Lab 3 Assignment:

Command Line Execution screenshot:

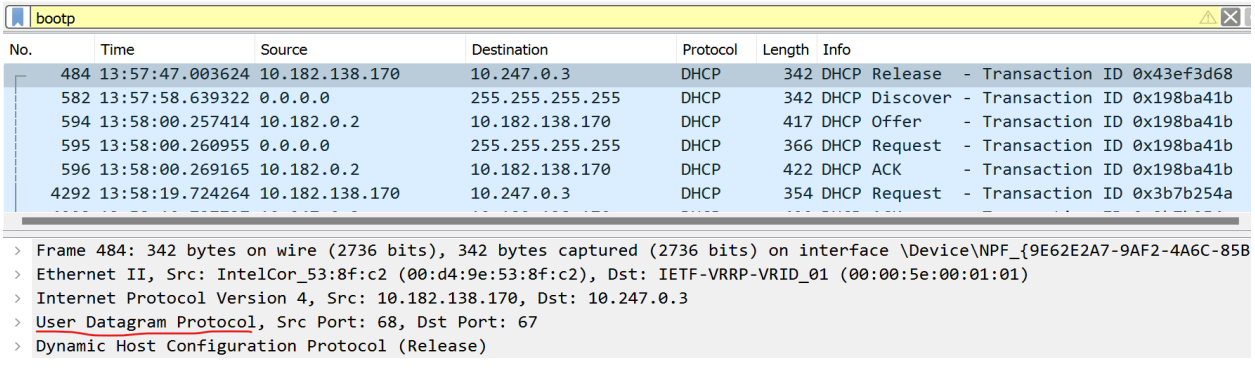
```
Wireless LAN adapter Wi-Fi:

   Connection-specific DNS Suffix  . : dhost.uta.edu
   Link-local IPv6 Address . . . . . : fe80::7697:7afc:d38e:6ffa%14
   IPv4 Address. . . . . . . . . . . : 10.182.138.170
   Subnet Mask . . . . . . . . . . . : 255.255.0.0
   Default Gateway . . . . . . . . . : 10.182.0.1

C:\Users\91890>ipconfig/renew

Windows IP Configuration

No operation can be performed on Local Area Connection* 1 while it has its media disconnected.
No operation can be performed on Local Area Connection* 2 while it has its media disconnected.

Wireless LAN adapter Local Area Connection* 1:

   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . :

Wireless LAN adapter Local Area Connection* 2:

   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . :

Wireless LAN adapter Wi-Fi:

   Connection-specific DNS Suffix  . : dhost.uta.edu
   Link-local IPv6 Address . . . . . : fe80::7697:7afc:d38e:6ffa%14
   IPv4 Address. . . . . . . . . . . : 10.182.138.170
   Subnet Mask . . . . . . . . . . . : 255.255.0.0
   Default Gateway . . . . . . . . . : 10.182.0.1

C:\Users\91890>ipconfig/release

Windows IP Configuration

No operation can be performed on Local Area Connection* 1 while it has its media disconnected.
No operation can be performed on Local Area Connection* 2 while it has its media disconnected.

Wireless LAN adapter Local Area Connection* 1:

   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . :
```

```
   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . :

Wireless LAN adapter Local Area Connection* 2:

   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . :

Wireless LAN adapter Wi-Fi:

   Connection-specific DNS Suffix  . :
   Link-local IPv6 Address . . . . . : fe80::7697:7afc:d38e:6ffa%14
   Default Gateway . . . . . . . . . :

C:\Users\91890>ipconfig/renew

Windows IP Configuration

No operation can be performed on Local Area Connection* 1 while it has its media disconnected.
No operation can be performed on Local Area Connection* 2 while it has its media disconnected.

Wireless LAN adapter Local Area Connection* 1:

   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . :

Wireless LAN adapter Local Area Connection* 2:

   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . :

Wireless LAN adapter Wi-Fi:

   Connection-specific DNS Suffix  . : dhost.uta.edu
   Link-local IPv6 Address . . . . . : fe80::7697:7afc:d38e:6ffa%14
   IPv4 Address. . . . . . . . . . . : 10.182.138.170
   Subnet Mask . . . . . . . . . . . : 255.255.0.0
   Default Gateway . . . . . . . . . : 10.182.0.1

C:\Users\91890>
```

Answer the following questions:

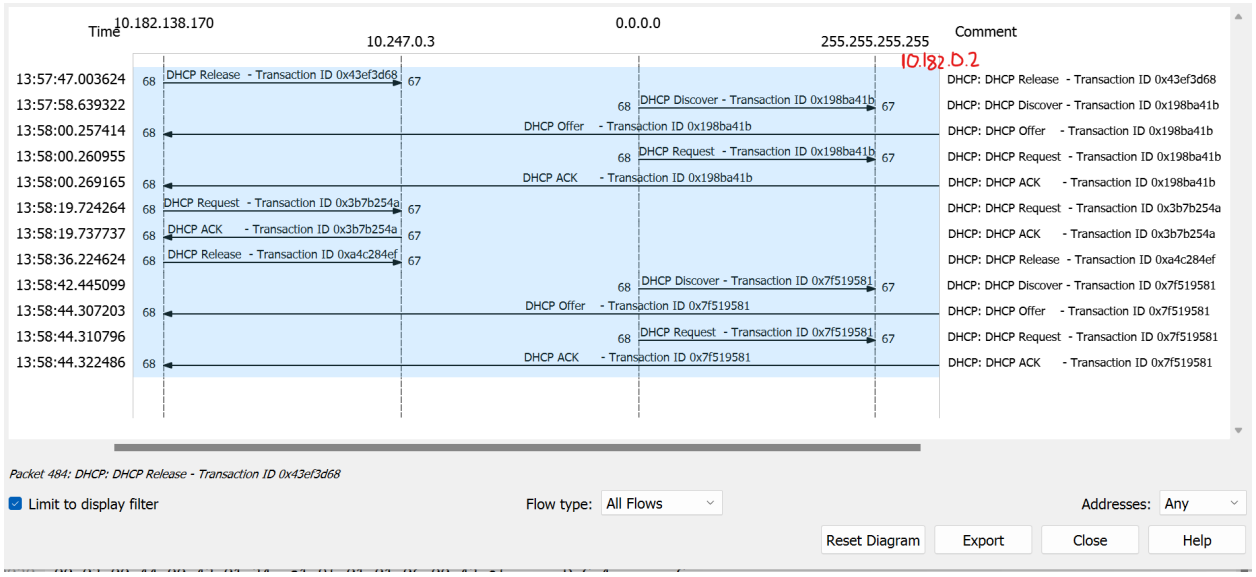
1. Are DHCP messages sent over UDP or TCP?

→ The DHCP messages are sent over UDP - User Datagram Protocol



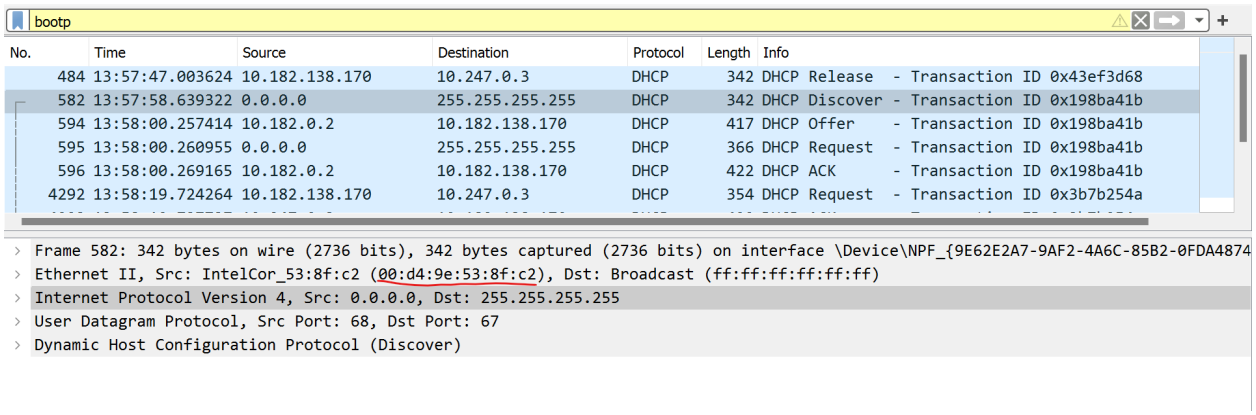
2. Draw a timing datagram illustrating the sequence of the first four-packet Discover/Offer/Request/ACK DHCP exchange between the client and server. For each packet, indicate the source and destination port numbers. Are the port numbers the same as in the example given in this lab assignment?

→ Yes the Port numbers are same as in the lab example ie 68 and 67



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

→ The link-layer address of my host is 00:d4:9e:53:8f:c2



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

→ The option (53) : DHCP message Type differentiates both discover and request messages.

Request message has Option 54 DHCP server Identifier and Option (81) client fully qualified domain name. Screenshot attached below of Discover and request DHCP message

```
No.     Time               Source                Destination           Protocol Length Info
    582 13:57:58.639322    0.0.0.0               255.255.255.255       DHCP     342    DHCP Discover - Transaction ID 0x198ba41b
Frame 582: 342 bytes on wire (2736 bits), 342 bytes captured (2736 bits) on interface \Device\NPF_{9E62E2A7-9AF2-4A6C-85B2-0FDA4874E057},
id 0
    Interface id: 0 (\Device\NPF_{9E62E2A7-9AF2-4A6C-85B2-0FDA4874E057})
    Encapsulation type: Ethernet (1)
    Arrival Time: Nov  1, 2022 13:57:58.639322000 Central Daylight Time
    [Time shift for this packet: 0.000000000 seconds]
    Epoch Time: 1667329078.639322000 seconds
    [Time delta from previous captured frame: 0.072878000 seconds]
    [Time delta from previous displayed frame: 11.635698000 seconds]
    [Time since reference or first frame: 36.253766000 seconds]
    Frame Number: 582
    Frame Length: 342 bytes (2736 bits)
    Capture Length: 342 bytes (2736 bits)
    [Frame is marked: False]
    [Frame is ignored: False]
    [Protocols in frame: eth:ethertype:ip:udp:dhcp]
    [Coloring Rule Name: UDP]
    [Coloring Rule String: udp]
Ethernet II, Src: IntelCor_53:8f:c2 (00:d4:9e:53:8f:c2), Dst: Broadcast (ff:ff:ff:ff:ff:ff)
    Destination: Broadcast (ff:ff:ff:ff:ff:ff)
    Source: IntelCor_53:8f:c2 (00:d4:9e:53:8f:c2)
    Type: IPv4 (0x0800)
Internet Protocol Version 4, Src: 0.0.0.0, Dst: 255.255.255.255
User Datagram Protocol, Src Port: 68, Dst Port: 67
Dynamic Host Configuration Protocol (Discover)
    Message type: Boot Request (1)
    Hardware type: Ethernet (0x01)
    Hardware address length: 6
    Hops: 0
    Transaction ID: 0x198ba41b
    Seconds elapsed: 0
    Bootp flags: 0x0000 (Unicast)
    Client IP address: 0.0.0.0
    Your (client) IP address: 0.0.0.0
    Next server IP address: 0.0.0.0
    Relay agent IP address: 0.0.0.0
    Client MAC address: IntelCor_53:8f:c2 (00:d4:9e:53:8f:c2)
    Client hardware address padding: 00000000000000000000
    Server host name not given
    Boot file name not given
    Magic cookie: DHCP
    Option: (53) DHCP Message Type (Discover)
    Option: (61) Client identifier
    Option: (50) Requested IP Address (10.182.138.170)
    Option: (12) Host Name
    Option: (60) Vendor class identifier
    Option: (55) Parameter Request List
    Option: (255) End
```

```
No.     Time               Source                Destination           Protocol Length Info
    595 13:58:00.260955    0.0.0.0               255.255.255.255       DHCP     366    DHCP Request  - Transaction ID 0x198ba41b
Frame 595: 366 bytes on wire (2928 bits), 366 bytes captured (2928 bits) on interface \Device\NPF_{9E62E2A7-9AF2-4A6C-85B2-0FDA4874E057},
id 0
    Interface id: 0 (\Device\NPF_{9E62E2A7-9AF2-4A6C-85B2-0FDA4874E057})
    Encapsulation type: Ethernet (1)
    Arrival Time: Nov  1, 2022 13:58:00.260955000 Central Daylight Time
    [Time shift for this packet: 0.000000000 seconds]
    Epoch Time: 1667329080.260955000 seconds
    [Time delta from previous captured frame: 0.003541000 seconds]
    [Time delta from previous displayed frame: 0.003541000 seconds]
    [Time since reference or first frame: 37.875399000 seconds]
    Frame Number: 595
    Frame Length: 366 bytes (2928 bits)
    Capture Length: 366 bytes (2928 bits)
    [Frame is marked: False]
    [Frame is ignored: False]
    [Protocols in frame: eth:ethertype:ip:udp:dhcp]
    [Coloring Rule Name: UDP]
    [Coloring Rule String: udp]
Ethernet II, Src: IntelCor_53:8f:c2 (00:d4:9e:53:8f:c2), Dst: Broadcast (ff:ff:ff:ff:ff:ff)
    Destination: Broadcast (ff:ff:ff:ff:ff:ff)
    Source: IntelCor_53:8f:c2 (00:d4:9e:53:8f:c2)
    Type: IPv4 (0x0800)
Internet Protocol Version 4, Src: 0.0.0.0, Dst: 255.255.255.255
User Datagram Protocol, Src Port: 68, Dst Port: 67
Dynamic Host Configuration Protocol (Request)
    Message type: Boot Request (1)
    Hardware type: Ethernet (0x01)
    Hardware address length: 6
    Hops: 0
    Transaction ID: 0x198ba41b
    Seconds elapsed: 0
    Bootp flags: 0x0000 (Unicast)
    Client IP address: 0.0.0.0
    Your (client) IP address: 0.0.0.0
    Next server IP address: 0.0.0.0
    Relay agent IP address: 0.0.0.0
    Client MAC address: IntelCor_53:8f:c2 (00:d4:9e:53:8f:c2)
    Client hardware address padding: 00000000000000000000
    Server host name not given
    Boot file name not given
    Magic cookie: DHCP
    Option: (53) DHCP Message Type (Request)
    Option: (61) Client identifier
    Option: (50) Requested IP Address (10.182.138.170)
    Option: (54) DHCP Server Identifier (10.247.0.3)
    Option: (12) Host Name
    Option: (81) Client Fully Qualified Domain Name
    Option: (60) Vendor class identifier
    Option: (55) Parameter Request List
    Option: (255) End
```

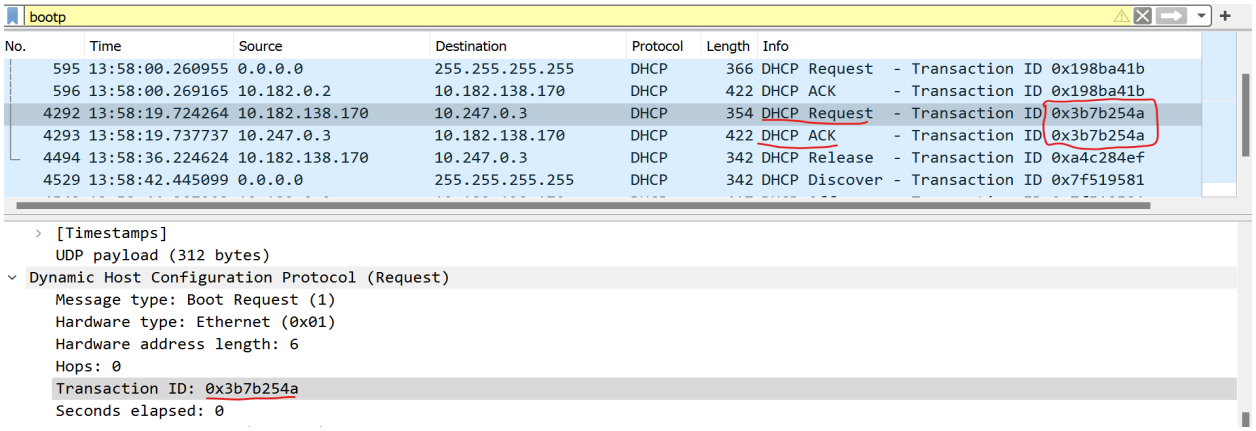
5. What is the value of the Transaction-ID in each of the first four (Discover/Offer/Request/ACK) DHCP messages? What are the values of the Transaction-ID in the second set (Request/ACK) set of DHCP messages? What is the purpose of the Transaction-ID field?

→ The value of the Transaction-ID for all of the first four (Discover/Offer/Request/ACK) DHCP messages is 0x198ba41b.

```
    484 13:57:47.003624 10.182.138.170 10.247.0.3       DHCP     342 DHCP Release  - Transaction ID 0x43ef3d68
    582 13:57:58.639322 0.0.0.0        255.255.255.255  DHCP     342 DHCP Discover - Transaction ID 0x198ba41b
    594 13:58:00.257414 10.182.0.2     10.182.138.170   DHCP     417 DHCP Offer    - Transaction ID 0x198ba41b
    595 13:58:00.260955 0.0.0.0        255.255.255.255  DHCP     366 DHCP Request  - Transaction ID 0x198ba41b
    596 13:58:00.269165 10.182.0.2     10.182.138.170   DHCP     422 DHCP ACK      - Transaction ID 0x198ba41b
   4292 13:58:19.724264 10.182.138.170 10.247.0.3       DHCP     354 DHCP Request  - Transaction ID 0x3b7b254a
```

```
    [Timestamps]
    UDP payload (380 bytes)
Dynamic Host Configuration Protocol (ACK)
    Message type: Boot Reply (2)
    Hardware type: Ethernet (0x01)
    Hardware address length: 6
    Hops: 0
    Transaction ID: 0x198ba41b
    Seconds elapsed: 0
```

→ The values of the Transaction-ID for all in the second set (Request/ACK) set of DHCP messages is 0x3b7b254a.



→ The Transaction ID is different for every set of DHCP messages because the requesting device can differentiate between different requests made by it.

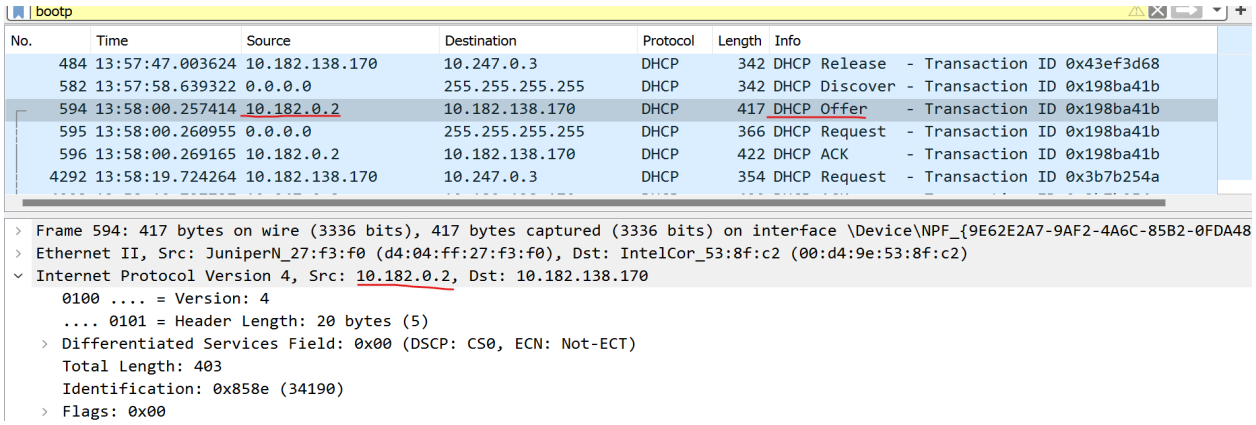
6. A host uses DHCP to obtain an IP address, among other things. But a host's IP address is not confirmed until the end of the four-message exchange! If the IP address is not set until the end of the four-message exchange, then what values are used in the IP datagrams in the four-message exchange? For 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.

→

Message type	**Source Address**	**Destination Address**
DHCP Discover	0.0.0.0	255.255.255.255
DHCP Offer	10.182.0.2	255.255.255.255
DHCP Request	0.0.0.0	255.255.255.255
DHCP Ack	10.182.0.2	255.255.255.255

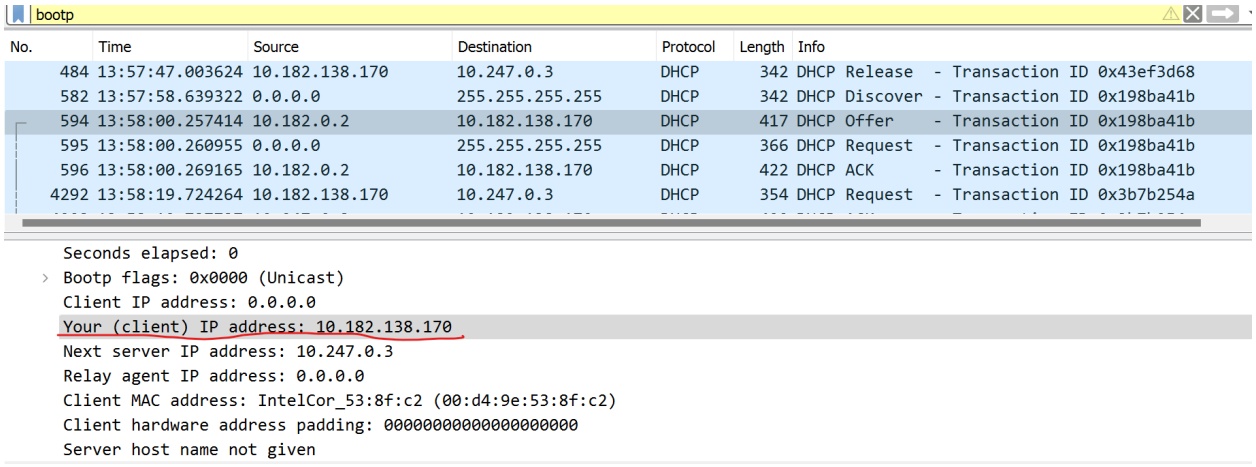
7. What is the IP address of your DHCP server?

→ The Ip address of DHCP server is 10.182.0.2



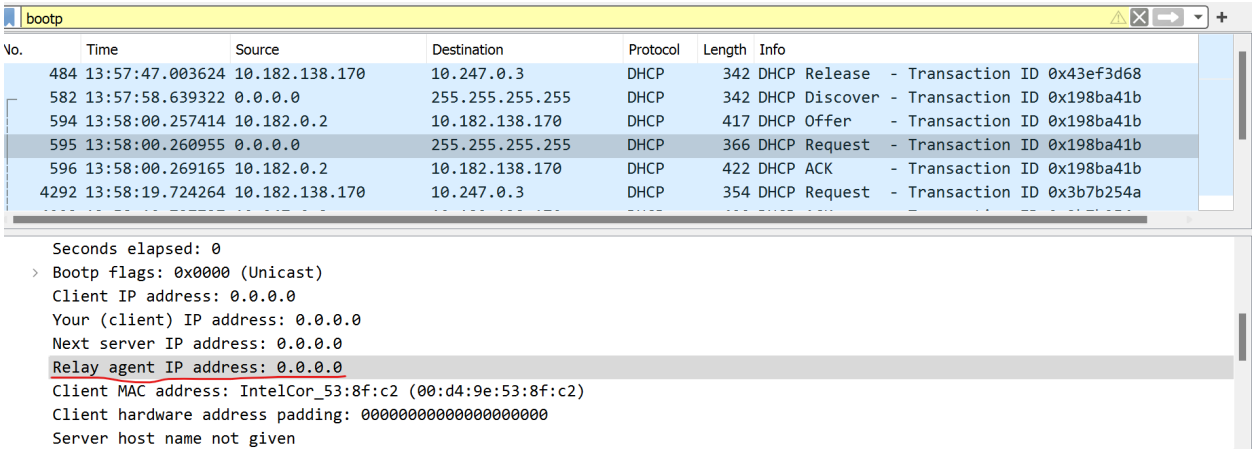
8. What IP address is the DHCP server offering to your host in the DHCP Offer message? Indicate which DHCP message contains the offered DHCP address.

→ The IP address offered by the DHCP server to my host in the DHCP offer message is 10.182.138.170
The DHCP offer message contains the offered DHCP address.



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?

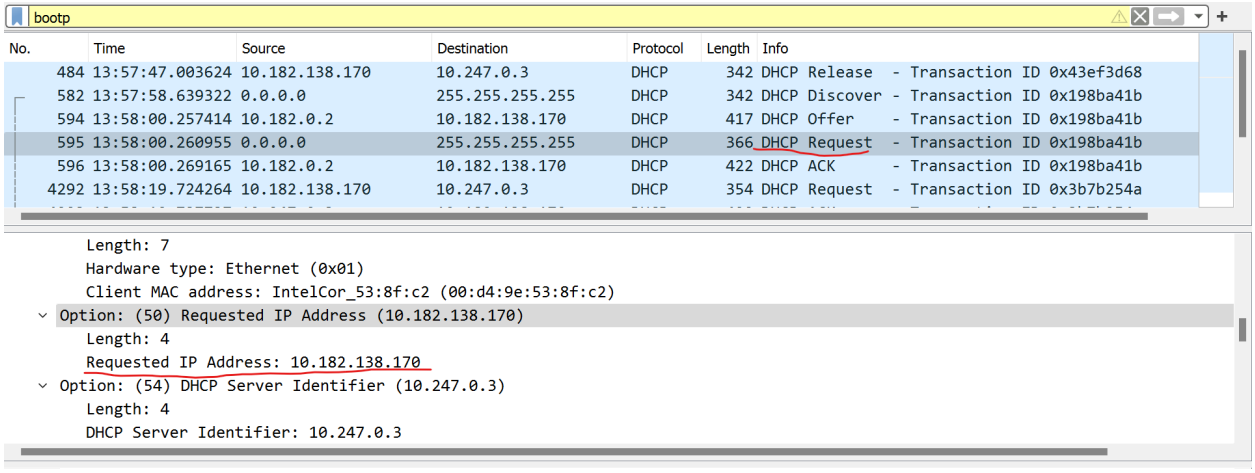
→ The absence of a relay agent is indicated by a 0.0.0.0 value. There is no relay agent in my experiment. The IP address of my relay agent is 0.0.0.0



10. Explain the purpose of the router and subnet mask lines in the DHCP offer message.
    → The router line says where the client should send the message by default - default gateway
    → the subnet mask purpose is used to tell the client which subnet mask that is available to use

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?

→ The request message has the IP address offered by the DHCP offer message. The client accepts the IP address. After the IP address being offered in the offer message, the request message is sent by the client to assign that IP address to itself.

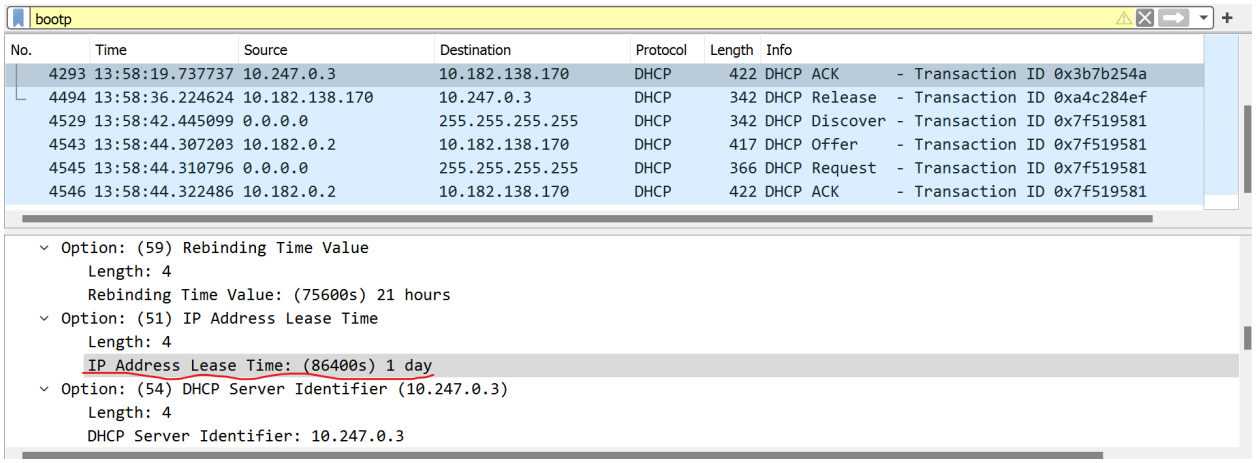


12. Explain the purpose of the lease time. How long is the lease time in your experiment?

→ The need for lease time is to know how long that particular IP address will be assigned to the client by the DHCP server. During this time, this IP address will not be assigned to another client.

→ The lease time is 1 day (86400s).

Screenshot attached below.



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?

→The purpose of DHCP release message is to release the Ip address or return back the Ip address to the dhcp server that was offered.

→ There is NO acknowledgment of the receipt of the client's DHCP request.

→ If the client's DHCP release message is lost, then the server will not assign that IP address until the lease Time on the address expires but the client releases the IP address.

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.
→ Yes the ARP packets were sent and received during the DHCP packet-exchange period.
→ They are the broadcast message sent out. Before offering an IP address to the client, the DHCP server checks whether the IP address is not in use by another client, hence DHCP server broadcast the ARP request message.