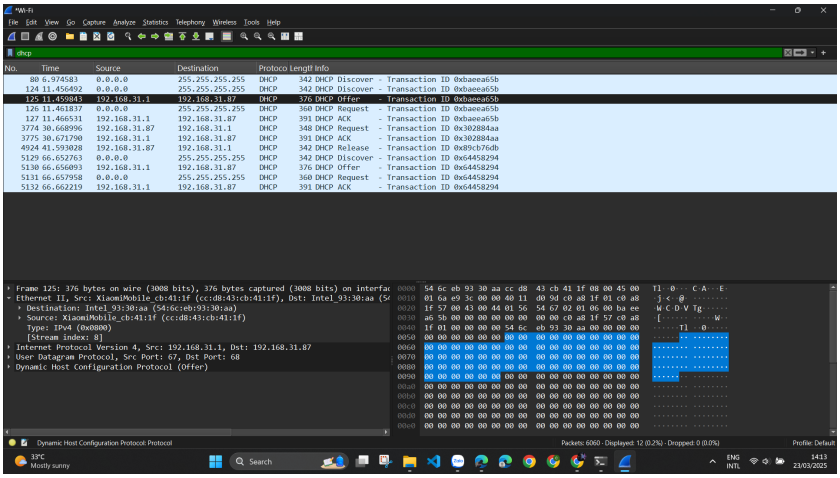
Thành phố Hồ Chí Minh, tháng 3 năm 2025

1 Question 1

Are DHCP messages sent over UDP or TCP?

ANS: Since DHCP is a connectionless protocol that must operate before an IP address is assigned, it uses UDP instead of TCP. The client communicates with the DHCP server via UDP port 67 (server side) and UDP port 68 (client side).



2 Question 2

Draw a timing datagram illustrating the sequence of the first four-packet Discover/Offer/Request/ACK DHCP exchange between the client and server. For each packet, indicated the source and destination port numbers. Are the port numbers the same as in the example given in this lab assignment?

ANS: DHCPDiscover:

Client → Broadcast (255.255.255.255) → Server

Source Port: 68 (UDP)

Destination Port: 67 (UDP)

DHCPOffer:

Server → Broadcast hoặc Unicast → Client

Source Port: 67 (UDP)

Destination Port: 68 (UDP)

DHCPRequest:

Client → Broadcast → Server

Source Port: 68 (UDP)

Destination Port: 67 (UDP)

DHCPACK:

Server → Broadcast hoặc Unicast → Client

Source Port: 67 (UDP)

Destination Port: 68 (UDP)

Client DHCP Server

| |

| —- DHCP Discover —-> | (Src Port: 68, Dest Port: 67)

| <—- DHCP Offer ——— | (Src Port: 67, Dest Port: 68)

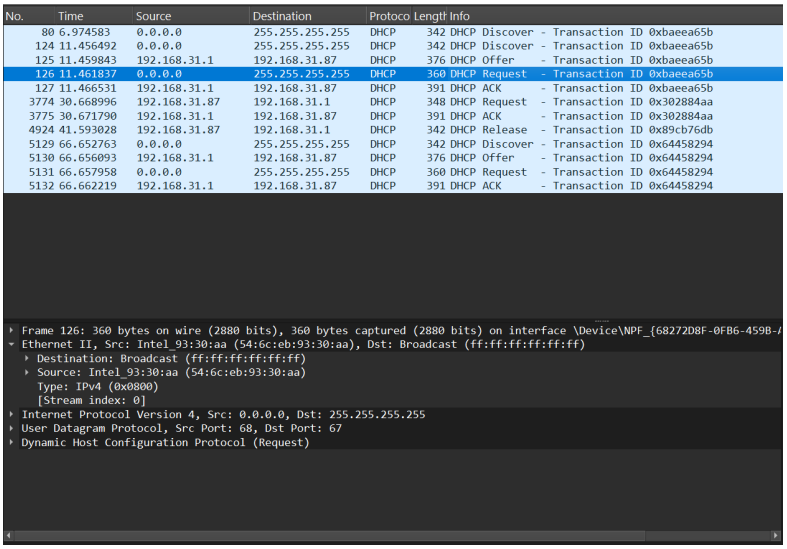
| —- DHCP Request —-> | (Src Port: 68, Dest Port: 67)

| <—- DHCP ACK ——— | (Src Port: 67, Dest Port: 68)

3 Question 3

What is the link-layer (e.g., Ethernet) address of your host?

ANS: My device's link-layer address (also known as the MAC address) is 54:6c:eb:93:30:aa.



4 Question 4

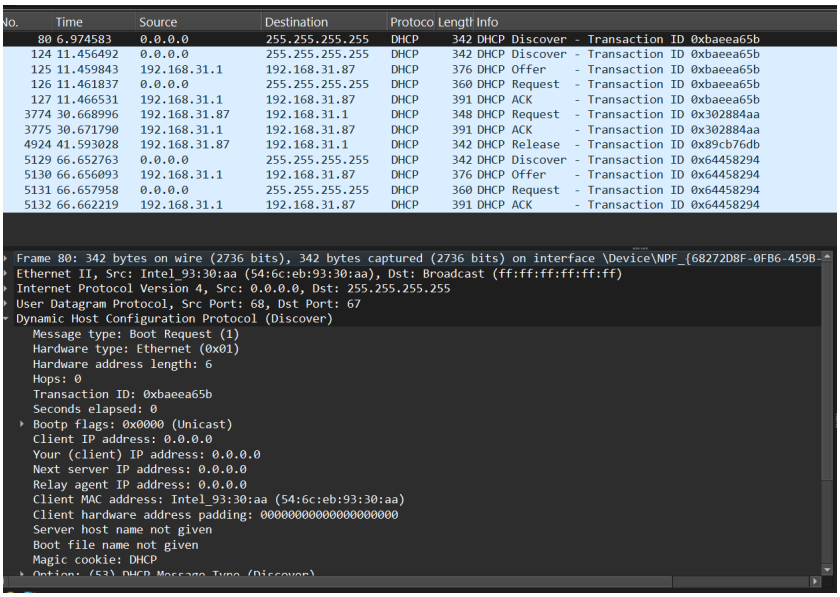
What values in the DHCP discover message differentiate this message from the DHCP request message?

ANS: The key difference between a DHCP Discover message and a DHCP Request message lies in the DHCP Message Type field. Additionally, the DHCP Request message includes a Server Identifier field, which specifies the DHCP server from which the client is requesting an IP address.

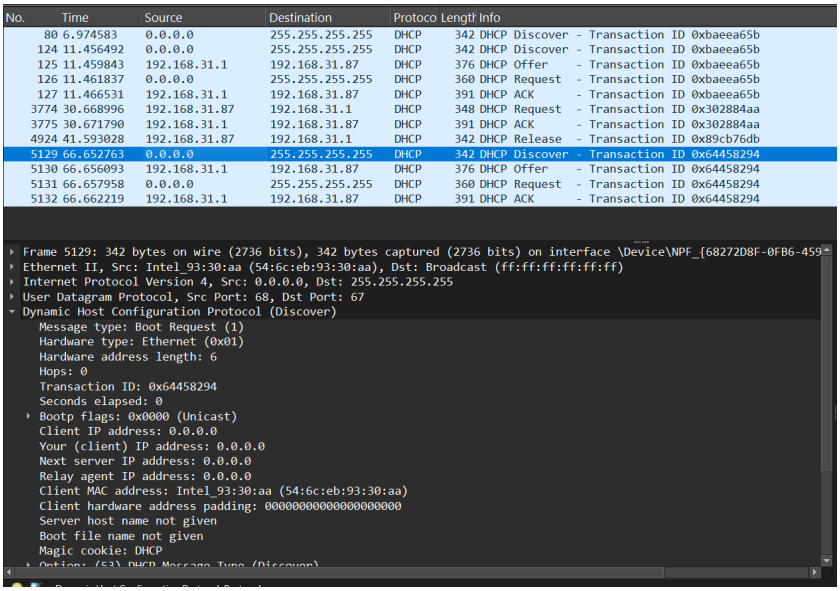
5 Question 5

What is the value of the Transaction-ID in each of the first four (Discover/Offer/Request/ACK) DHCP messages? What are the values of the Transaction-ID in the second set (Request/ACK) set of DHCP messages? What is the purpose of the Transaction-ID field?

1st set of messages: 0xbaeea65b



2nd Set of messages: 0x64458294



Each request has a different transaction ID, enabling the host to track and differentiate multiple DHCP requests from the user.

6 Question 6

A host uses DHCP to obtain an IP address, among other things. But a host's IP address is not confirmed until the end of the four-message exchange! If the IP address is not set until the end of the four-message exchange, then what values are used in the IP datagrams in the four-message exchange? For each of the four DHCP messages (Discover/Offer/Request/ACK DHCP), indicate the source and destination IP addresses that are carried in the encapsulating IP datagram.

ANS:

- Discover: 0.0.0.0/255.255.255.255
- Offer: 192.168.31.1/192.168.31.87
- Request: 0.0.0.0/255.255.255.255
- ACK: 192.168.31.1/192.168.31.87

7 Question 7

What is the IP address of your DHCP server?

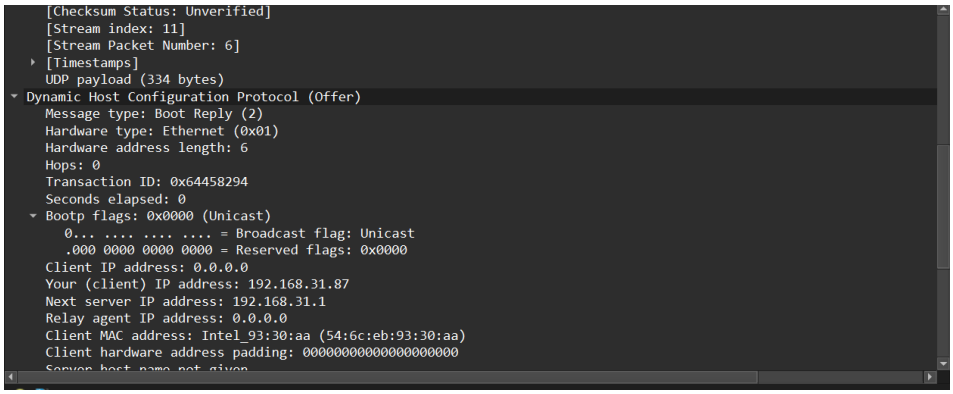
ANS: The IP address of my DHCP server is 192.168.31.87

80	6.974583	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ID 0xbaeea65b
124	11.456492	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ID 0xbaeea65b
125	11.459843	192.168.31.1	192.168.31.87	DHCP	376	DHCP Offer - Transaction ID 0xbaeea65b
126	11.461837	0.0.0.0	255.255.255.255	DHCP	360	DHCP Request - Transaction ID 0xbaeea65b
127	11.466531	192.168.31.1	192.168.31.87	DHCP	391	DHCP ACK - Transaction ID 0xbaeea65b
3774	30.668996	192.168.31.87	192.168.31.1	DHCP	348	DHCP Request - Transaction ID 0x302884aa
3775	30.671790	192.168.31.1	192.168.31.87	DHCP	391	DHCP ACK - Transaction ID 0x302884aa
4924	41.593028	192.168.31.87	192.168.31.1	DHCP	342	DHCP Release - Transaction ID 0x89cb76db
5129	66.652763	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ID 0x64458294
5130	66.656093	192.168.31.1	192.168.31.87	DHCP	376	DHCP Offer - Transaction ID 0x64458294
5131	66.657958	0.0.0.0	255.255.255.255	DHCP	360	DHCP Request - Transaction ID 0x64458294
5132	66.662219	192.168.31.1	192.168.31.87	DHCP	391	DHCP ACK - Transaction ID 0x64458294

8 Question 8

What IP address is the DHCP server offering to your host in the DHCP Offer message? Indicate which DHCP message contains the offered DHCP address.

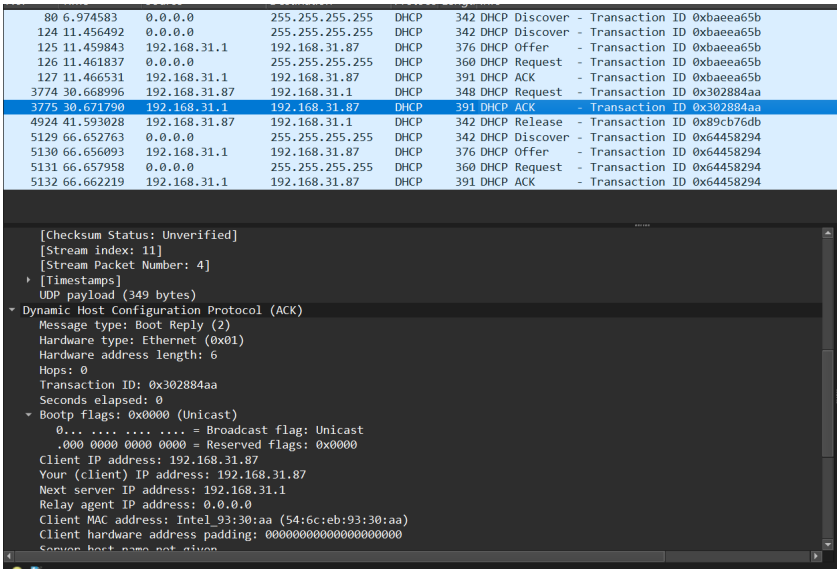
ANS: As part of the DHCP process, my client is assigned the IP address 192.168.31.87 in the offer message, which contains the proposed address from the DHCP server.



9 Question 9

In the example screenshot in this assignment, there is no relay agent between the host and the DHCP server. What values in the trace indicate the absence of a relay agent? Is there a relay agent in your experiment? If so what is the IP address of the agent?

ANS: The IP address of the relay agent is 10.33.128.254



10 Question 10

Explain the purpose of the router and subnet mask lines in the DHCP offer message.

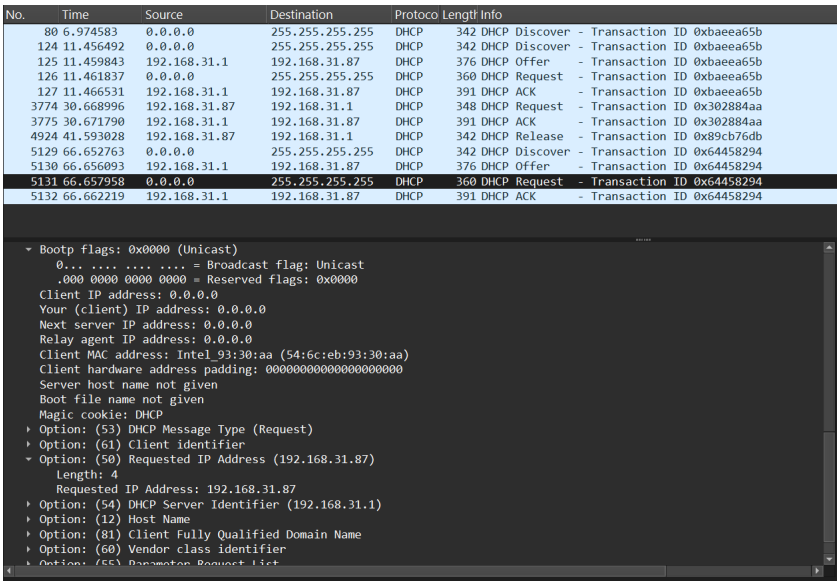
ANS:

- The subnet mask line provides the client with the appropriate subnet mask, allowing it to determine the network and host portions of an IP address.

- The router line specifies the default gateway, which is the address the client should use to send messages to devices outside its local network.

11 Question 11

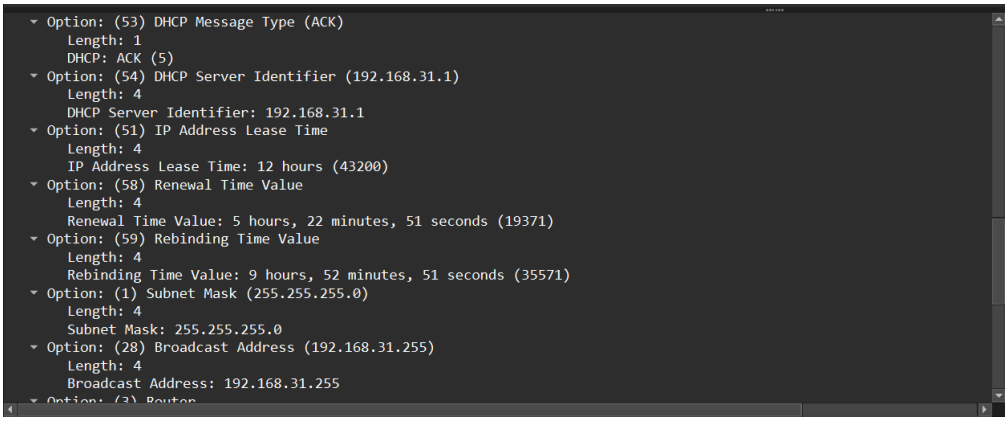
In the DHCP trace file noted in footnote 2, the DHCP server offers a specific IP address to the client (see also question 8. above). In the client's response to the first server OFFER message, does the client accept this IP address? Where in the client's RESPONSE is the client's requested address?



ANS: The client acknowledges and accepts the IP address proposed in the DHCP Offer message by including it in the DHCP Request message. In this process, after the DHCP server offers the IP address 192.168.31.87, the client does not immediately start using it. Instead, it responds with a DHCP Request message, explicitly requesting that specific IP address. This step ensures that the client confirms its intent to use the assigned address and allows the DHCP server to finalize the lease process before officially allocating the IP address to the client.

12 Question 12

Explain the purpose of the lease time. How long is the lease time in your experiment?



ANS: The lease time specifies the duration for which a client is permitted to use the assigned IP address before it must request a renewal or obtain a new address from the DHCP server. In my experiment, the lease time is set to 43200 seconds, which is equivalent to 12 hours.

13 Question 13

What is the purpose of the DHCP release message? Does the DHCP server issue an acknowledgment of receipt of the client's DHCP request? What would happen if the client's DHCP release message is lost?

ANS:

- The purpose of the DHCP Release message is for the client to inform the DHCP server that it is relinquishing its assigned IP address, allowing the server to mark the address as available for reassignment to other clients.
- However, there is no acknowledgment mechanism in place to confirm whether the server has successfully received the release message. Since DHCP operates over UDP, which is a connectionless protocol, the release message is sent without guaranteeing its delivery.

- If the release message is lost during transmission, the client will still consider the IP address relinquished and will no longer use it. However, the DHCP server, unaware of this release, will retain the IP address in its lease database and will not assign it to another client until the original lease period expires.

14 Question 14

Clear the bootp filter from your Wireshark window. Were any ARP packets sent or received during the DHCP packet-exchange period? If so, explain the purpose of those ARP packets.

ANS: Yes, they appear to be broadcasts sent out by the network to build up the known IP addresses by the clients network.