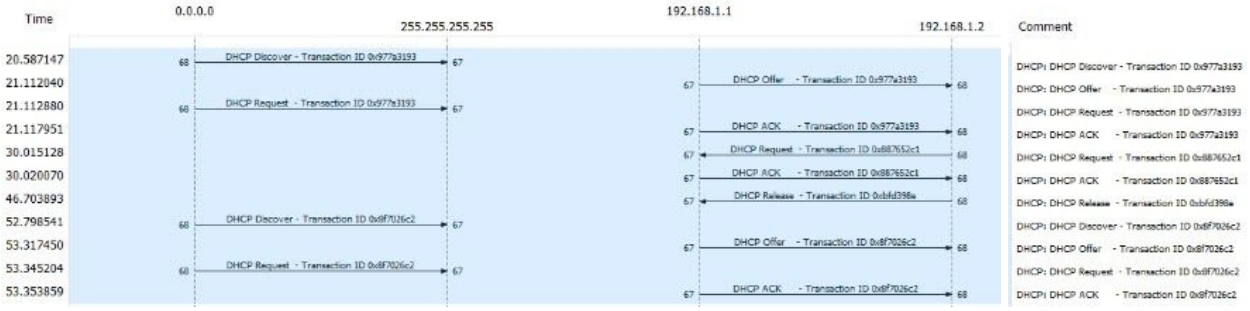
LAB 10

2.

2.1 DHCP messages are sent via UDP.

```
> Frame 666: 344 bytes on wire (2752 bits), 344 bytes captured (2752 bits) on interface \Device\NPF_{B55C6E62-5C53-40D7-9F51-384A44DCBA99}, id 0
> Ethernet II, Src: IntelCor_de:32:a8 (cc:2f:71:de:32:a8), Dst: Broadcast (ff:ff:ff:ff:ff:ff)
> Internet Protocol Version 4, Src: 0.0.0.0, Dst: 255.255.255.255
v User Datagram Protocol, Src Port: 68, Dst Port: 67
    Source Port: 68
    Destination Port: 67
    Length: 310
    Checksum: 0xdc78 [unverified]
    [Checksum Status: Unverified]
    [Stream index: 84]
  > [Timestamps]
> Dynamic Host Configuration Protocol (Discover)
```

2.2 The timing datagram illustrating the sequence of the first four-packet is given below



The port numbers are the same as in the example given.

1) Src – 68, Dst – 67
2) Dst – 67, Src – 68
3) Src – 68, Dst – 67
4) Dst – 67, Src – 68

2.3 The link-layer address of the host is cc:2f:71:de:32:a8

```
v Dynamic Host Configuration Protocol (Request)
    Message type: Boot Request (1)
    Hardware type: Ethernet (0x01)
    Hardware address length: 6
    Hops: 0
    Transaction ID: 0x977a3193
    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_de:32:a8 (cc:2f:71:de:32:a8)
    Client hardware address padding: 00000000000000000000
    Server host name not given
    Boot file name not given
```

2.4 The message type value differentiates from the discover and request message. 1 is for discover and 3 is for request as shown in the screenshots below.

```
Option: (53) DHCP Message Type (Request)
    Length: 1
    DHCP: Request (3)
```

```
Option: (53) DHCP Message Type (Discover)
    Length: 1
    DHCP: Discover (1)
```

2.5 Transaction IDs are different so that the host can differentiate between different groups of messages

No.	Time	Source	Destination	Protocol	Length	Info
666	20.587147	0.0.0.0	255.255.255.255	DHCP	344	DHCP Discover - Transaction ID 0x977a3193
668	21.112040	192.168.1.1	192.168.1.2	DHCP	342	DHCP Offer - Transaction ID 0x977a3193
669	21.112880	0.0.0.0	255.255.255.255	DHCP	370	DHCP Request - Transaction ID 0x977a3193
670	21.117951	192.168.1.1	192.168.1.2	DHCP	342	DHCP ACK - Transaction ID 0x977a3193
2854	30.015128	192.168.1.2	192.168.1.1	DHCP	358	DHCP Request - Transaction ID 0x887652c1
2855	30.020070	192.168.1.1	192.168.1.2	DHCP	342	DHCP ACK - Transaction ID 0x887652c1
4788	46.703893	192.168.1.2	192.168.1.1	DHCP	342	DHCP Release - Transaction ID 0xbfd398e
4963	52.798541	0.0.0.0	255.255.255.255	DHCP	344	DHCP Discover - Transaction ID 0x8f7026c2
4970	53.317450	192.168.1.1	192.168.1.2	DHCP	342	DHCP Offer - Transaction ID 0x8f7026c2
4971	53.345204	0.0.0.0	255.255.255.255	DHCP	370	DHCP Request - Transaction ID 0x8f7026c2
4972	53.353859	192.168.1.1	192.168.1.2	DHCP	342	DHCP ACK - Transaction ID 0x8f7026c2

2.6 Source and destination IP addresses of 4 DHCP messages are shown below:

Source	Destination	Protocol	Length	Info
0.0.0.0	255.255.255.255	DHCP	344	DHCP Discover
192.168.1.1	192.168.1.2	DHCP	342	DHCP Offer
0.0.0.0	255.255.255.255	DHCP	370	DHCP Request
192.168.1.1	192.168.1.2	DHCP	342	DHCP ACK

2.7 The IP address of my DHCP server is 192.168.1.2

```
Client IP address: 0.0.0.0
Your (client) IP address: 192.168.1.2
Next server IP address: 0.0.0.0
Relay agent IP address: 0.0.0.0
Client MAC address: IntelCor_de:32:a8 (cc:2f:71:de:32:a8)
Client hardware address padding: 00000000000000000000
Server host name not given
Boot file name not given
Magic cookie: DHCP
```

2.8 The offered IP address is 192.168.1.2

```
Option: (53) DHCP Message Type (Offer)
    Length: 1
    DHCP: Offer (2)
Internet Protocol Version 4, Src: 192.168.1.1, Dst: 192.168.1.2
    0100 .... = Version: 4
    .... 0101 = Header Length: 20 bytes (5)
Client IP address: 0.0.0.0
Your (client) IP address: 192.168.1.2
```

2.9 The value that indicates that there's no relay agent is 0.0.0.0. In the screenshot, the value for the relay agent is 0.0.0.0. If there were an IP there then we could give values in the trace.

```
Bootp flags: 0x0000 (Unicast)
Client IP address: 0.0.0.0
Your (client) IP address: 192.168.1.2
Next server IP address: 0.0.0.0
Relay agent IP address: 0.0.0.0
Client MAC address: IntelCor_de:32:a8 (cc:2f:71:de:32:a8)
Client hardware address padding: 00000000000000000000
Server host name not given
Boot file name not given
Magic cookie: DHCP
```

2.10 a) Subnet mask line tells the client which subnet mask to use.
b) The router line indicates where the client should send the messages by default.

```
Option: (1) Subnet Mask (255.255.255.0)
    Length: 4
    Subnet Mask: 255.255.255.0
```

2.11

No.	Time	Source	Destination	Protocol	Length	Info
666	20.587147	0.0.0.0	255.255.255.255	DHCP	344	DHCP Discover - Transaction ID 0x977a3193
668	21.112040	192.168.1.1	192.168.1.2	DHCP	342	DHCP Offer - Transaction ID 0x977a3193
669	21.112880	0.0.0.0	255.255.255.255	DHCP	370	DHCP Request - Transaction ID 0x977a3193
670	21.117951	192.168.1.1	192.168.1.2	DHCP	342	DHCP ACK - Transaction ID 0x977a3193
2854	30.015128	192.168.1.2	192.168.1.1	DHCP	358	DHCP Request - Transaction ID 0x887652c1
2855	30.020070	192.168.1.1	192.168.1.2	DHCP	342	DHCP ACK - Transaction ID 0x887652c1
4788	46.703893	192.168.1.2	192.168.1.1	DHCP	342	DHCP Release - Transaction ID 0xbfd398e

For the first iteration the Destination IP Address in DHCP Offer Packet doesn't match the Source IP address for the next DHCP Request Packet, hence the client doesn’t accept this address. But after the first iteration, this scheme is not followed and the Destination IP Address in DHCP Offer Packet matches the Source IP address for the next DHCP Request Packet. Hence the client now accepts the offered address.

2.12 The lease time tells the client how long they can use the specific IP address or connection assigned by the server before they will have to be assigned a new one.
The lease time in this experiment is 1 day.

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

2.13 The purpose of the release message is to release the IP address back to the server. There is no verification that the release message has been received by the server.
If the message is lost, the client releases the IP address, but the server will not reassign that address until the client’s lease on the address expires. It will just continue to run until the lease expires.

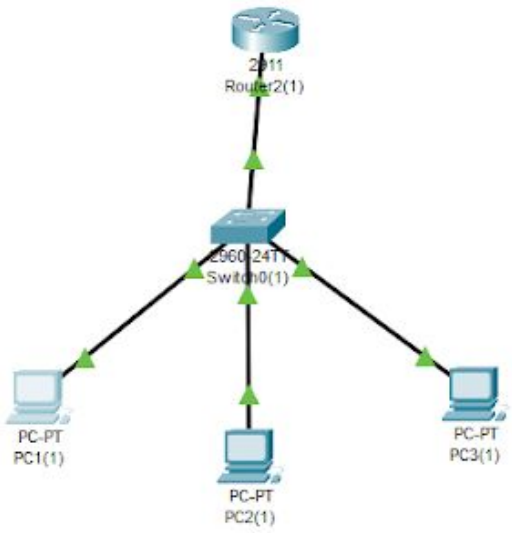
2.14 Yes, they appear in between the sent and received packets of the DHCP. They are broadcast packets.These broadcasts are sent out by the network to build up the known IP addresses by the client’s network. These packets help to sort out the mac and ip addresses.

666	20.587147	0.0.0.0	255.255.255.255	DHCP	344	DHCP Discover - Transaction ID 0x977a3193
667	20.648523	Netgear_fb:3b:34	Broadcast	ARP	60	Who has 192.168.1.2? Tell 192.168.1.1

```
Ethernet II, Src: Netgear_fb:3b:34 (a4:2b:8c:fb:3b:34), Dst: Broadcast (ff:ff:ff:ff:ff:ff)
  Destination: Broadcast (ff:ff:ff:ff:ff:ff)
      Address: Broadcast (ff:ff:ff:ff:ff:ff)
      .... ..1. .... .... .... .... = LG bit: Locally administered address (this is NOT the factory default)
      .... ...1 .... .... .... .... = IG bit: Group address (multicast/broadcast)
  Source: Netgear_fb:3b:34 (a4:2b:8c:fb:3b:34)
      Address: Netgear_fb:3b:34 (a4:2b:8c:fb:3b:34)
      .... ..0. .... .... .... .... = LG bit: Globally unique address (factory default)
      .... ...0 .... .... .... .... = IG bit: Individual address (unicast)
    Type: ARP (0x0806)
    Padding: 000000000000000000000000000000000000
```

No.	Time	Source	Destination	Protocol	Length	Info
75	1.702092	IntelCor_de:32:a8	Broadcast	ARP	42	Who has 169.254.249.192? (ARP Probe)
109	2.699486	IntelCor_de:32:a8	Broadcast	ARP	42	Who has 169.254.249.192? (ARP Probe)
131	3.712164	IntelCor_de:32:a8	Broadcast	ARP	42	Who has 169.254.249.192? (ARP Probe)
157	4.699860	IntelCor_de:32:a8	Broadcast	ARP	42	ARP Announcement for 169.254.249.192
180	5.101332	Netgear_fb:3b:34	IntelCor_de:32:a8	ARP	42	Who has 192.168.1.2? Tell 192.168.1.1
202	6.113082	Netgear_fb:3b:34	IntelCor_de:32:a8	ARP	42	Who has 192.168.1.2? Tell 192.168.1.1
290	7.101359	Netgear_fb:3b:34	IntelCor_de:32:a8	ARP	42	Who has 192.168.1.2? Tell 192.168.1.1
384	8.151178	Netgear_fb:3b:34	Broadcast	ARP	42	Who has 192.168.1.2? Tell 192.168.1.1
418	9.179365	Netgear_fb:3b:34	Broadcast	ARP	42	Who has 192.168.1.2? Tell 192.168.1.1
465	10.202589	Netgear_fb:3b:34	Broadcast	ARP	42	Who has 192.168.1.2? Tell 192.168.1.1
530	11.228081	Netgear_fb:3b:34	Broadcast	ARP	42	Who has 192.168.1.2? Tell 192.168.1.1
563	12.144769	Netgear_fb:3b:34	Broadcast	ARP	42	Who has 192.168.1.2? Tell 192.168.1.1
572	13.180610	Netgear_fb:3b:34	Broadcast	ARP	42	Who has 192.168.1.2? Tell 192.168.1.1
577	14.192782	Netgear_fb:3b:34	Broadcast	ARP	42	Who has 192.168.1.2? Tell 192.168.1.1
579	15.229766	Netgear_fb:3b:34	Broadcast	ARP	42	Who has 192.168.1.2? Tell 192.168.1.1
584	16.240717	Netgear_fb:3b:34	Broadcast	ARP	42	Who has 192.168.1.2? Tell 192.168.1.1
586	17.268309	Netgear_fb:3b:34	Broadcast	ARP	42	Who has 192.168.1.2? Tell 192.168.1.1

3. Screenshot of the topology:



The IPs assigned to the PCs are shown below
PC1: 192.168.1.11
PC2: 192.168.1.12
PC3:192.168.1.13