计算机学院 计算机网络 课程实验报告

实验题目： DHCP		学号：202200130048
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实验方法介绍：

通过 wireshark 结合命令行窗口捕获 DHCP 协议传递的消息，分析

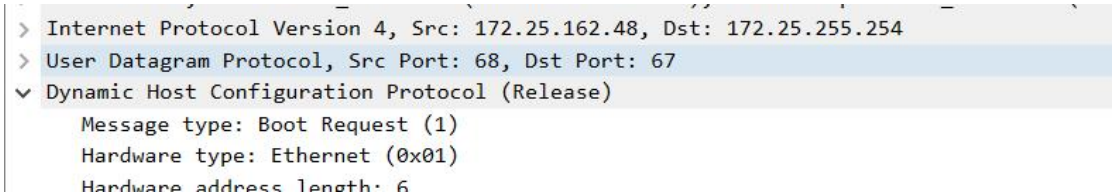
实验过程描述：

1. 收集数据包跟踪，在命令行窗口输入命令，抓包
2. 查看 DHCP 的 discover 消息
3. 查看 DHCP 的 offer 消息
4. 查看 DHCP 的 request 消息
5. 查看 DHCP 的 ACK 消息

结论分析：

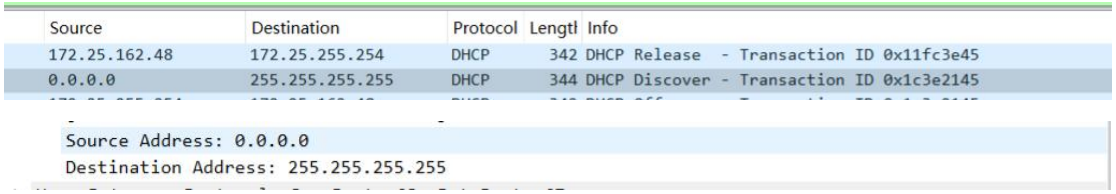
1. Is this DHCP Discover message sent out using UDP or TCP as the underlying transport protocol?

用了 UDP



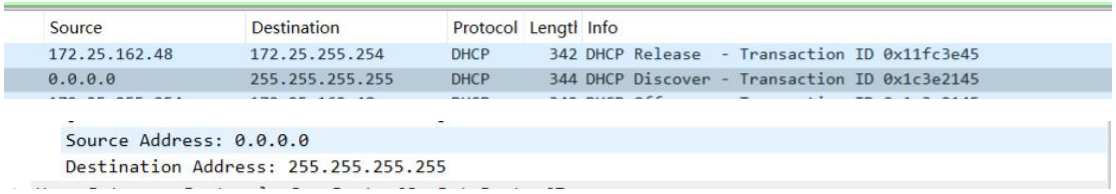
2. What is the source IP address used in the IP datagram containing the Discover message? Is there anything special about this address? Explain.

Source IP：0.0.0.0，“这个网络上的这个主机”的源 IP 地址，用于初始化。



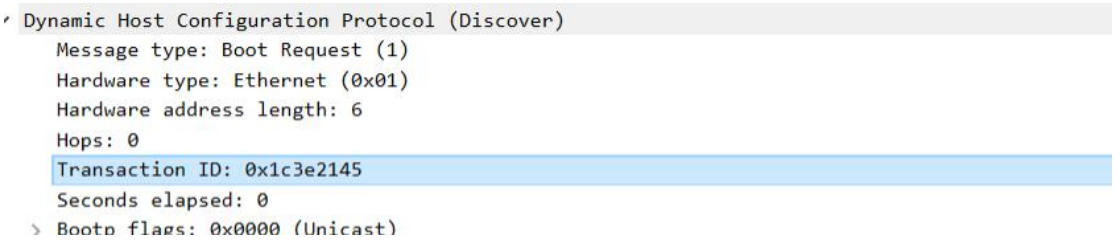
3. What is the destination IP address used in the datagram containing the Discover message. Is there anything special about this address? Explain.

destination IP：255.255.255.255，是 IP 广播地址，在本地网络的任何地方都可以到达 DHCP 服务器。



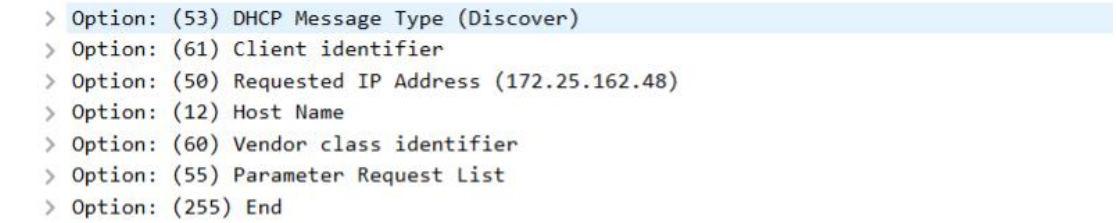
4. What is the value in the transaction ID field of this DHCP Discover message?

0x1c3e2145



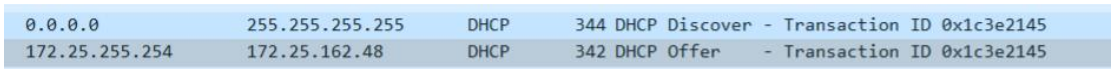
5.What are five pieces of information (beyond an IP address) that the client is suggesting or requesting to receive from the DHCP server as part of this DHCP transaction?

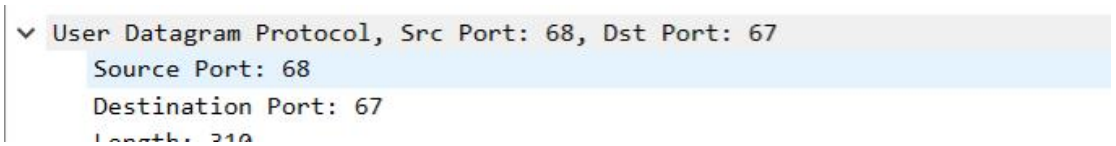
Message type，消息种类；client identifier，客户端；host name，主机名；vendor class identifier，供应商；parameter request list，参数请求表

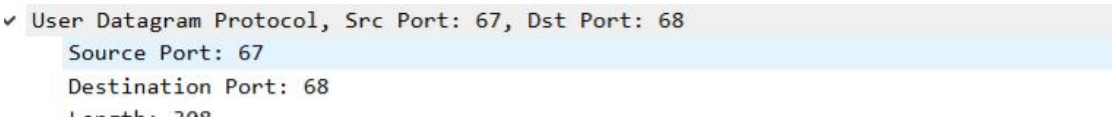


6. How do you know that this Offer message is being sent in response to the DHCP Discover message you studied in questions 1-5 above?

Transaction ID 一样，且 discover 消息端口是 68->67，offer 是 67->68，相反

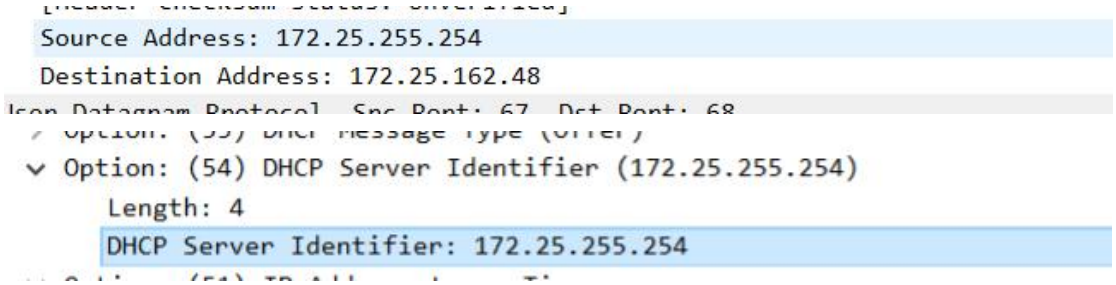






7. What is the source IP address used in the IP datagram containing the Offer message? Is there anything special about this address? Explain.

Source address：172.25.255.254，是 DHCP 服务器地址



8. What is the destination IP address used in the datagram containing the

Offer message? Is there anything special about this address? Explain

172.25.162.48，书上写的是广播地址 255.255.255.255，这个是临时分配的地址

```
Header Checksum: 0xbf82 [validation disabled]
[Header checksum status: Unverified]
Source Address: 172.25.255.254
Destination Address: 172.25.162.48
User Datagram Protocol, Src Port: 67, Dst Port: 68
```

9. What are five pieces of information that the DHCP server is providing to the DHCP client in the DHCP Offer message?

Message type,server identifier,subnet mask,router,domain name server

```
> Option: (53) DHCP Message Type (Offer)
> Option: (54) DHCP Server Identifier (172.25.255.254)
> Option: (51) IP Address Lease Time
> Option: (1) Subnet Mask (255.255.128.0)
> Option: (3) Router
> Option: (6) Domain Name Server
```

10. What is the UDP source port number in the IP datagram containing the first DHCP Request message in your trace? What is the UDP destination port number being used?

Src port: 68, dst port: 67

```
User Datagram Protocol, Src Port: 68, Dst Port: 67
    Source Port: 68
    Destination Port: 67
    Length: 336
```

11.What is the source IP address in the IP datagram containing this Request message?

0.0.0.0，主机的源地址

```
[Header checksum status: Unverified]
Source Address: 0.0.0.0
Destination Address: 255.255.255.255
User Datagram Protocol, Src Port: 68, Dst Port: 67
```

12. What is the destination IP address used in the datagram containing this Request message.

255.255.255.255，广播地址

```
[Header checksum status: Unverified]
Source Address: 0.0.0.0
Destination Address: 255.255.255.255
User Datagram Protocol, Src Port: 68, Dst Port: 67
```

13.What is the value in the transaction ID field of this DHCP Request message?Does it match the transaction IDs of the earlier Discover and Offer messages?

0x1c3e2145，匹配

```
    19 9.095673     172.25.162.48     172.25.255.254    DHCP     342 DHCP Release  - Transaction ID 0x11fc3e45
   346 24.780561    0.0.0.0           255.255.255.255   DHCP     344 DHCP Discover - Transaction ID 0x1c3e2145
   348 24.986321    172.25.255.254    172.25.162.48     DHCP     342 DHCP Offer    - Transaction ID 0x1c3e2145
   349 24.987703    0.0.0.0           255.255.255.255   DHCP     370 DHCP Request  - Transaction ID 0x1c3e2145
   365 25.404653    172.25.255.254    172.25.162.48     DHCP     342 DHCP ACK      - Transaction ID 0x1c3e2145
```

14.What differences do you see between the entries in the 'parameter request list' option in this Request message and the same list option in the earlier Discover message?

与 discover 的参数请求列表相同

```
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.What is the source IP address in the IP datagram containing this ACK message?

172.25.255.254，DHCP 服务器地址

```
    [Header checksum status: Unverified]
    Source Address: 172.25.255.254
    Destination Address: 172.25.162.48
```

16. What is the destination IP address used in the datagram containing this ACK message.

172.25.162.48，主机地址

```
    [Header checksum status: Unverified]
    Source Address: 172.25.255.254
    Destination Address: 172.25.162.48
```

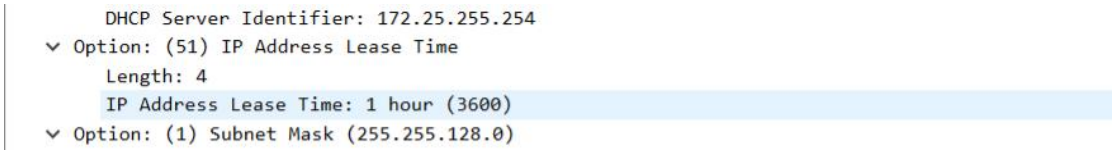
17.What is the name of the field in the DHCP ACK message (as indicated in the Wireshark window) that contains the assigned client IP address?

Your (client) IP address

```
> Bootp flags: 0x0000 (Unicast)
  Client IP address: 0.0.0.0
  Your (client) IP address: 172.25.162.48
  Next server IP address: 0.0.0.0
```

18. For how long a time (the so-called "lease time") has the DHPC server assigned this IP address to the client?

1 hour = 3600s



19. What is the IP address (returned by the DHCP server to the DHCP client in this DHCP ACK message) of the first-hop router on the default path from the client to the rest of the Internet?

172.25.255.254

结论：

1.DHCP Discover：客户端发送广播报文寻找 DHCP 服务器，报文中包含客户端的 MAC 地址。

广播发送：Discover 报文以广播形式（目的 IP 地址为 255.255.255.255，目的 MAC 地址为全 F 广播地址）发送至所在子网，确保所有 DHCP 服务器都能接收到。

未携带 IP 地址：客户端尚未获得 IP 地址，故源 IP 地址通常为 0.0.0.0，源 MAC 地址为其自身物理地址。

2. DHCP Offer：服务器接收到 Discover 后，选择一个未分配的 IP 地址和其他参数，通过单播或广播方式向客户端发送 Offer 报文。

发送方式：服务器可以选择单播（知道客户端 MAC 地址时）或广播（未知客户端 IP 地址时）发送 Offer 报文。

携带 IP 地址：服务器为客户端分配的临时 IP 地址，以及服务器自身的 IP 地址（DHCP Server Identifier）。

3.DHCP Request：客户端选择一个收到的 Offer，发送 Request 报文以请求确认该配置。

4.DHCP Acknowledge (ACK)：服务器发送 ACK 报文确认分配，客户端至此完成 IP 地址及其他参数的获取。