Assignment – 1 (DHCP)

1. Are DHCP messages sent over UDP or TCP?

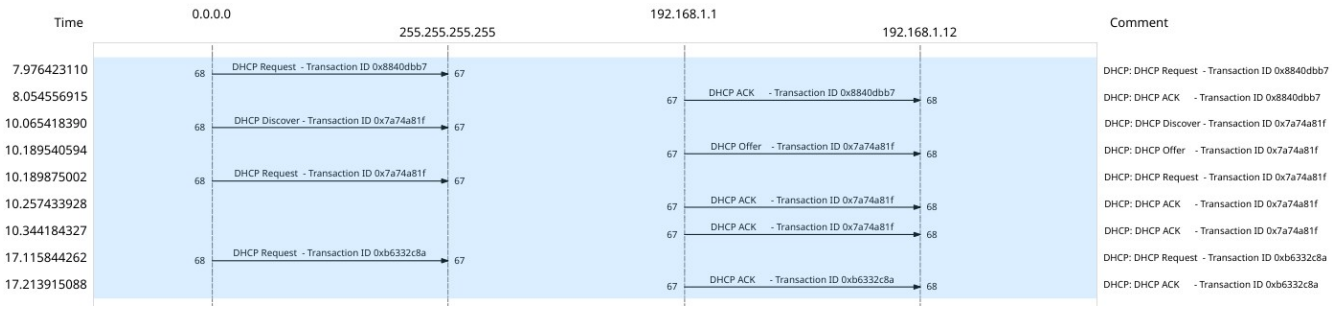
A. DHCP messages are sent over UDP.

No.	Time	Source	Destination	Protocol	Length	Info
33	7.976423110	0.0.0.0	255.255.255.255	DHCP	324	DHCP Request - Transaction ID 0x8840dbb7
34	8.054556915	192.168.1.1	192.168.1.12	DHCP	328	DHCP ACK - Transaction ID 0x8840dbb7
90	10.065418390	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ID 0x7a74a81f
92	10.189540594	192.168.1.1	192.168.1.12	DHCP	328	DHCP Offer - Transaction ID 0x7a74a81f
93	10.189875002	0.0.0.0	255.255.255.255	DHCP	342	DHCP Request - Transaction ID 0x7a74a81f
95	10.257433928	192.168.1.1	192.168.1.12	DHCP	328	DHCP ACK - Transaction ID 0x7a74a81f
97	10.344184327	192.168.1.1	192.168.1.12	DHCP	328	DHCP ACK - Transaction ID 0x7a74a81f
174	17.115844262	0.0.0.0	255.255.255.255	DHCP	324	DHCP Request - Transaction ID 0xb6332c8a
175	17.213915088	192.168.1.1	192.168.1.12	DHCP	328	DHCP ACK - Transaction ID 0xb6332c8a

```
▸ Frame 90: 342 bytes on wire (2736 bits), 342 bytes captured (2736 bits) on interface wlp8s0, id 0
▸ Ethernet II, Src: IntelCor_71:fa:4d (b8:9a:2a:71:fa:4d), Dst: Broadcast (ff:ff:ff:ff:ff:ff)
▸ 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)
```

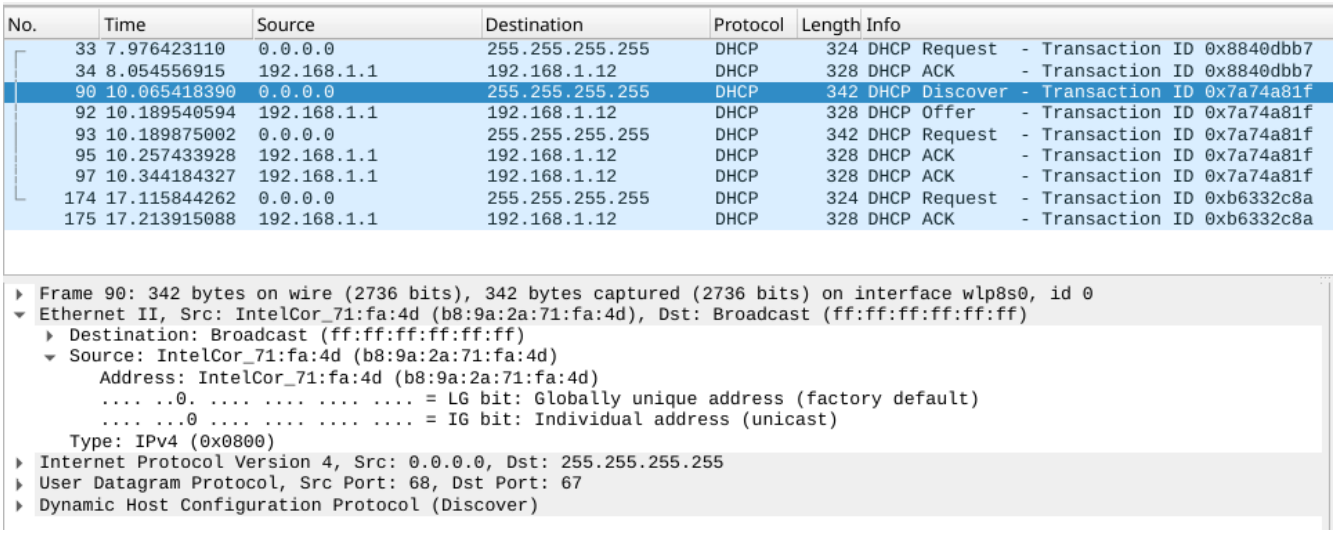
2. Draw a timing datagram illustrating the sequence of the first four-packet Discover/ Offer/Request/ACK DHCP exchange between the client and server. For each packet ,indicate the source and destination port numbers.

A.



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

A. Ethernet address of my host is b8:9a:2a:71:fa:4d



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97	10.344184327	192.168.1.1	192.168.1.12	DHCP	328	DHCP ACK - Transaction ID 0x7a74a81f
174	17.115844262	0.0.0.0	255.255.255.255	DHCP	324	DHCP Request - Transaction ID 0xb6332c8a
175	17.213915088	192.168.1.1	192.168.1.12	DHCP	328	DHCP ACK - Transaction ID 0xb6332c8a

```
▸ Frame 90: 342 bytes on wire (2736 bits), 342 bytes captured (2736 bits) on interface wlp8s0, id 0
▾ Ethernet II, Src: IntelCor_71:fa:4d (b8:9a:2a:71:fa:4d), Dst: Broadcast (ff:ff:ff:ff:ff:ff)
  ▸ Destination: Broadcast (ff:ff:ff:ff:ff:ff)
  ▾ Source: IntelCor_71:fa:4d (b8:9a:2a:71:fa:4d)
      Address: IntelCor_71:fa:4d (b8:9a:2a:71:fa:4d)
      .... ..0. .... .... .... .... = LG bit: Globally unique address (factory default)
      .... ...0 .... .... .... .... = IG bit: Individual address (unicast)
    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)
```

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

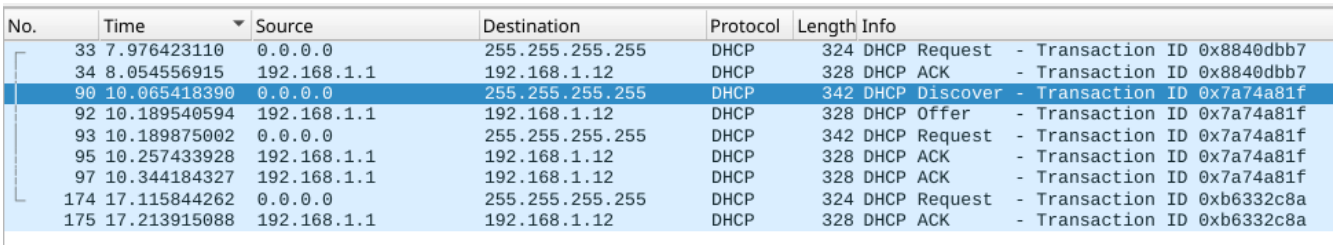
A. Both DHCP messages differ in the DHCP Message Type field, and the DHCP Request message contains the DHCP server identifier field value.

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?

A.

The Transaction-ID value in each of the first four DHCP messages is 0x7a74a81f.



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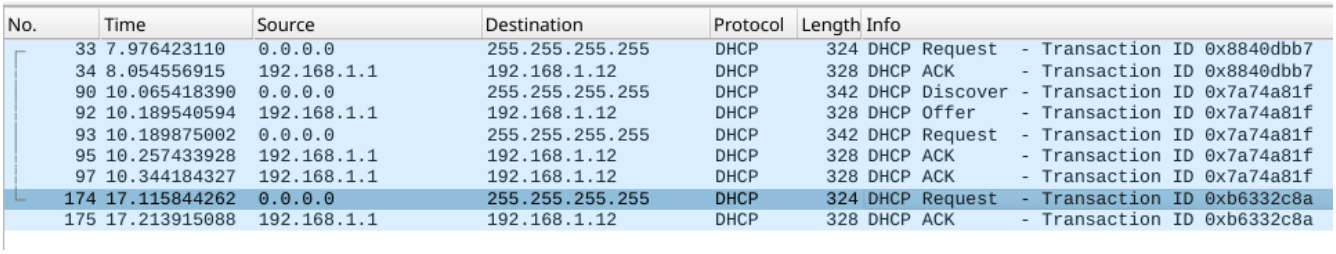
97	10.344184327	192.168.1.1	192.168.1.12	DHCP	328	DHCP ACK - Transaction ID 0x7a74a81f
174	17.115844262	0.0.0.0	255.255.255.255	DHCP	324	DHCP Request - Transaction ID 0xb6332c8a
175	17.213915088	192.168.1.1	192.168.1.12	DHCP	328	DHCP ACK - Transaction ID 0xb6332c8a

The Transaction-ID in the second set (Request/ACK) set of DHCP message is 0xb6332c8a.



No.	Time	Source	Destination	Protocol	Length	Info
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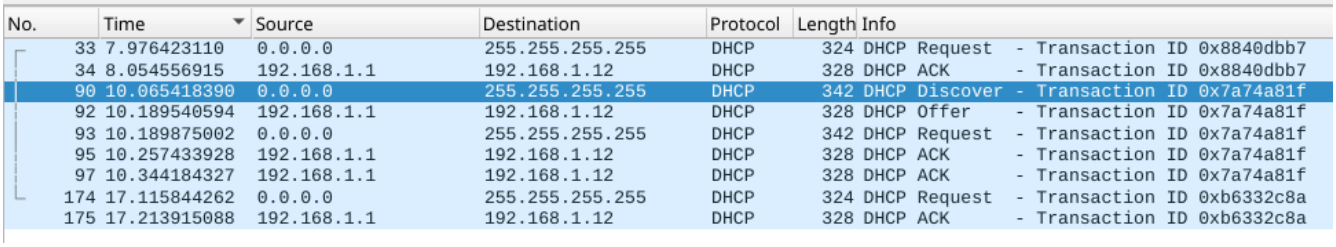
The Transaction-ID field in DHCP messages serves to uniquely identify each DHCP transaction, prevent duplicate responses from DHCP servers, and enhance message integrity and security.

6. 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.

A.



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93	10.189875002	0.0.0.0	255.255.255.255	DHCP	342	DHCP Request - Transaction ID 0x7a74a81f
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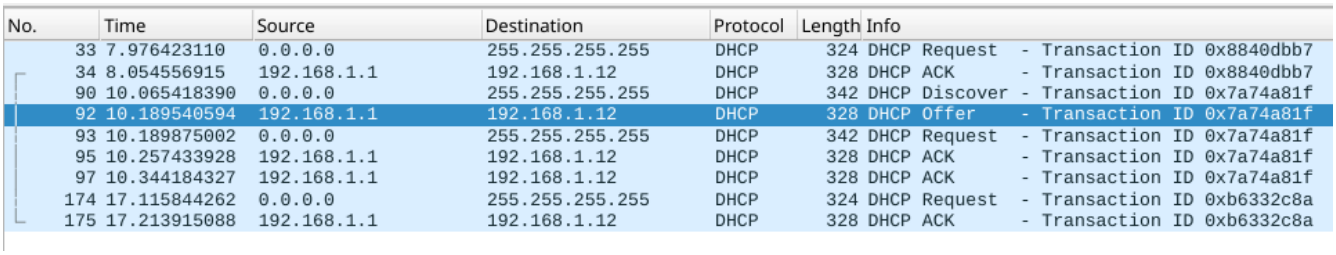
7. What is the IP address of your DHCP server?

A. The IP address of my DHCP server is 192.168.1.1



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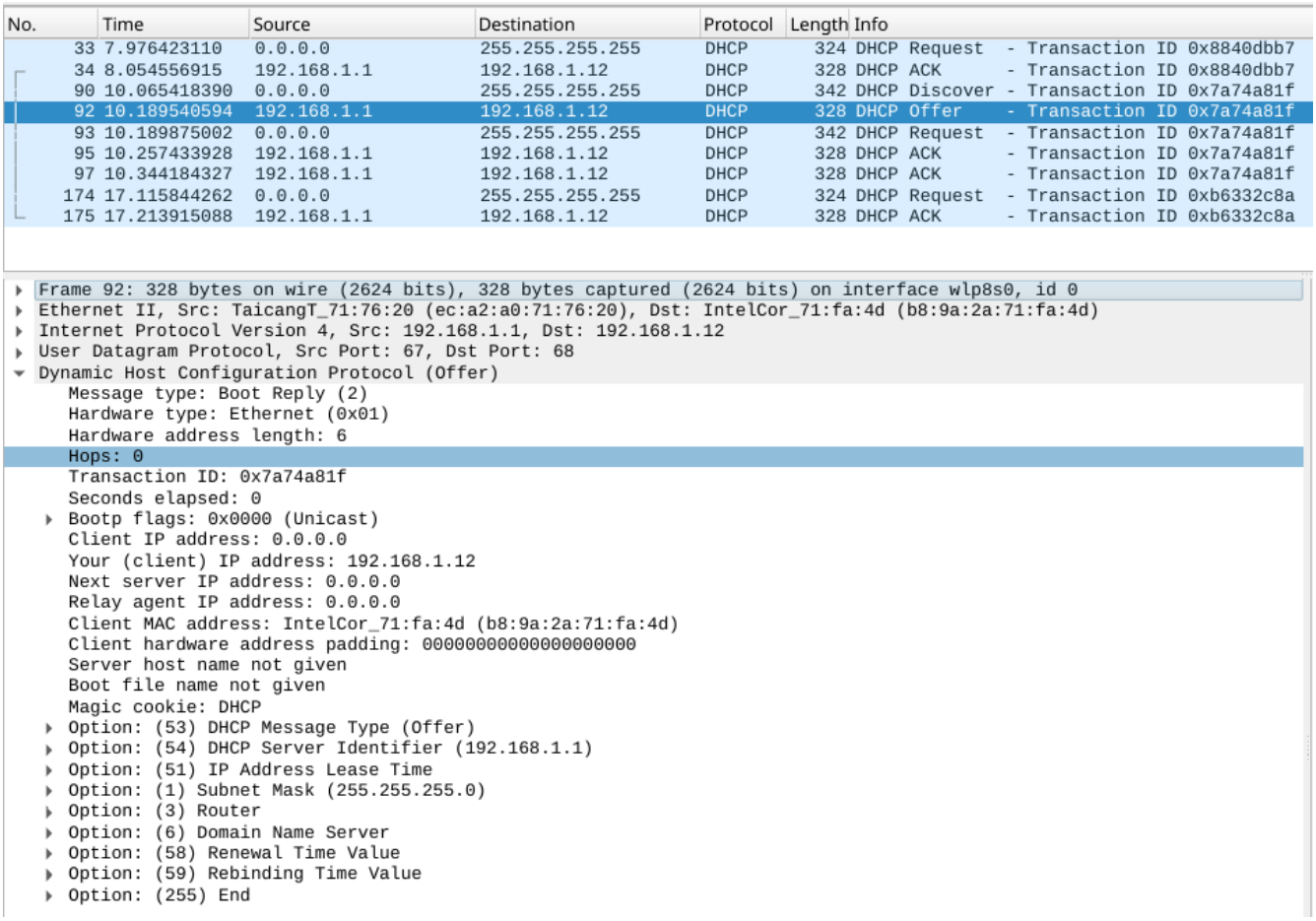
8. What IP address is the DHCP server offering to your host in the DHCP Offer message? Indicate which DHCP message contains the offered DHCP address.

A. DHCP server is offering 192.168.1.12 IP address to my host in the DHCP

Offer message.

The DHCP Offer message contains the offered DHCP address.



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93	10.189875002	0.0.0.0	255.255.255.255	DHCP	342	DHCP Request - Transaction ID 0x7a74a81f
95	10.257433928	192.168.1.1	192.168.1.12	DHCP	328	DHCP ACK - Transaction ID 0x7a74a81f
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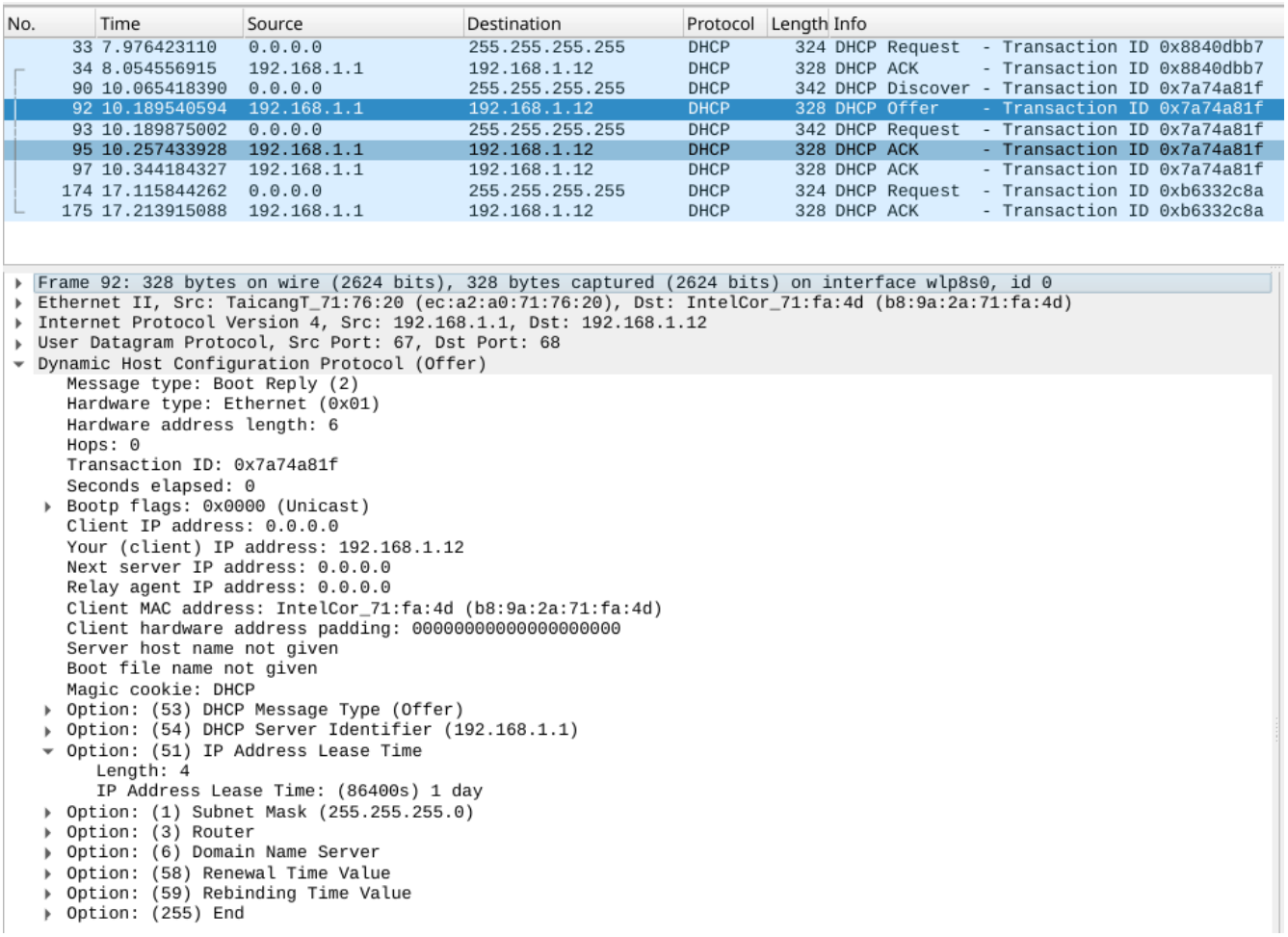
174	17.115844262	0.0.0.0	255.255.255.255	DHCP	324	DHCP Request - Transaction ID 0xb6332c8a
175	17.213915088	192.168.1.1	192.168.1.12	DHCP	328	DHCP ACK - Transaction ID 0xb6332c8a

```
▸ Frame 92: 328 bytes on wire (2624 bits), 328 bytes captured (2624 bits) on interface wlp8s0, id 0
▸ Ethernet II, Src: TaicangT_71:76:20 (ec:a2:a0:71:76:20), Dst: IntelCor_71:fa:4d (b8:9a:2a:71:fa:4d)
▸ Internet Protocol Version 4, Src: 192.168.1.1, Dst: 192.168.1.12
▸ User Datagram Protocol, Src Port: 67, Dst Port: 68
▾ Dynamic Host Configuration Protocol (Offer)
    Message type: Boot Reply (2)
    Hardware type: Ethernet (0x01)
    Hardware address length: 6
    Hops: 0
    Transaction ID: 0x7a74a81f
    Seconds elapsed: 0
  ▸ Bootp flags: 0x0000 (Unicast)
    Client IP address: 0.0.0.0
    Your (client) IP address: 192.168.1.12
    Next server IP address: 0.0.0.0
    Relay agent IP address: 0.0.0.0
    Client MAC address: IntelCor_71:fa:4d (b8:9a:2a:71:fa:4d)
    Client hardware address padding: 00000000000000000000
    Server host name not given
    Boot file name not given
    Magic cookie: DHCP
  ▸ Option: (53) DHCP Message Type (Offer)
  ▸ Option: (54) DHCP Server Identifier (192.168.1.1)
  ▸ Option: (51) IP Address Lease Time
  ▸ Option: (1) Subnet Mask (255.255.255.0)
  ▸ Option: (3) Router
  ▸ Option: (6) Domain Name Server
  ▸ Option: (58) Renewal Time Value
  ▸ Option: (59) Rebinding Time Value
  ▸ Option: (255) End
```

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

A. The purpose of the lease time is to tell the client how long they can use the specific IP address by the server before they will have to be assigned a new one.

The lease time in my experiment is 86400 seconds.



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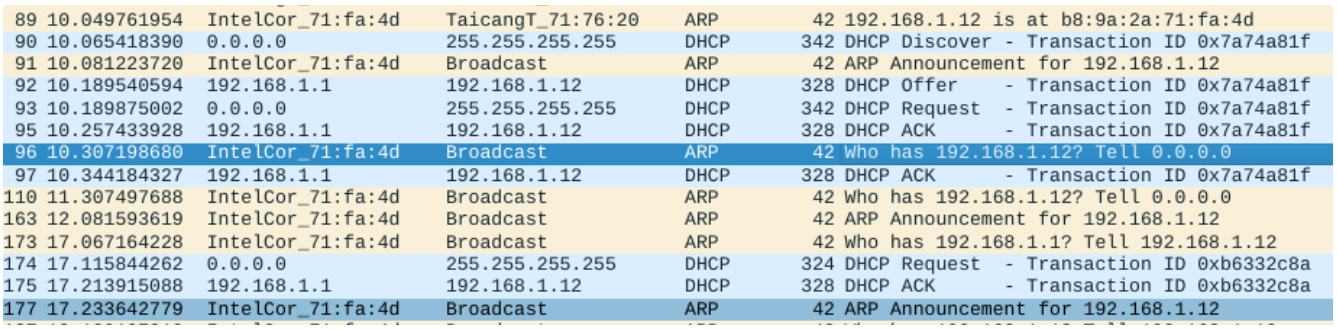
10. Were any ARP packets sent or received during the DHCP packet-exchange period? If so,explain the purpose of those ARP packets.

A. During the DHCP packet-exchange period, ARP packets were sent.

The purpose of these ARP packets is that before offering an IP address to a client, the DHCP server issues an ARP request to ensure that the offered IP address is not already in use by another workstation.



89	10.049761954	IntelCor_71:fa:4d	TaicangT_71:76:20	ARP	42	192.168.1.12 is at b8:9a:2a:71:fa:4d
90	10.065418390	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ID 0x7a74a81f
91	10.081223720	IntelCor_71:fa:4d	Broadcast	ARP	42	ARP Announcement for 192.168.1.12
92	10.189540594	192.168.1.1	192.168.1.12	DHCP	328	DHCP Offer - Transaction ID 0x7a74a81f
93	10.189875002	0.0.0.0	255.255.255.255	DHCP	342	DHCP Request - Transaction ID 0x7a74a81f
95	10.257433928	192.168.1.1	192.168.1.12	DHCP	328	DHCP ACK - Transaction ID 0x7a74a81f
96	10.307198680	IntelCor_71:fa:4d	Broadcast	ARP	42	Who has 192.168.1.12? Tell 0.0.0.0
97	10.344184327	192.168.1.1	192.168.1.12	DHCP	328	DHCP ACK - Transaction ID 0x7a74a81f
110	11.307497688	IntelCor_71:fa:4d	Broadcast	ARP	42	Who has 192.168.1.12? Tell 0.0.0.0
163	12.081593619	IntelCor_71:fa:4d	Broadcast	ARP	42	ARP Announcement for 192.168.1.12
173	17.067164228	IntelCor_71:fa:4d	Broadcast	ARP	42	Who has 192.168.1.1? Tell 192.168.1.12
174	17.115844262	0.0.0.0	255.255.255.255	DHCP	324	DHCP Request - Transaction ID 0xb6332c8a
175	17.213915088	192.168.1.1	192.168.1.12	DHCP	328	DHCP ACK - Transaction ID 0xb6332c8a
177	17.233642779	IntelCor_71:fa:4d	Broadcast	ARP	42	ARP Announcement for 192.168.1.12