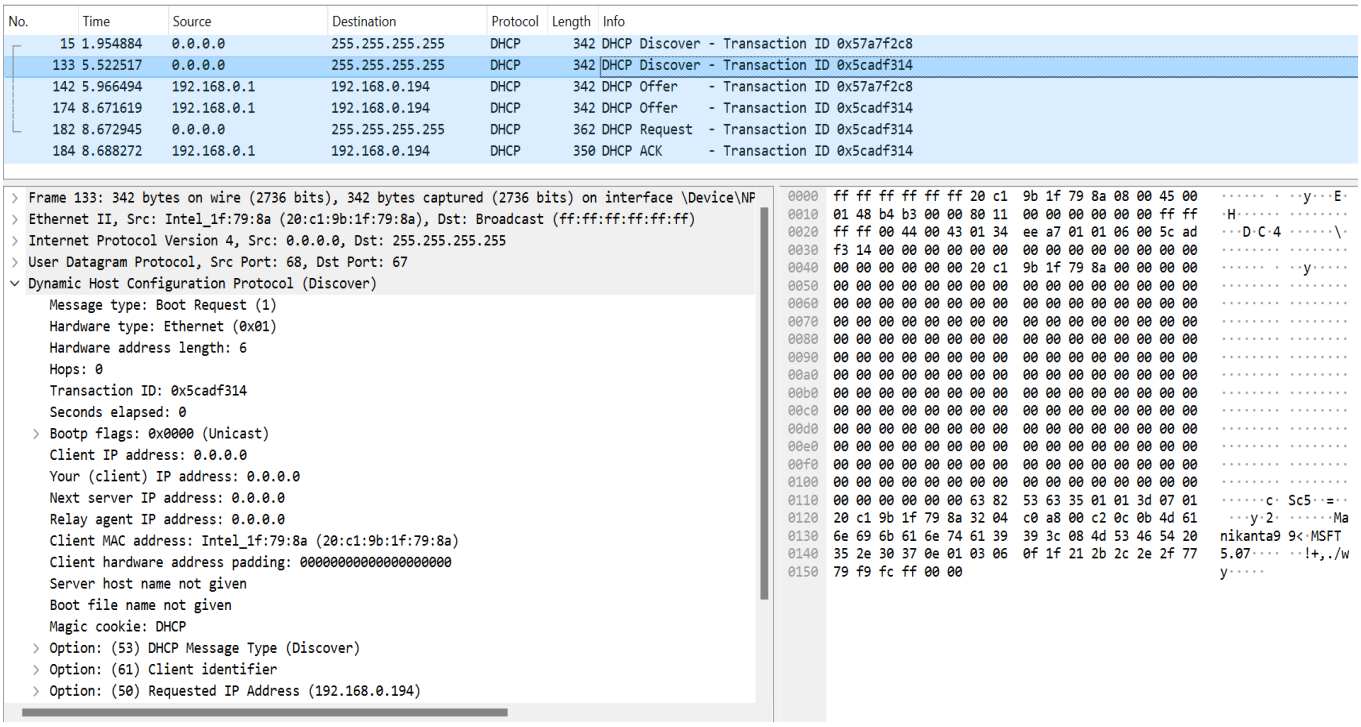
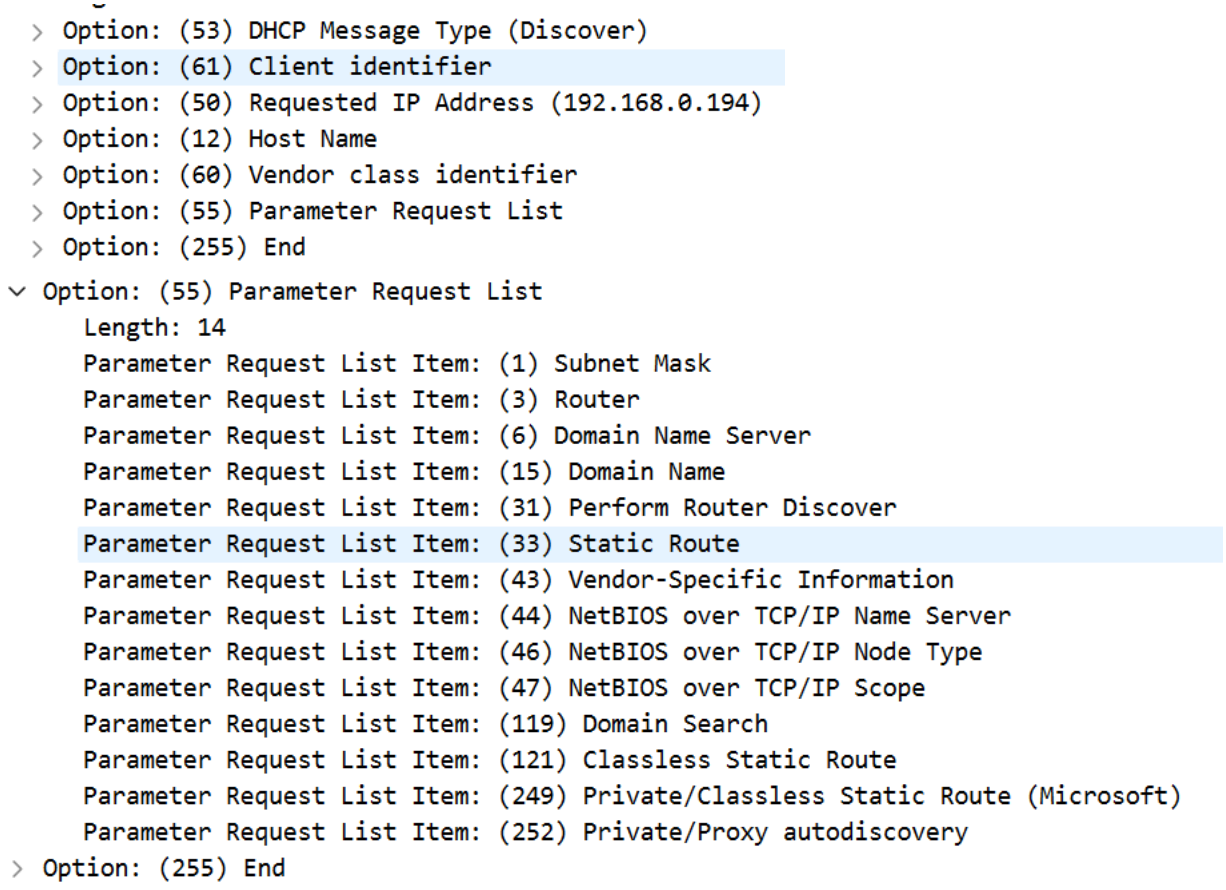
CS-315 COMPUTER NETWORKS LAB-9 (DHCP)

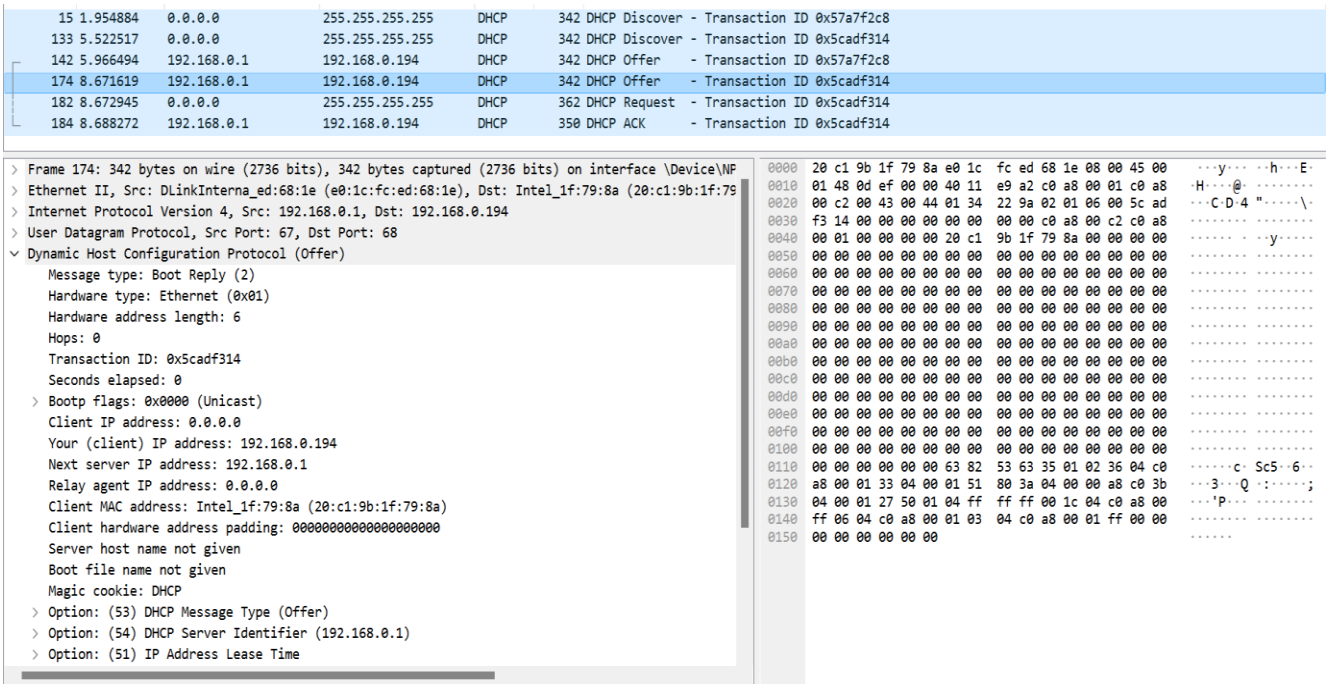


1. **UDP**, as we can see in the screenshot above.
2. **Source IP address = 0.0.0.0** [can be seen in the screenshot above]. The speciality of this IP address is that it is used by a client/device when it doesn't have a configured IP address yet or when it wants to request a new IP address from a DHCP server. In the context of DHCP (Dynamic Host Configuration Protocol), the 0.0.0.0 address in the source field indicates to the DHCP server that the device sending the Discover message does not have an assigned IP address and is seeking one. This allows the DHCP server to allocate an available IP address from its pool and assign it to the requesting device. In short, the source hasn’t been allotted any IP address yet and therefore it is using the default IP address as 0.0.0.0.
3. **Destination IP address = 255.255.255.255** [from screenshot]. The speciality of this IP address is that it represents the broadcast

address in IPv4 networks. This means that just like a network broadcast IP this message will be transmitted to all network adapters on the local network segment. When a device sends a DHCP Discover message, it doesn't yet know the IP address of the DHCP server. Therefore, it sends the Discover message to the broadcast address 255.255.255.255, indicating that it wants any DHCP server on the network to respond.

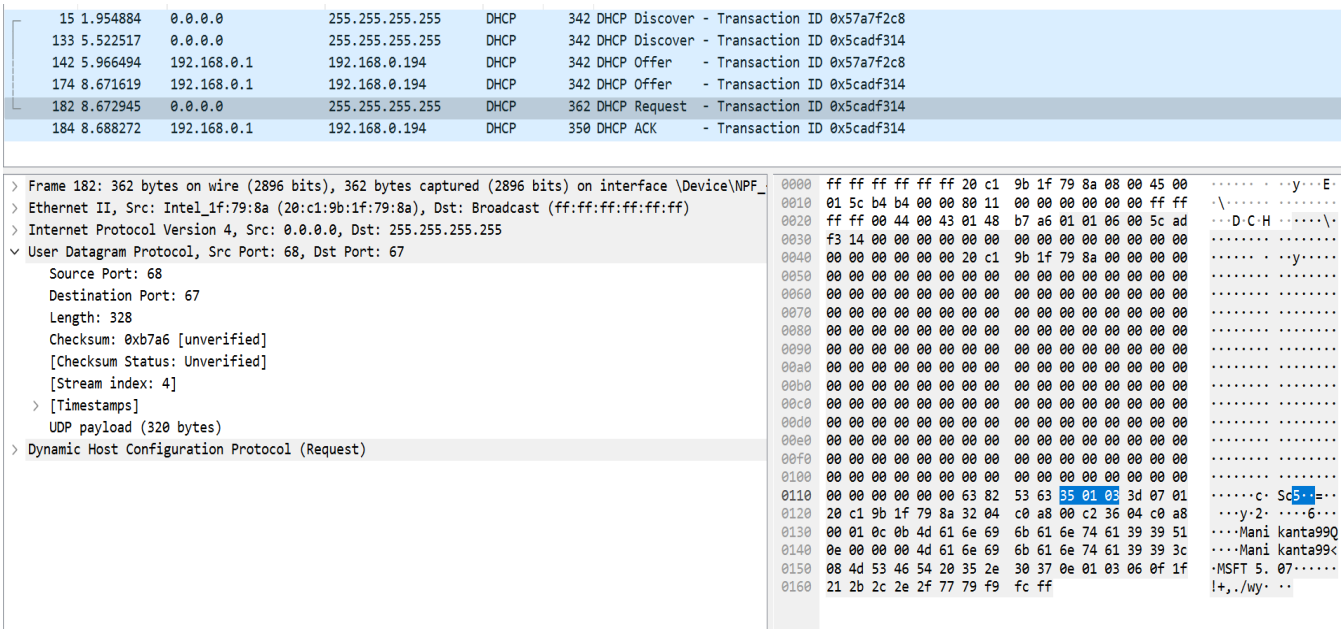
4. Value in the transaction ID field = **0x5cadf314** [from screenshot]
5. Other than the IP address, the 5 pieces of information the client is suggesting or requesting to receive are DHCP message type, Client identifier, Host Name, Vendor class identifier**,** and **Parameter Request List – Subnet Mask, Router, Domain Name Server, Domain Name, Static Route etc**.





6. We know this Offer message is being sent in response to the DHCP Discover message we studied above because both messages **share the same Transaction ID: 0x5cadf314**.
7. **Source IP address = 192.168.0.1** [from screenshot above].
   The speciality of this address is that it represents the DHCP server. DHCP server sends an Offer message using its own IP address as the source to indicate to the client where the offer is coming from.
8. **Destination IP address = 192.168.0.194** [from screenshot above].
   The speciality of this address is that it is the IP address of the client to which the DHCP server is sending the offer, i.e., This is the new IP address that will be allotted to the client.
9. The pieces of information that the DHCP server is providing to the DHCP client in the DHCP Offer message are DHCP Message Type, DHCP Server Identifier, **IP Address Lease Time, Renewal Time Value, Rebinding Time Value, Subnet mask, Broadcast Address, Domain Name Server and Router.**

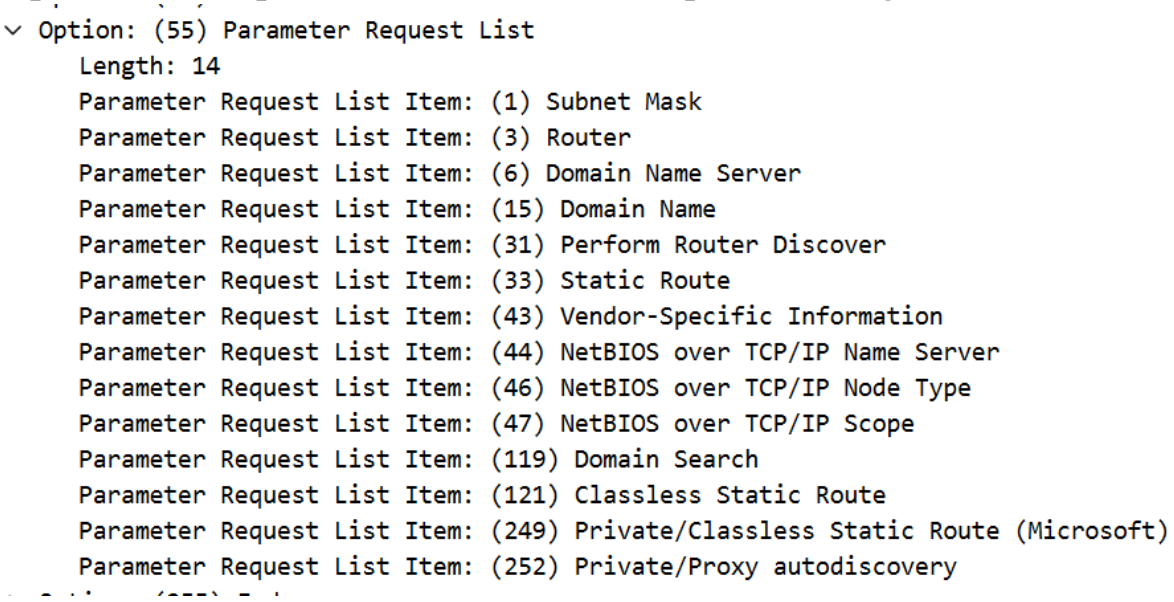
```
> Option: (53) DHCP Message Type (Offer)
> Option: (54) DHCP Server Identifier (192.168.0.1)
> Option: (51) IP Address Lease Time
> Option: (58) Renewal Time Value
> Option: (59) Rebinding Time Value
> Option: (1) Subnet Mask (255.255.255.0)
> Option: (28) Broadcast Address (192.168.0.255)
> Option: (6) Domain Name Server
> Option: (3) Router
> Option: (255) End
```



10. **UDP source port no. = 68** & **destination port no. = 67**.
11. **Source IP address = 0.0.0.0** [from screenshot above].

The speciality of this IP address is that it signifies that the client does not have a configured IP address yet or that it is requesting a new IP address from a DHCP server. The source IP address is set to 0.0.0.0 by the client to indicate its desire to acquire an IP address dynamically.

12. **Destination IP address = 255.255.255.255**[from screenshot]. The speciality of this IP address is that it represents the broadcast address in IPv4 networks. When a client sends a DHCP Request message, it does not yet know the IP address of the DHCP server that made the offer. Therefore, it sends the Discover message to the broadcast address 255.255.255.255, indicating that it wants any DHCP server on the network to respond.
13. Value in the transaction ID field = **0x5cadf314**. Yes, it matches the transaction IDs of the earlier Discover and Offer messages that we studied above.
14. No differences can be seen between the entries in the 'parameter request list' option in this Request message and the same list option in the earlier Discover message.
    The parameter request list of the DHCP request message is:



    The parameter request list of the earlier DHCP discover message is:

```
Option: (55) Parameter Request List
    Length: 14
    Parameter Request List Item: (1) Subnet Mask
    Parameter Request List Item: (3) Router
    Parameter Request List Item: (6) Domain Name Server
    Parameter Request List Item: (15) Domain Name
    Parameter Request List Item: (31) Perform Router Discover
    Parameter Request List Item: (33) Static Route
    Parameter Request List Item: (43) Vendor-Specific Information
    Parameter Request List Item: (44) NetBIOS over TCP/IP Name Server
    Parameter Request List Item: (46) NetBIOS over TCP/IP Node Type
    Parameter Request List Item: (47) NetBIOS over TCP/IP Scope
    Parameter Request List Item: (119) Domain Search
    Parameter Request List Item: (121) Classless Static Route
    Parameter Request List Item: (249) Private/Classless Static Route (Microsoft)
    Parameter Request List Item: (252) Private/Proxy autodiscovery
```

```
 15 1.954884   0.0.0.0          255.255.255.255    DHCP    342 DHCP Discover - Transaction ID 0x57a7f2c8
133 5.522517   0.0.0.0          255.255.255.255    DHCP    342 DHCP Discover - Transaction ID 0x5cadf314
142 5.966494   192.168.0.1      192.168.0.194      DHCP    342 DHCP Offer    - Transaction ID 0x57a7f2c8
174 8.671619   192.168.0.1      192.168.0.194      DHCP    342 DHCP Offer    - Transaction ID 0x5cadf314
182 8.672945   0.0.0.0          255.255.255.255    DHCP    362 DHCP Request  - Transaction ID 0x5cadf314
184 8.688272   192.168.0.1      192.168.0.194      DHCP    350 DHCP ACK      - Transaction ID 0x5cadf314
```

```
> Ethernet II, Src: DLinkInterna_ed:68:1e (e0:1c:fc:ed:68:1e), Dst: Intel_1f:79:8a (20:c1:9b:1f:79
> Internet Protocol Version 4, Src: 192.168.0.1, Dst: 192.168.0.194
> User Datagram Protocol, Src Port: 67, Dst Port: 68
v Dynamic Host Configuration Protocol (ACK)
    Message type: Boot Reply (2)
    Hardware type: Ethernet (0x01)
    Hardware address length: 6
    Hops: 0
    Transaction ID: 0x5cadf314
    Seconds elapsed: 0
  > Bootp flags: 0x0000 (Unicast)
    Client IP address: 0.0.0.0
    Your (client) IP address: 192.168.0.194
    Next server IP address: 192.168.0.1
    Relay agent IP address: 0.0.0.0
    Client MAC address: Intel_1f:79:8a (20:c1:9b:1f:79:8a)
    Client hardware address padding: 00000000000000000000
    Server host name not given
    Boot file name not given
    Magic cookie: DHCP
  > Option: (53) DHCP Message Type (ACK)
  > Option: (54) DHCP Server Identifier (192.168.0.1)
  > Option: (51) IP Address Lease Time
  > Option: (58) Renewal Time Value
```

```
0000  20 c1 9b 1f 79 8a e0 1c  fc ed 68 1e 08 00 45 00    ···y····  ··h···E·
0010  01 50 0d f0 00 00 40 11  e9 99 c0 a8 00 01 c0 a8   ·P····@·  ········
0020  00 c2 00 43 00 44 01 3c  e1 5b 02 01 06 00 5c ad   ···C·D·<  ·[····\·
0030  f3 14 00 00 00 00 00 00  00 00 c0 a8 00 c2 c0 a8   ········  ········
0040  00 01 00 00 00 00 20 c1  9b 1f 79 8a 00 00 00 00   ······ ·  ··y·····
0050  00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00   ········  ········
0060  00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00   ········  ········
0070  00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00   ········  ········
0080  00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00   ········  ········
0090  00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00   ········  ········
00a0  00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00   ········  ········
00b0  00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00   ········  ········
00c0  00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00   ········  ········
00d0  00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00   ········  ········
00e0  00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00   ········  ········
00f0  00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00   ········  ········
0100  00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00   ········  ········
0110  00 00 00 00 00 00 63 82  53 63 35 01 05 36 04 c0   ·····c·  Sc5··6··
0120  a8 00 01 33 04 00 01 51  80 3a 04 00 00 a8 c0 3b   ···3···Q ·:·····;
0130  04 00 01 27 50 01 04 ff  ff ff 00 1c 04 c0 a8 00   ···'P···  ········
0140  ff 06 04 c0 a8 00 01 51  0e 03 ff ff 4d 61 6e 69   ·······Q  ····Mani
0150  6b 61 6e 74 61 39 39 03  04 c0 a8 00 01 ff        kanta99·  ·····
```

15. **Source IP address = 192.168.0.1.**

The speciality of this IP address is that it is the IP address of the DHCP server. The DHCP server sends ACK messages to confirm that it has assigned an IP address to the client and to provide other network configuration information. Therefore, the source IP address of the DHCP server indicates that the ACK message is coming from the DHCP server.

16. **Destination IP address = 192.168.0.194**.
    The speciality of this IP address is that it is the IP address that would be assigned to the client. The DHCP server sends the ACK message directly to the client's IP address to confirm the assignment of the IP address and provide network configuration parameters.
17. The field in the DHCP ACK message that contains the assigned client IP address is "**Your (client) IP address**". This field contains the value "192.168.0.194", which is the IP address assigned to the client by the DHCP server.
18. The DHCP server assigned this IP address to the client for **86400 seconds or 1 day**.

```
Option: (51) IP Address Lease Time
    Length: 4
    IP Address Lease Time: 1 day (86400)
```

19. The IP address of the first-hop router on the default path from the client to the rest of the Internet is **192.168.0.1** as seen in the screenshots below.

```
Your (client) IP address: 192.168.0.194
Next server IP address: 192.168.0.1
```

```
Option: (3) Router
    Length: 4
    Router: 192.168.0.1
```