

IT304

Computer Networks

Lab Report – 3
September 6 , 2022

Understanding of DHCP using wireshark
and packet tracer

Group ID – TG3

Aditya Nawal (202001402)

Kunj Patel (202001421)

Divya Patel (202001420)

Aryan Shah (202001430)

Experiment 1

Command Prompt log

```
Microsoft Windows [Version 10.0.19044.1826]
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C:\Windows\System32>ipconfig/release

Windows IP Configuration

No operation can be performed on Ethernet 2 while it has its media disconnected.

Ethernet adapter Ethernet 2:

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

Ethernet adapter Ethernet:

    Connection-specific DNS Suffix  . :
    Link-local IPv6 Address . . . . . : fe80::dc10:3f7a:dde0:9e71%3
    Default Gateway . . . . . :

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Ethernet adapter Ethernet 2:

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    Connection-specific DNS Suffix  . :

Ethernet adapter Ethernet:

    Connection-specific DNS Suffix  . : DAIICT.AC.IN
    Link-local IPv6 Address . . . . . : fe80::dc10:3f7a:dde0:9e71%3
    IPv4 Address. . . . . : 10.100.77.75
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . : 10.100.77.2

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    Link-local IPv6 Address . . . . . : fe80::dc10:3f7a:dde0:9e71%3
    IPv4 Address. . . . . : 10.100.77.75
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . : 10.100.77.2

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    Connection-specific DNS Suffix  . :
    Link-local IPv6 Address . . . . . : fe80::dc10:3f7a:dde0:9e71%3
    Default Gateway . . . . . :

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Windows IP Configuration

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    Link-local IPv6 Address . . . . . : fe80::dc10:3f7a:dde0:9e71%3
    IPv4 Address. . . . . : 10.100.77.75
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . : 10.100.77.2

C:\Windows\System32>
```

1. Are DHCP messages sent over UDP or TCP?

UDP

| | | | | | | |
|------|-----------|-------------|-----------------|------|-------------------|-----------------------------|
| 463 | 32.879248 | 0.0.0.0 | 255.255.255.255 | DHCP | 352 DHCP Request | - Transaction ID 0x6d2ee4ed |
| 504 | 34.003905 | 0.0.0.0 | 255.255.255.255 | DHCP | 342 DHCP Discover | - Transaction ID 0x92694533 |
| 505 | 34.005565 | 10.100.77.1 | 10.100.77.74 | DHCP | 371 DHCP Offer | - Transaction ID 0x92694533 |
| 506 | 34.005858 | 0.0.0.0 | 255.255.255.255 | DHCP | 358 DHCP Request | - Transaction ID 0x92694533 |
| 507 | 34.007300 | 10.100.77.1 | 10.100.77.74 | DHCP | 371 DHCP ACK | - Transaction ID 0x92694533 |
| 1397 | 35.899145 | 0.0.0.0 | 255.255.255.255 | DHCP | 342 DHCP Discover | - Transaction ID 0xd3a7c4cb |
| 1398 | 35.900278 | 10.100.77.1 | 255.255.255.255 | DHCP | 371 DHCP Offer | - Transaction ID 0xd3a7c4cb |
| 1399 | 35.900912 | 0.0.0.0 | 255.255.255.255 | DHCP | 358 DHCP Request | - Transaction ID 0xd3a7c4cb |
| 1400 | 35.902019 | 10.100.77.1 | 255.255.255.255 | DHCP | 371 DHCP ACK | - Transaction ID 0xd3a7c4cb |
| 2442 | 39.188062 | 0.0.0.0 | 255.255.255.255 | DHCP | 342 DHCP Discover | - Transaction ID 0xeafc8cc7 |
| 2443 | 39.189871 | 0.0.0.0 | 255.255.255.255 | DHCP | 358 DHCP Request | - Transaction ID 0xeafc8cc7 |
| 2916 | 44.084562 | 0.0.0.0 | 255.255.255.255 | DHCP | 342 DHCP Discover | - Transaction ID 0x34d5d9bd |
| 2917 | 44.086179 | 0.0.0.0 | 255.255.255.255 | DHCP | 358 DHCP Request | - Transaction ID 0x34d5d9bd |
| 3864 | 57.604438 | 0.0.0.0 | 255.255.255.255 | DHCP | 352 DHCP Request | - Transaction ID 0xf7b502d2 |
| 4194 | 64.139795 | 0.0.0.0 | 255.255.255.255 | DHCP | 342 DHCP Discover | - Transaction ID 0x83945d51 |
| 4195 | 64.146331 | 10.100.77.1 | 255.255.255.255 | DHCP | 371 DHCP Offer | - Transaction ID 0x83945d51 |

> Frame 463: 352 bytes on wire (2816 bits), 352 bytes captured (2816 bits) on interface \Device\NPF_{1E9396D9-8471-40CA-4...}

> Ethernet II, Src: ASRockIn_da:c8:3d (a8:a1:59:da:c8:3d), 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

Source Port: 68

Destination Port: 67

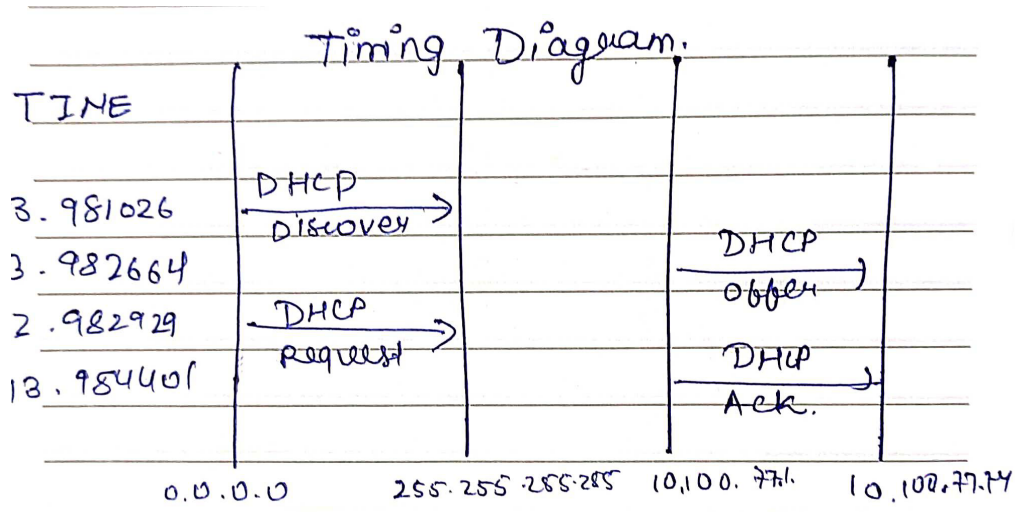
Length: 318

Checksum: 0x1110 [unverified]

[Checksum Status: Unverified]

2.

A. Draw a timing diagram 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.



| dhcpv6 | | | | | | |
|---|------------|------------------------|-------------|----------|--------|---|
| No. | Time | Source | Destination | Protocol | Length | Info |
| 2718 | 41.090185 | fe80::1ed1:e0ff:fea... | ff02::1:2 | DHCPv6 | 110 | Solicit XID: 0x69e300 CID: 000300011cd1e0a315d4 |
| 2870 | 43.156630 | fe80::d39:7f11:b8d6... | ff02::1:2 | DHCPv6 | 151 | Solicit XID: 0x986f73 CID: 000100012a7676dca8a159dac83d |
| 3907 | 58.931857 | fe80::c00e:7a2e:8de... | ff02::1:2 | DHCPv6 | 149 | Solicit XID: 0x22dc25 CID: 000100012050cbc0001558e4b419 |
| 3908 | 58.954376 | fe80::f937:c21d:d32... | ff02::1:2 | DHCPv6 | 151 | Solicit XID: 0x23f72b CID: 000100012a760050a8a159dbbc79 |
| 3912 | 59.159702 | fe80::d39:7f11:b8d6... | ff02::1:2 | DHCPv6 | 151 | Solicit XID: 0x986f73 CID: 000100012a7676dca8a159dac83d |
| 3963 | 60.451145 | fe80::1ed1:e0ff:fea... | ff02::1:2 | DHCPv6 | 110 | Solicit XID: 0x69d700 CID: 000300011cd1e0a32040 |
| 4123 | 63.215659 | fe80::1ed1:e0ff:fea... | ff02::1:2 | DHCPv6 | 110 | Solicit XID: 0x330601 CID: 000300011cd1e0a34d39 |
| 4398 | 66.958360 | fe80::f937:c21d:d32... | ff02::1:2 | DHCPv6 | 151 | Solicit XID: 0x23f72b CID: 000100012a760050a8a159dbbc79 |
| 4699 | 72.016870 | fe80::91cf:c765:a18... | ff02::1:2 | DHCPv6 | 151 | Solicit XID: 0x4f71c1 CID: 000100012a75eedda8a159dada98 |
| 5223 | 78.734346 | fe80::35e1:c255:ddf... | ff02::1:2 | DHCPv6 | 151 | Solicit XID: 0x2211ea CID: 000100012a75f01ba8a159dbbc59 |
| 5313 | 80.027935 | fe80::91cf:c765:a18... | ff02::1:2 | DHCPv6 | 151 | Solicit XID: 0x4f71c1 CID: 000100012a75eedda8a159dada98 |
| 5471 | 82.972490 | fe80::f937:c21d:d32... | ff02::1:2 | DHCPv6 | 151 | Solicit XID: 0x23f72b CID: 000100012a760050a8a159dbbc79 |
| 5630 | 86.745268 | fe80::35e1:c255:ddf... | ff02::1:2 | DHCPv6 | 151 | Solicit XID: 0x2211ea CID: 000100012a75f01ba8a159dbbc59 |
| 5747 | 90.382368 | fe80::1ed1:e0ff:fea... | ff02::1:2 | DHCPv6 | 108 | Information-request XID: 0x198e9f CID: 000300011cd1e0a3253c |
| 5778 | 91.024752 | fe80::1ed1:e0ff:fea... | ff02::1:2 | DHCPv6 | 108 | Information-request XID: 0x593feb CID: 000300011cd1e0a34d39 |
| 5786 | 91.169132 | fe80::d39:7f11:b8d6... | ff02::1:2 | DHCPv6 | 151 | Solicit XID: 0x986f73 CID: 000100012a7676dca8a159dac83d |
| 5916 | 96.028254 | fe80::91cf:c765:a18... | ff02::1:2 | DHCPv6 | 151 | Solicit XID: 0x4f71c1 CID: 000100012a75eedda8a159dada98 |
| 6155 | 102.753321 | fe80::35e1:c255:ddf... | ff02::1:2 | DHCPv6 | 151 | Solicit XID: 0x2211ea CID: 000100012a75f01ba8a159dbbc59 |
| 6311 | 109.621474 | fe80::35f6:52f:ecbf... | ff02::1:2 | DHCPv6 | 151 | Solicit XID: 0x28c0f4 CID: 000100012a7600a0a8a159dbbc7b |
| 6667 | 117.622341 | fe80::35f6:52f:ecbf... | ff02::1:2 | DHCPv6 | 151 | Solicit XID: 0x28c0f4 CID: 000100012a7600a0a8a159dbbc7b |
| 7248 | 128.030634 | fe80::91cf:c765:a18... | ff02::1:2 | DHCPv6 | 151 | Solicit XID: 0x4f71c1 CID: 000100012a75eedda8a159dada98 |
| 7340 | 129.927327 | fe80::1ed1:e0ff:fea... | ff02::1:2 | DHCPv6 | 108 | Information-request XID: 0x53aa6d CID: 000300011cd1e0a315d4 |
| 7494 | 133.622516 | fe80::35f6:52f:ecbf... | ff02::1:2 | DHCPv6 | 151 | Solicit XID: 0x28c0f4 CID: 000100012a7600a0a8a159dbbc7b |
| 7514 | 134.756703 | fe80::35e1:c255:ddf... | ff02::1:2 | DHCPv6 | 151 | Solicit XID: 0x2211ea CID: 000100012a75f01ba8a159dbbc59 |
| > Source: 1c:d1:e0:a3:4d:39 (1c:d1:e0:a3:4d:39) Type: IPv6 (0x86dd) > Internet Protocol Version 6, Src: fe80::1ed1:e0ff:fea3:4d39, Dst: ff02::1:2 0110 = Version: 6 > 1110 0000 = Traffic class: 0xe0 (DSCP: CS7, ECN: Not-ECT) 0000 0000 0000 0000 = Flow label: 0x00000 Payload length: 56 Next header: UDP (17) Hop limit: 64 Source: fe80::1ed1:e0ff:fea3:4d39 [Source SA MAC: 1c:d1:e0:a3:4d:39 (1c:d1:e0:a3:4d:39)] Destination: ff02::1:2 [Source GeoIP: Unknown] [Destination GeoIP: Unknown] > User Datagram Protocol, Src Port: 546, Dst Port: 547 Source Port: 546 Destination Port: 547 Length: 56 Checksum: 0x8dd7 [unverified] [Checksum Status: Unverified] [Stream index: 311] > DHCPv6 | | | | | | |

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

Link-layer address: 00:15:58:e4:b4:19

lab 3.pcapng

File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help

Apply a display filter ... <Ctrl-/>

| No. | Time | Source | Destination | Protocol | Length | Info |
|-----|----------|------------------------|------------------------|----------|--------|---|
| 1 | 0.000000 | 10.100.77.85 | 239.255.255.250 | SSDP | 217 | M-SEARCH * HTTP/1.1 |
| 2 | 0.059561 | 10.100.77.80 | 239.255.255.250 | SSDP | 217 | M-SEARCH * HTTP/1.1 |
| 3 | 0.204763 | 10.100.77.37 | 239.255.255.250 | SSDP | 217 | M-SEARCH * HTTP/1.1 |
| 4 | 0.392817 | fe80::c00e:7a2e:8de... | ff02::1:2 | DHCPv6 | 149 | Solicit XID: 0x22dc25 CID: 000100012050cbc0001558e4b419 |
| 5 | 0.438786 | 10.100.77.48 | 239.255.255.250 | SSDP | 217 | M-SEARCH * HTTP/1.1 |
| 6 | 0.458589 | 10.100.77.38 | 239.255.255.250 | SSDP | 217 | M-SEARCH * HTTP/1.1 |
| 7 | 0.484221 | 10.100.77.1 | 224.0.0.18 | VRRP | 60 | Announcement (v2) |
| 8 | 0.509503 | 10.100.77.108 | 239.255.255.250 | SSDP | 217 | M-SEARCH * HTTP/1.1 |
| 9 | 0.791672 | 10.100.77.79 | 239.255.255.250 | SSDP | 217 | M-SEARCH * HTTP/1.1 |
| 10 | 0.994558 | Cisco_ee:6a:37 | PVST+ | STP | 64 | RST. Root = 32768/47/00:f2:8b:ee:6a:29 Cost = 0 Port = 0x810e |
| 11 | 1.010456 | 10.100.77.85 | 239.255.255.250 | SSDP | 217 | M-SEARCH * HTTP/1.1 |
| 12 | 1.070233 | 10.100.77.80 | 239.255.255.250 | SSDP | 217 | M-SEARCH * HTTP/1.1 |
| 13 | 1.207952 | 10.100.77.37 | 239.255.255.250 | SSDP | 217 | M-SEARCH * HTTP/1.1 |
| 14 | 1.466696 | 10.100.77.38 | 239.255.255.250 | SSDP | 217 | M-SEARCH * HTTP/1.1 |
| 15 | 1.480262 | 1c:d1:e0:a3:4d:47 | Spanning-tree-(for-... | STP | 60 | RST. Root = 0/3000/00:09:97:72:a4:01 Cost = 60004 Port = 0x800e |
| 16 | 1.485956 | 10.100.77.1 | 224.0.0.18 | VRRP | 60 | Announcement (v2) |
| 17 | 2.017547 | 10.100.77.85 | 239.255.255.250 | SSDP | 217 | M-SEARCH * HTTP/1.1 |
| 18 | 2.079749 | 10.100.77.80 | 239.255.255.250 | SSDP | 217 | M-SEARCH * HTTP/1.1 |

> Frame 4: 149 bytes on wire (1192 bits), 149 bytes captured (1192 bits) on interface 0

> Ethernet II, Src: IntelCor_35:a4:8e (00:27:0e:35:a4:8e), Dst: IPv6mcast_01:00:02 (33:33:00:01:00:02)

> Internet Protocol Version 6, Src: fe80::c00e:7a2e:8de3:7f3d, Dst: ff02::1:2

> User Datagram Protocol, Src Port: 546, Dst Port: 547

Source Port: 546

Destination Port: 547

Length: 95

Checksum: 0xb768 [unverified]

[Checksum Status: Unverified]

[Stream index: 3]

> DHCPv6

Message type: Solicit (1)

Transaction ID: 0x22dc25

> Elapsed time

> Client Identifier

Option: Client Identifier (1)

Length: 14

Value: 000100012050cbc0001558e4b419

DUID: 000100012050cbc0001558e4b419

DUID Type: link-layer address plus time (1)

Hardware type: Ethernet (1)

DUID Time: Mar 7, 2017 07:09:12.000000000 India Standard Time

Link-layer address: 00:15:58:e4:b4:19

> Identity Association for Non-temporary Address

> Fully Qualified Domain Name

> Vendor Class

> Option Request

```

0040 dc 25 00 08 00 02 0c 1c 00 01 00 0e 00 01 00 01 .%.
0050 20 50 c0 c0 00 15 58 e4 b4 19 00 03 00 0c 17 00 P.
0060 27 0e 00 00 00 00 00 00 00 00 27 00 09 00 07 '
0070 4c 41 42 31 2d 50 43 00 10 00 0e 00 00 01 37 00 LABI-PC.
0080 08 4d 53 46 54 20 35 2e 30 00 06 00 08 00 18 00 .MSFT 5. 0.
0090 17 00 11 00 27 ....

```

Link-layer address (dhcpv6.duidllt.link_layer_addr), 6 bytes

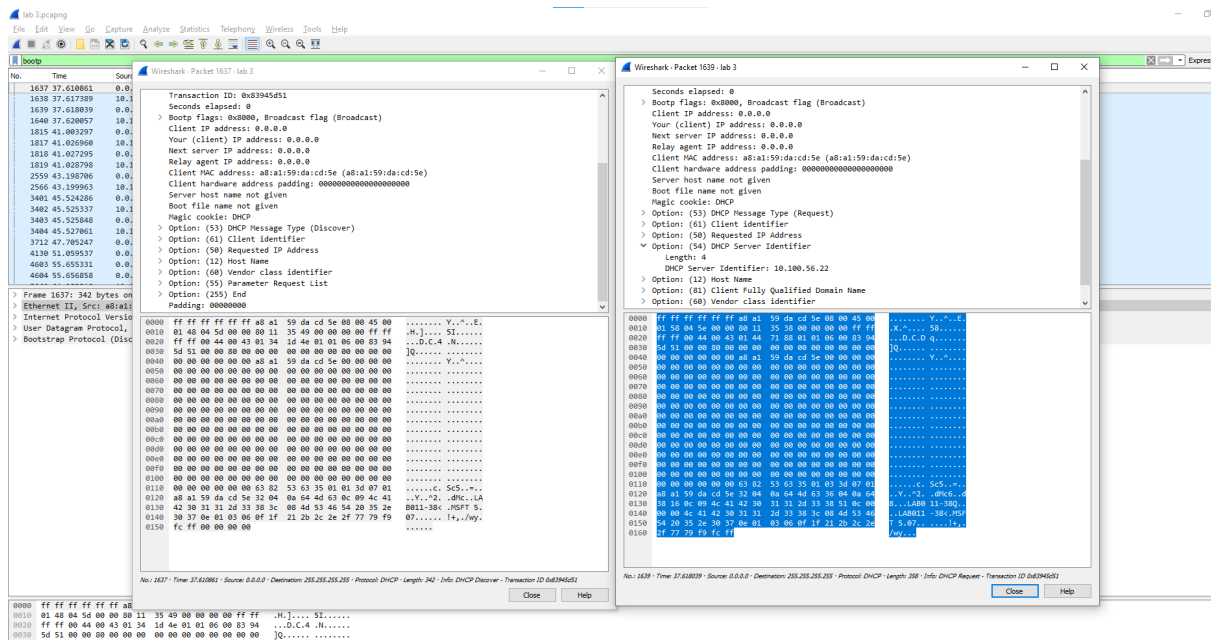
4. What values in the DHCP discover message differentiate this message from the DHCP request message?
 - a. DHCP Message Type has value 1 for Discover and value 3 for Request
 - b. Request packet has a server identifier field.

Magic Cookie, DHCP

> Option: (53) DHCP Message Type (Request)

Length: 1

DHCP: Request (3)



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?

Transaction ID: 0x83945d51

Transaction ID: 0xeaf233ee

Transaction ID helps server differentiate between different requests made by users.

| No. | Time | Source | Destination | Protocol | Length | Info |
|------|-----------|-------------|-----------------|----------|--------|---|
| 1637 | 37.610861 | 0.0.0.0 | 255.255.255.255 | DHCP | 342 | DHCP Discover - Transaction ID 0x83945d51 |
| 1638 | 37.617389 | 10.100.77.1 | 255.255.255.255 | DHCP | 371 | DHCP Offer - Transaction ID 0x83945d51 |
| 1639 | 37.618039 | 0.0.0.0 | 255.255.255.255 | DHCP | 358 | DHCP Request - Transaction ID 0x83945d51 |
| 1640 | 37.620057 | 10.100.77.1 | 255.255.255.255 | DHCP | 371 | DHCP ACK - Transaction ID 0x83945d51 |
| 1815 | 41.003297 | 0.0.0.0 | 255.255.255.255 | DHCP | 342 | DHCP Discover - Transaction ID 0xeaf233ee |
| 1817 | 41.026960 | 10.100.77.1 | 10.100.77.75 | DHCP | 371 | DHCP Offer - Transaction ID 0xeaf233ee |
| 1818 | 41.027295 | 0.0.0.0 | 255.255.255.255 | DHCP | 358 | DHCP Request - Transaction ID 0xeaf233ee |
| 1819 | 41.028798 | 10.100.77.1 | 10.100.77.75 | DHCP | 371 | DHCP ACK - Transaction ID 0xeaf233ee |
| 2559 | 43.198706 | 0.0.0.0 | 255.255.255.255 | DHCP | 342 | DHCP Discover - Transaction ID 0x1d44297b |
| 2566 | 43.199963 | 10.100.77.1 | 10.100.77.36 | DHCP | 371 | DHCP Offer - Transaction ID 0x1d44297b |
| 3401 | 45.524286 | 0.0.0.0 | 255.255.255.255 | DHCP | 342 | DHCP Discover - Transaction ID 0x5757efb7 |
| 3402 | 45.525337 | 10.100.77.1 | 255.255.255.255 | DHCP | 371 | DHCP Offer - Transaction ID 0x5757efb7 |
| 3403 | 45.525848 | 0.0.0.0 | 255.255.255.255 | DHCP | 358 | DHCP Request - Transaction ID 0x5757efb7 |
| 3404 | 45.527061 | 10.100.77.1 | 255.255.255.255 | DHCP | 371 | DHCP ACK - Transaction ID 0x5757efb7 |
| 3712 | 47.705247 | 0.0.0.0 | 255.255.255.255 | DHCP | 342 | DHCP Discover - Transaction ID 0x1d44297b |
| 4130 | 51.059537 | 0.0.0.0 | 255.255.255.255 | DHCP | 352 | DHCP Request - Transaction ID 0x77a2be59 |
| 4603 | 55.655331 | 0.0.0.0 | 255.255.255.255 | DHCP | 342 | DHCP Discover - Transaction ID 0x1d44297b |
| 4604 | 55.656858 | 0.0.0.0 | 255.255.255.255 | DHCP | 358 | DHCP Request - Transaction ID 0x1d44297b |

Frame 1640: 371 bytes on wire (2968 bits), 371 bytes captured (2968 bits) on interface 0
 Ethernet II, Src: Cisco_ee:6a:29 (00:f2:8b:ee:6a:29), Dst: Broadcast (ff:ff:ff:ff:ff:ff)
 Internet Protocol Version 4, Src: 10.100.77.1, Dst: 255.255.255.255
 User Datagram Protocol, Src Port: 67, Dst Port: 68
 Bootstrap Protocol (ACK)

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

| | | | | | | |
|------|-----------|-------------|-----------------|------|-------------------|-----------------------------|
| 1637 | 37.610861 | 0.0.0.0 | 255.255.255.255 | DHCP | 342 DHCP Discover | - Transaction ID 0x83945d51 |
| 1638 | 37.617389 | 10.100.77.1 | 255.255.255.255 | DHCP | 371 DHCP Offer | - Transaction ID 0x83945d51 |
| 1639 | 37.618039 | 0.0.0.0 | 255.255.255.255 | DHCP | 358 DHCP Request | - Transaction ID 0x83945d51 |
| 1640 | 37.620057 | 10.100.77.1 | 255.255.255.255 | DHCP | 371 DHCP ACK | - Transaction ID 0x83945d51 |

source - 0.0.0.0 destination 255.255.255.255

source - 10.100.77.1 destination 255.255.255.255

source - 0.0.0.0 destination 255.255.255.255

source - 10.100.77.1 destination 255.255.255.255

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

DHCP Server Identifier: 10.100.56.22

lab 3.pcapng

File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help

bootp

| No. | Time | Source | Destination | Protocol | Length | Info |
|------|-----------|-------------|-----------------|----------|--------|---|
| 1637 | 37.610861 | 0.0.0.0 | 255.255.255.255 | DHCP | 342 | DHCP Discover - Transaction ID 0x83945d51 |
| 1638 | 37.617389 | 10.100.77.1 | 255.255.255.255 | DHCP | 371 | DHCP Offer - Transaction ID 0x83945d51 |
| 1639 | 37.618039 | 0.0.0.0 | 255.255.255.255 | DHCP | 358 | DHCP Request - Transaction ID 0x83945d51 |
| 1640 | 37.620057 | 10.100.77.1 | 255.255.255.255 | DHCP | 371 | DHCP ACK - Transaction ID 0x83945d51 |
| 1815 | 41.003297 | 0.0.0.0 | 255.255.255.255 | DHCP | 342 | DHCP Discover - Transaction ID 0xeaf233ee |
| 1817 | 41.026960 | 10.100.77.1 | 10.100.77.75 | DHCP | 371 | DHCP Offer - Transaction ID 0xeaf233ee |
| 1818 | 41.027295 | 0.0.0.0 | 255.255.255.255 | DHCP | 358 | DHCP Request - Transaction ID 0xeaf233ee |
| 1819 | 41.028798 | 10.100.77.1 | 10.100.77.75 | DHCP | 371 | DHCP ACK - Transaction ID 0xeaf233ee |
| 2559 | 43.198706 | 0.0.0.0 | 255.255.255.255 | DHCP | 342 | DHCP Discover - Transaction ID 0x1d44297b |
| 2566 | 43.199963 | 10.100.77.1 | 10.100.77.36 | DHCP | 371 | DHCP Offer - Transaction ID 0x1d44297b |
| 3401 | 45.524286 | 0.0.0.0 | 255.255.255.255 | DHCP | 342 | DHCP Discover - Transaction ID 0x5757efb7 |
| 3402 | 45.525337 | 10.100.77.1 | 255.255.255.255 | DHCP | 371 | DHCP Offer - Transaction ID 0x5757efb7 |
| 3403 | 45.525848 | 0.0.0.0 | 255.255.255.255 | DHCP | 358 | DHCP Request - Transaction ID 0x5757efb7 |
| 3404 | 45.527061 | 10.100.77.1 | 255.255.255.255 | DHCP | 371 | DHCP ACK - Transaction ID 0x5757efb7 |
| 3712 | 47.705247 | 0.0.0.0 | 255.255.255.255 | DHCP | 342 | DHCP Discover - Transaction ID 0x1d44297b |
| 4130 | 51.059537 | 0.0.0.0 | 255.255.255.255 | DHCP | 352 | DHCP Request - Transaction ID 0x77a2be59 |
| 4603 | 55.655331 | 0.0.0.0 | 255.255.255.255 | DHCP | 342 | DHCP Discover - Transaction ID 0x1d44297b |
| 4604 | 55.656858 | 0.0.0.0 | 255.255.255.255 | DHCP | 358 | DHCP Request - Transaction ID 0x1d44297b |

Client IP address: 0.0.0.0
Your (client) IP address: 10.100.77.99
Next server IP address: 10.100.56.184
Relay agent IP address: 10.100.77.1
Client MAC address: a8:a1:59:da:cd:5e (a8:a1:59:da:cd:5e)
Client hardware address padding: 00000000000000000000
Server host name not given
Boot file name: undionly.kpxe
Magic cookie: DHCP

Option: (53) DHCP Message Type (ACK)
Length: 1
DHCP: ACK (5)

Option: (58) Renewal Time Value
Length: 4
Renewal Time Value: (9000s) 2 hours, 30 minutes

Option: (59) Rebinding Time Value
Length: 4
Rebinding Time Value: (15750s) 4 hours, 22 minutes, 30 seconds

Option: (51) IP Address Lease Time
Length: 4
IP Address Lease Time: (18000s) 5 hours

Option: (54) DHCP Server Identifier
Length: 4
DHCP Server Identifier: 10.100.56.22

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

Option: (3) Router

0120 00 23 28 3b 04 00 00 3d 86 33 04 00 00 46 50 36 .#(;...=.3...FPG
0130 04 2a c4 3b 1d 01 04 ff ff ff 00 03 04 0a 64 4d .d8... ..dM
0140 02 06 08 0a 64 38 1b 0a 64 38 19 0f 0d 44 41 49d8.. dB...DAI
0150 49 43 54 2e 41 43 2e 49 4e 00 2c 04 0a 64 38 7b ICT,AC,I N,...d8{
0160 2e 01 08 2b 0d 31 30 2e 31 30 30 2e 35 36 2e 31 ...+.10. 100.56.1
0170 38 35 ff 85.

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 screenshot shows a Wireshark packet capture of a DHCP transaction. The packet list on the left shows several DHCP messages. The packet details pane on the right shows the structure of the DHCP Offer message (frame 2566). The 'Your (client) IP address' field is highlighted, showing the offered IP address 10.100.77.36.

| No. | Time | Source | Destination | Protocol | Length | Info |
|------|-----------|-------------|-----------------|----------|--------|---|
| 1637 | 37.610861 | 0.0.0.0 | 255.255.255.255 | DHCP | 342 | DHCP Discover - Transaction ID 0x83945d51 |
| 1638 | 37.617389 | 10.100.77.1 | 255.255.255.255 | DHCP | 371 | DHCP Offer - Transaction ID 0x83945d51 |
| 1639 | 37.618039 | 0.0.0.0 | 255.255.255.255 | DHCP | 358 | DHCP Request - Transaction ID 0x83945d51 |
| 1640 | 37.620057 | 10.100.77.1 | 255.255.255.255 | DHCP | 371 | DHCP ACK - Transaction ID 0x83945d51 |
| 1815 | 41.003297 | 0.0.0.0 | 255.255.255.255 | DHCP | 342 | DHCP Discover - Transaction ID 0xeaf233ee |
| 1817 | 41.026960 | 10.100.77.1 | 10.100.77.75 | DHCP | 371 | DHCP Offer - Transaction ID 0xeaf233ee |
| 1818 | 41.027295 | 0.0.0.0 | 255.255.255.255 | DHCP | 358 | DHCP Request - Transaction ID 0xeaf233ee |
| 1819 | 41.028798 | 10.100.77.1 | 10.100.77.75 | DHCP | 371 | DHCP ACK - Transaction ID 0xeaf233ee |
| 2559 | 43.198706 | 0.0.0.0 | 255.255.255.255 | DHCP | 342 | DHCP Discover - Transaction ID 0x1d44297b |
| 2566 | 43.199963 | 10.100.77.1 | 10.100.77.36 | DHCP | 371 | DHCP Offer - Transaction ID 0x1d44297b |
| 3401 | 45.524286 | 0.0.0.0 | 255.255.255.255 | DHCP | 342 | DHCP Discover - Transaction ID 0x5757efb7 |
| 3402 | 45.525337 | 10.100.77.1 | 255.255.255.255 | DHCP | 371 | DHCP Offer - Transaction ID 0x5757efb7 |
| 3403 | 45.525848 | 0.0.0.0 | 255.255.255.255 | DHCP | 358 | DHCP Request - Transaction ID 0x5757efb7 |
| 3404 | 45.527061 | 10.100.77.1 | 255.255.255.255 | DHCP | 371 | DHCP ACK - Transaction ID 0x5757efb7 |
| 3712 | 47.705247 | 0.0.0.0 | 255.255.255.255 | DHCP | 342 | DHCP Discover - Transaction ID 0x1d44297b |
| 4130 | 51.059537 | 0.0.0.0 | 255.255.255.255 | DHCP | 352 | DHCP Request - Transaction ID 0x77a2be59 |
| 4603 | 55.655331 | 0.0.0.0 | 255.255.255.255 | DHCP | 342 | DHCP Discover - Transaction ID 0x1d44297b |
| 4604 | 55.656858 | 0.0.0.0 | 255.255.255.255 | DHCP | 358 | DHCP Request - Transaction ID 0x1d44297b |

Frame 2566: 371 bytes on wire (2968 bits), 371 bytes captured (2968 bits) on interface 0
> Ethernet II, Src: Cisco_ee:6a:29 (00:f2:8b:ee:6a:29), Dst: a8:a1:59:da:da:98 (a8:a1:59:da:da:98)
> Internet Protocol Version 4, Src: 10.100.77.1, Dst: 10.100.77.36
> User Datagram Protocol, Src Port: 67, Dst Port: 68
▼ Bootstrap Protocol (Offer)
 Message type: Boot Reply (2)
 Hardware type: Ethernet (0x01)
 Hardware address length: 6
 Hops: 1
 Transaction ID: 0x1d44297b
 Seconds elapsed: 0
 > Bootp flags: 0x0000 (Unicast)
 Client IP address: 0.0.0.0
 Your (client) IP address: 10.100.77.36
 Next server IP address: 10.100.56.184
 Relay agent IP address: 10.100.77.1
 Client MAC address: a8:a1:59:da:da:98 (a8:a1:59:da:da:98)
 Client hardware address padding: 00000000000000000000
 Server host name not given
 Boot file name: undionly.kpxe
 Magic cookie: DHCP
 ▼ Option: (53) DHCP Message Type (Offer)
 Length: 1
 DHCP: Offer (2)
 ▼ Option: (1) Subnet Mask
 Length: 4
 Subnet Mask: 255.255.255.0
 ▼ Option: (58) Renewal Time Value
 0030 29 7b 00 00 00 00 00 00 00 0a 64 4d 24 0a 64 }{..... .dm;d
 0040 38 b5 0a 64 4d 01 a8 a1 59 da da 98 00 00 00 00 8..dm... Y.....
 0050 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
 0070 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
 0090 00 00 00 00 00 75 6e 64 69 6f 6e 6c 79 2e 6bundionly.k

Offer message return clients IP address

Your (client) IP address: 10.100.77.36

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?

Since the IP is 0.0.0.0, it tells us there is no relay agent. If there were an IP, we could give values in the trace.

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

The subnet mask line tells which subnet mask to use.

The router line tells where to send messages.

```
DHCP: Offer (2)
  Option: (1) Subnet Mask
    Length: 4
    Subnet Mask: 255.255.255.0
  Option: (58) Renewal Time Value
```

11. In the example screenshots in this assignment, the host requests the offered IP address in the DHCP Request message. What happens in your own experiment?

Ans. In my experiment also the same thing happened.

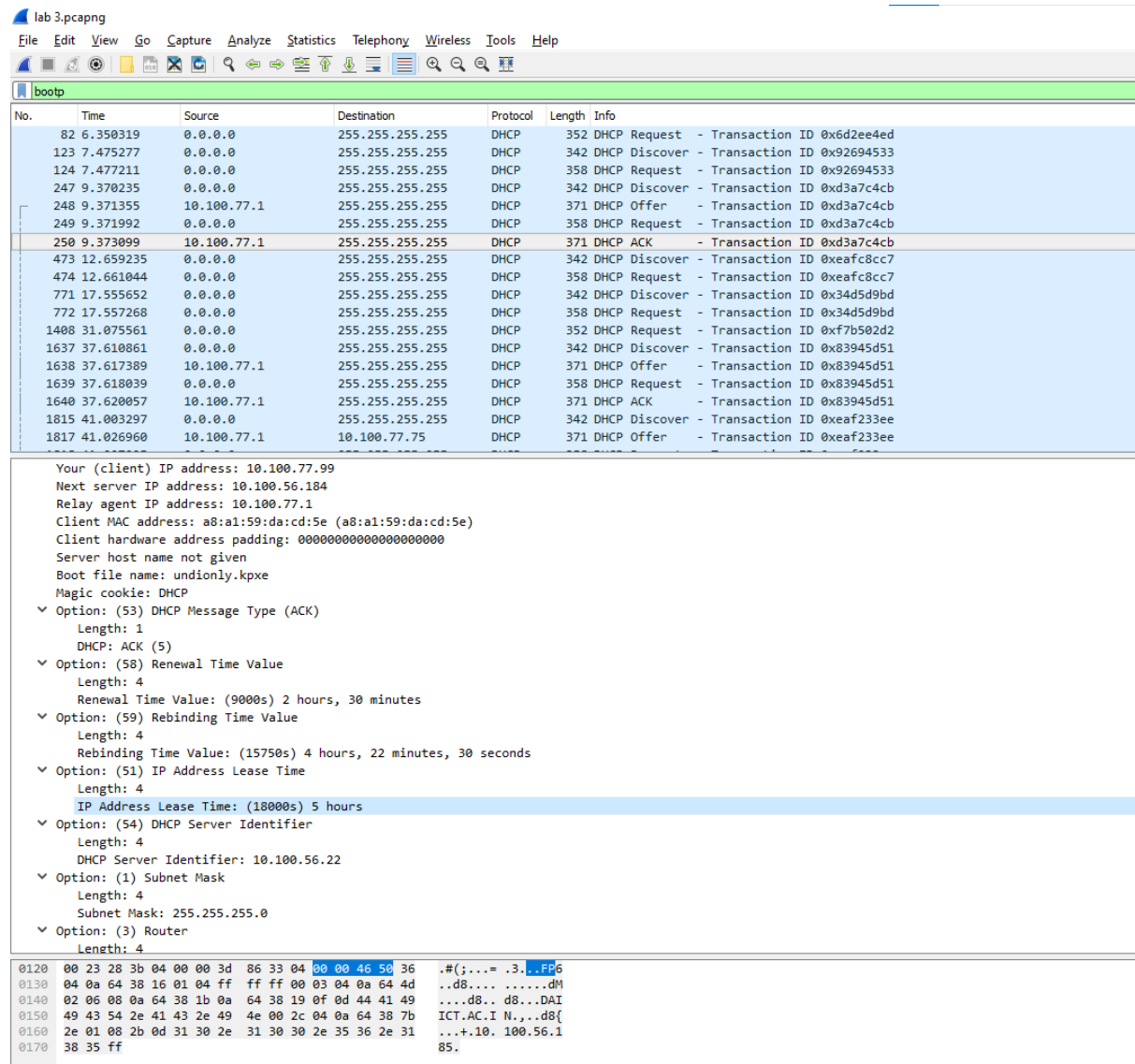
```

  Hop count: 1
  Transaction ID: 0xeac18d04
  Seconds elapsed: 0
  > Bootp flags: 0x0000 (Unicast)
  Client IP address: 0.0.0.0
  Your (client) IP address: 10.100.70.59
  Next server IP address: 10.100.56.184
  Relay agent IP address: 10.100.70.1
  Client MAC address: a8:a1:59:da:d2:8f (a8:a1:59:da:d2:8f)
  Client hardware address padding: 00000000000000000000
  Server host name not given
  Boot file name: undionly.kpxe
  Magic cookie: DHCP
  Option: (53) DHCP Message Type (Offer)
    Length: 1
    DHCP: Offer (2)
  Option: (1) Subnet Mask
    Length: 4
  Option: (54) Client Identifier
  Option: (50) Requested IP Address
    Length: 4
    Requested IP Address: 10.100.70.59
  Option: (54) DHCP Server Identifier
```

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

It is the maximum time till which system can use the IP address that it received from the DHCP server.

IP Address Lease Time: (18000s) 5 hours



lab 3.pcapng

File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help

bootp

| No. | Time | Source | Destination | Protocol | Length | Info |
|------|-----------|-------------|-----------------|----------|--------|---|
| 82 | 6.350319 | 0.0.0.0 | 255.255.255.255 | DHCP | 352 | DHCP Request - Transaction ID 0x6d2ee4ed |
| 123 | 7.475277 | 0.0.0.0 | 255.255.255.255 | DHCP | 342 | DHCP Discover - Transaction ID 0x92694533 |
| 124 | 7.477211 | 0.0.0.0 | 255.255.255.255 | DHCP | 358 | DHCP Request - Transaction ID 0x92694533 |
| 247 | 9.370235 | 0.0.0.0 | 255.255.255.255 | DHCP | 342 | DHCP Discover - Transaction ID 0xd3a7c4cb |
| 248 | 9.371355 | 10.100.77.1 | 255.255.255.255 | DHCP | 371 | DHCP Offer - Transaction ID 0xd3a7c4cb |
| 249 | 9.371992 | 0.0.0.0 | 255.255.255.255 | DHCP | 358 | DHCP Request - Transaction ID 0xd3a7c4cb |
| 250 | 9.373099 | 10.100.77.1 | 255.255.255.255 | DHCP | 371 | DHCP ACK - Transaction ID 0xd3a7c4cb |
| 473 | 12.659235 | 0.0.0.0 | 255.255.255.255 | DHCP | 342 | DHCP Discover - Transaction ID 0xeafc8cc7 |
| 474 | 12.661044 | 0.0.0.0 | 255.255.255.255 | DHCP | 358 | DHCP Request - Transaction ID 0xeafc8cc7 |
| 771 | 17.555652 | 0.0.0.0 | 255.255.255.255 | DHCP | 342 | DHCP Discover - Transaction ID 0x34d5d9bd |
| 772 | 17.557268 | 0.0.0.0 | 255.255.255.255 | DHCP | 358 | DHCP Request - Transaction ID 0x34d5d9bd |
| 1408 | 31.075561 | 0.0.0.0 | 255.255.255.255 | DHCP | 352 | DHCP Request - Transaction ID 0xf7b502d2 |
| 1637 | 37.610861 | 0.0.0.0 | 255.255.255.255 | DHCP | 342 | DHCP Discover - Transaction ID 0x83945d51 |
| 1638 | 37.617389 | 10.100.77.1 | 255.255.255.255 | DHCP | 371 | DHCP Offer - Transaction ID 0x83945d51 |
| 1639 | 37.618039 | 0.0.0.0 | 255.255.255.255 | DHCP | 358 | DHCP Request - Transaction ID 0x83945d51 |
| 1640 | 37.620057 | 10.100.77.1 | 255.255.255.255 | DHCP | 371 | DHCP ACK - Transaction ID 0x83945d51 |
| 1815 | 41.003297 | 0.0.0.0 | 255.255.255.255 | DHCP | 342 | DHCP Discover - Transaction ID 0xeaf233ee |
| 1817 | 41.026960 | 10.100.77.1 | 255.255.255.255 | DHCP | 371 | DHCP Offer - Transaction ID 0xeaf233ee |

Your (client) IP address: 10.100.77.99
Next server IP address: 10.100.56.184
Relay agent IP address: 10.100.77.1
Client MAC address: a8:a1:59:da:cd:5e (a8:a1:59:da:cd:5e)
Client hardware address padding: 00000000000000000000
Server host name not given
Boot file name: undionly.kpxe
Magic cookie: DHCP

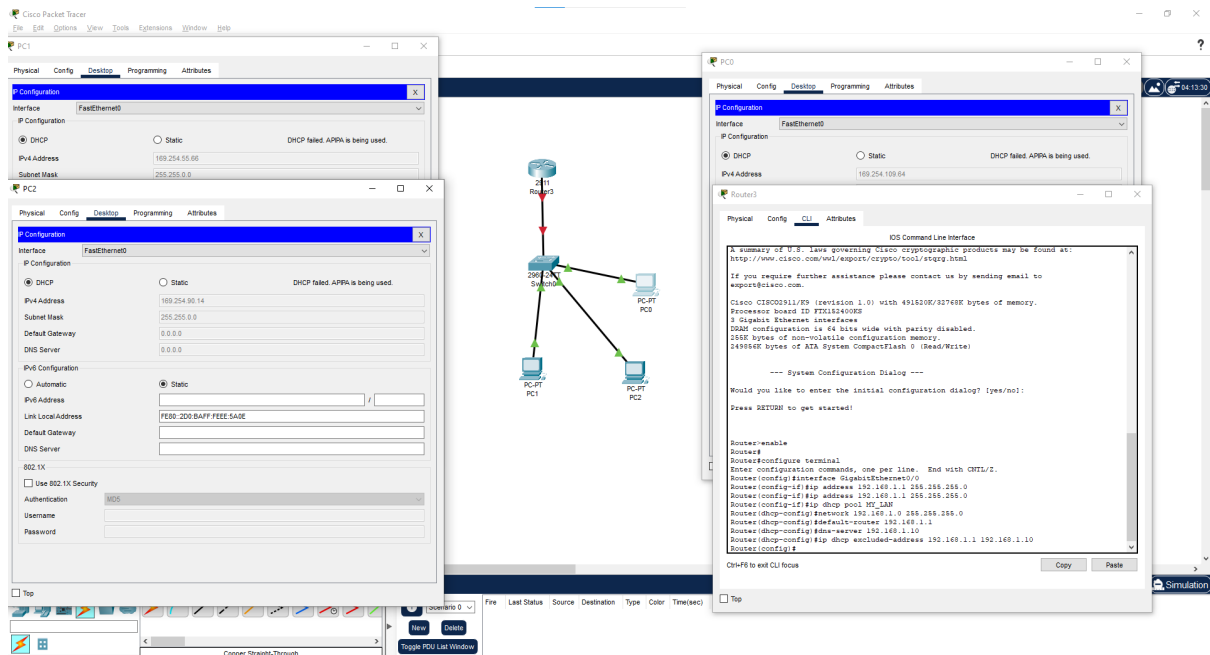
- Option: (53) DHCP Message Type (ACK)
Length: 1
DHCP: ACK (5)
- Option: (58) Renewal Time Value
Length: 4
Renewal Time Value: (9000s) 2 hours, 30 minutes
- Option: (59) Rebinding Time Value
Length: 4
Rebinding Time Value: (15750s) 4 hours, 22 minutes, 30 seconds
- Option: (51) IP Address Lease Time
Length: 4
IP Address Lease Time: (18000s) 5 hours
- Option: (54) DHCP Server Identifier
Length: 4
DHCP Server Identifier: 10.100.56.22
- Option: (1) Subnet Mask
Length: 4
Subnet Mask: 255.255.255.0
- Option: (3) Router
Length: 4

0120 00 23 28 3b 04 00 00 3d 86 33 04 00 00 46 50 36 .#(;...=.3..FP6
0130 04 0a 64 38 16 01 04 ff ff ff 00 03 04 0a 64 4d ...d8....dH
0140 02 06 08 0a 64 38 1b 0a 64 38 19 0f 0d 44 41 49d8..d8...DAI
0150 49 43 54 2e 41 43 2e 49 4e 00 2c 04 0a 64 38 7b ICT.AC.I N...d8{
0160 2e 01 08 2b 0d 31 30 2e 31 30 30 2e 35 36 2e 31 ...+.10. 100.56.1
0170 38 35 ff 85.

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

A release message is sent to tell the server to inform the IP address is released and can be allotted to someone else.

Experiment 2- Implementing DHCP server in a router



Q. Check which ip addresses are assigned to pc by DHCP server

From above attached screenshot

IP address assigned to PC0 is 169.254.109.64

IP address assigned to PC1 is 169.254.55.66

IP address assigned to PC2 is 169.254.90.14