山东大学 计算机科学与技术 学院

新兴网络技术与实践 课程实验报告

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实验题目：Wireshark Lab: DHCP v8.0		
实验学时：2	实验日期：2025/4/9	
实验目的： 学习 DHCP		

实验结果：

1. Are DHCP messages sent over UDP or TCP?

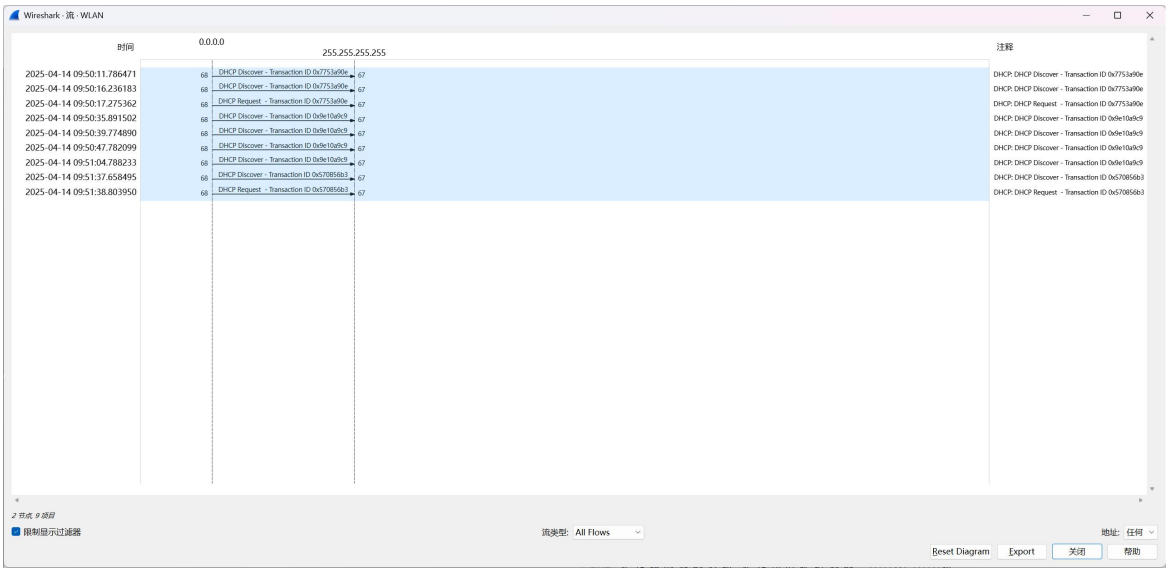
No.	Time	Source	Destination	Protoco	Lengt	Info
292	2025-04-14 09:50:11.786471	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ID 0x7753a90e
372	2025-04-14 09:50:16.236183	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ID 0x7753a90e
390	2025-04-14 09:50:17.274293	172.25.255.254	172.25.251.183	DHCP	342	DHCP Offer - Transaction ID 0x7753a90e
391	2025-04-14 09:50:17.275362	0.0.0.0	255.255.255.255	DHCP	354	DHCP Request - Transaction ID 0x7753a90e
394	2025-04-14 09:50:17.545263	172.25.255.254	172.25.251.183	DHCP	342	DHCP ACK - Transaction ID 0x7753a90e
887	2025-04-14 09:50:23.426024	172.25.251.183	172.25.255.254	DHCP	342	DHCP Request - Transaction ID 0xcc9ea3bf
895	2025-04-14 09:50:23.442256	172.25.255.254	172.25.251.183	DHCP	342	DHCP ACK - Transaction ID 0xcc9ea3bf
1431	2025-04-14 09:50:30.390638	172.25.251.183	172.25.255.254	DHCP	342	DHCP Release - Transaction ID 0x1db62fa8
1529	2025-04-14 09:50:35.891502	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ID 0x9e10a9c9
1586	2025-04-14 09:50:39.774890	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ID 0x9e10a9c9
1732	2025-04-14 09:50:47.782099	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ID 0x9e10a9c9
1929	2025-04-14 09:51:04.788233	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ID 0x9e10a9c9
2226	2025-04-14 09:51:37.658495	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ID 0x570856b3
2234	2025-04-14 09:51:38.801667	172.25.255.254	255.255.255.255	DHCP	342	DHCP Offer - Transaction ID 0x570856b3
2235	2025-04-14 09:51:38.803950	0.0.0.0	255.255.255.255	DHCP	354	DHCP Request - Transaction ID 0x570856b3
2236	2025-04-14 09:51:39.211447	172.25.255.254	255.255.255.255	DHCP	342	DHCP ACK - Transaction ID 0x570856b3

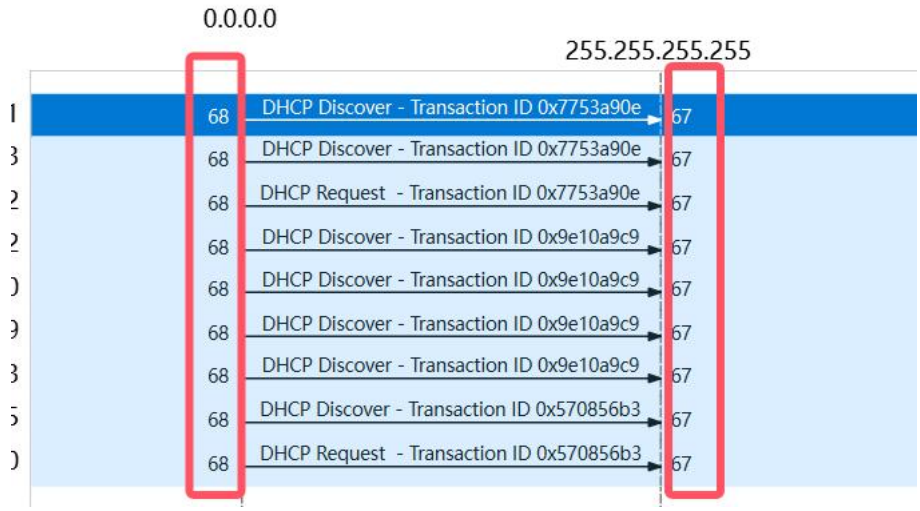
```
> Frame 292: 342 bytes on wire (2736 bits), 342 bytes captured (2736 bits) on interface \Device\NPF_{CBB6734A-BFCB-4
> Ethernet II, Src: Intel_d3:a8:6a (ac:19:8e:d3:a8:6a), Dst: Broadcast (ff:ff:ff:ff:ff:ff)
> Internet Protocol Version 4, Src: 0.0.0.0, Dst: 255.255.255.255
v User Datagram Protocol, Src Port: 68, Dst Port: 67
    Source Port: 68
    Destination Port: 67
    Length: 308
    Checksum: 0xa5c0 [unverified]
    [Checksum Status: Unverified]
    [Stream index: 123]
    [Stream Packet Number: 1]
  > [Timestamps]
    UDP payload (300 bytes)
> Dynamic Host Configuration Protocol (Discover)
```

DHCP 消息是通过 UDP 发送的。

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, indicated the source and

destination port numbers. Are the port numbers the same as in the example given in this lab assignment?



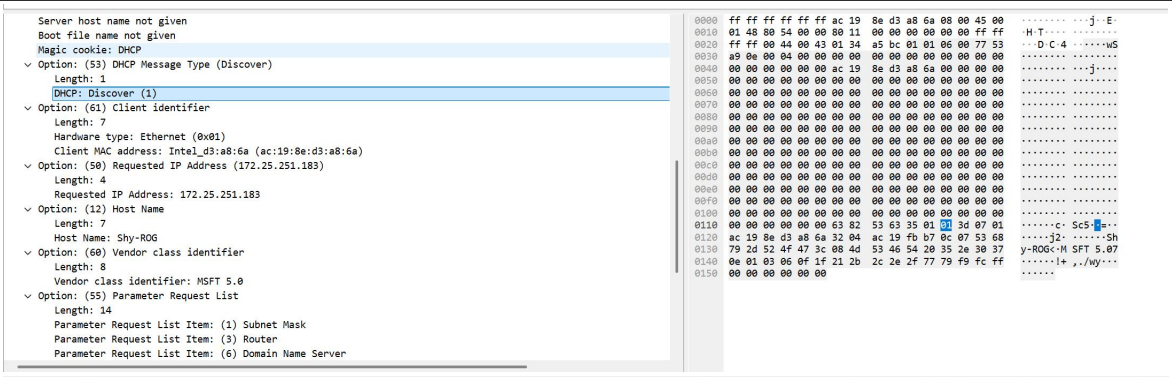


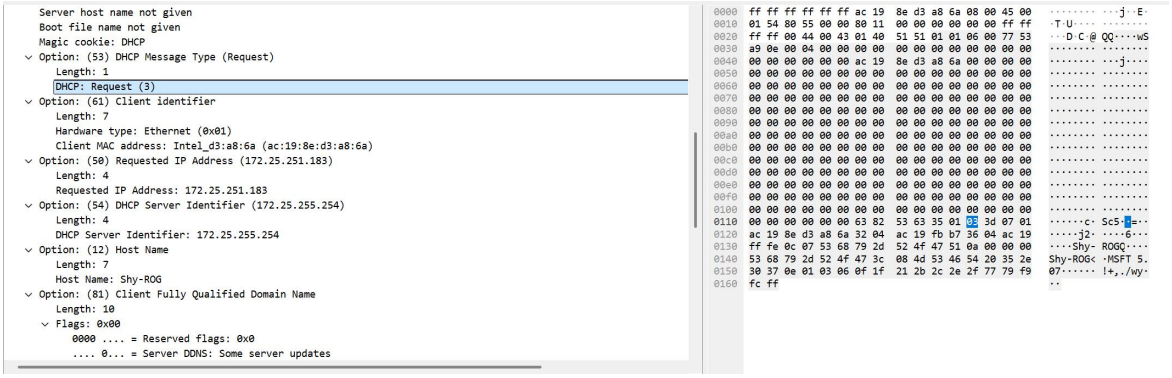
与课本是一致的。

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

在局域网 IP 下，地址是 255.255.255.255(ipv4)，实际公网上的地址为 172.25.251.183(ipv4) 、 2001:250:5800:1002::1250(ipv6) 、 AC-19-8E-D3-A8-6A(MAC 物理地址)。

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





在这一位会有区别。

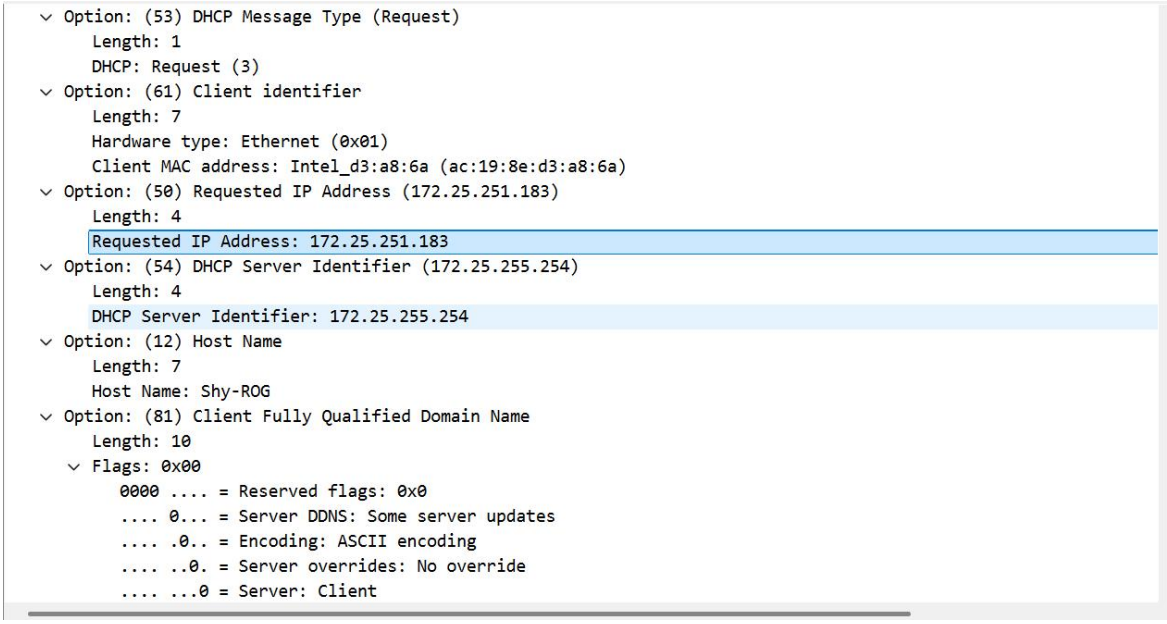
5. What is the value of the Transaction-ID in each of the first four (Discover/Offer/Request/ACK) DHCP messages? What are the values of the Transaction-ID in the second set (Request/ACK) set of DHCP messages? What is the purpose of the Transaction-ID field?

第一组是 0x7753a90e，第二组是 0x9e10a9c9

事务 id 是用于表明不同的事务的。

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.



来自主机的源地址最开始是 0.0.0.0，目标地址是 255.255.255.255

之后来自 DHCP 服务器的源地址是 172.25.255.254，目标地址是 ac:19:8e:d3:a8:6a(mac)

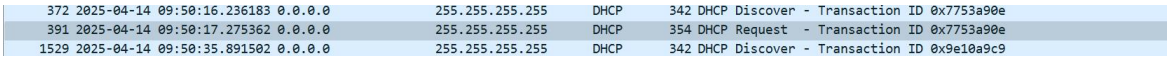
之后主机源地址是 172.25.251.183，目标地址是 172.25.255.254

之后来自 DHCP 服务器的源地址是 172.25.255.254，目标地址是 172.25.251.183

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

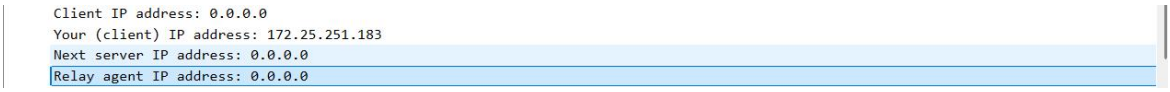
172.25.255.254

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.



这个标明了 IP 地址，地址是 172.25.251.183

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?



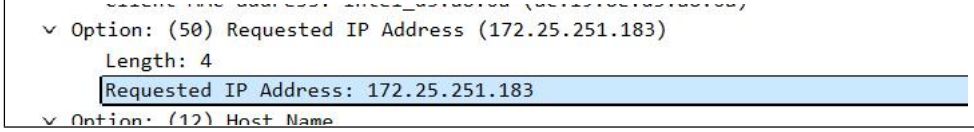
这里标明了是没有 relay agent 的

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

路由器字段用于告诉设备如何访问其他子网。子网掩码字段用于帮助设备判断目标 IP 地址是否在本地子网内。

11. In the DHCP trace file noted in footnote 2, the DHCP server offers a specific IP address to the client (see also question 8. above). In the client's response to the first server OFFER message, does the client accept this IP address? Where in the client's RESPONSE is the client's requested address?

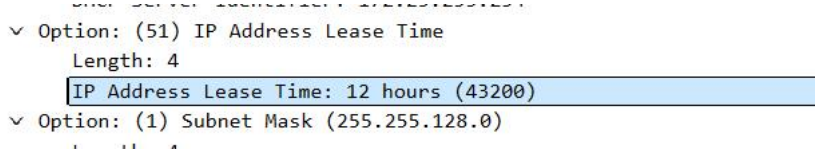
客户端接受了这个地址。客户端请求的地址在下图中



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

租约时间主要用途包括动态分配和回收 IP 地址，提高资源利用率。避免 IP 地址冲突，确保网络的稳定性。提供网络灵活性，支持设备在不同网络间切换。帮助网络管理员监控和管理网络资源等等。

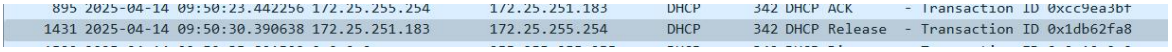
我的 IP 的租约时间为 12 小时。



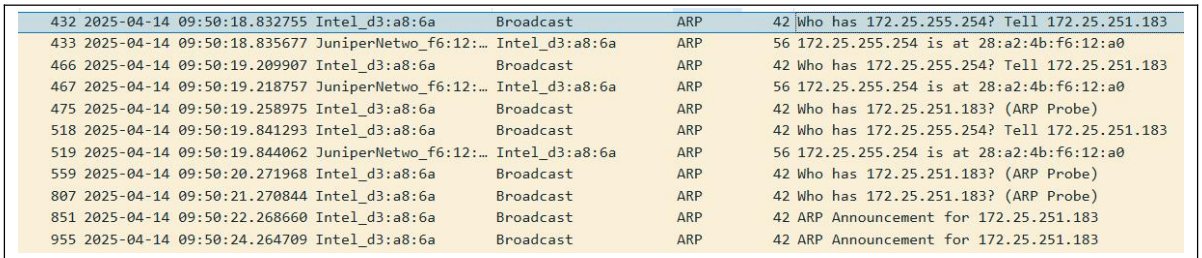
13. What is the purpose of the DHCP release message? Does the DHCP server issue an acknowledgment of receipt of the client's DHCP request? What would happen if the client's DHCP release message is lost?

DHCP 释放的主要作用是回收 IP 地址,提高 IP 地址利用率,支持网络管理,避免 IP 地址冲突,支持网络配置更新等。

服务端接收到了请求。如果这个消息丢失了会造成 IP 地址无法立即回收,资源利用率降低,影响网络管理等。



14. Clear the bootp filter from your Wireshark window. Were any ARP packets sent or received during the DHCP packet-exchange period? If so, explain the purpose of those ARP packets.



432	2025-04-14 09:50:18.832755	Intel_d3:a8:6a	Broadcast	ARP	42	Who has 172.25.255.254? Tell 172.25.251.183
433	2025-04-14 09:50:18.835677	JuniperNetwo_f6:12:…	Intel_d3:a8:6a	ARP	56	172.25.255.254 is at 28:a2:4b:f6:12:a0
466	2025-04-14 09:50:19.209907	Intel_d3:a8:6a	Broadcast	ARP	42	Who has 172.25.255.254? Tell 172.25.251.183
467	2025-04-14 09:50:19.218757	JuniperNetwo_f6:12:…	Intel_d3:a8:6a	ARP	56	172.25.255.254 is at 28:a2:4b:f6:12:a0
475	2025-04-14 09:50:19.258975	Intel_d3:a8:6a	Broadcast	ARP	42	Who has 172.25.251.183? (ARP Probe)
518	2025-04-14 09:50:19.841293	Intel_d3:a8:6a	Broadcast	ARP	42	Who has 172.25.255.254? Tell 172.25.251.183
519	2025-04-14 09:50:19.844062	JuniperNetwo_f6:12:…	Intel_d3:a8:6a	ARP	56	172.25.255.254 is at 28:a2:4b:f6:12:a0
559	2025-04-14 09:50:20.271968	Intel_d3:a8:6a	Broadcast	ARP	42	Who has 172.25.251.183? (ARP Probe)
807	2025-04-14 09:50:21.270844	Intel_d3:a8:6a	Broadcast	ARP	42	Who has 172.25.251.183? (ARP Probe)
851	2025-04-14 09:50:22.268660	Intel_d3:a8:6a	Broadcast	ARP	42	ARP Announcement for 172.25.251.183
955	2025-04-14 09:50:24.264709	Intel_d3:a8:6a	Broadcast	ARP	42	ARP Announcement for 172.25.251.183

期间有 ARP 数据包的传输。ARP 数据包的作用主要是解析 DHCP 服务器的 MAC 地址，检测 IP 地址冲突，更新 ARP 缓存，确保通信的准确性等。

问题及收获：

DHCP 通信的意义在于为网络中的设备提供自动化的 IP 地址分配和网络配置管理。通过 DHCP，网络管理员可以集中管理 IP 地址资源，避免手动配置带来的错误和冲突，同时提高网络的灵活性和可扩展性。CPDH 协议通过动态分配 IP 地址，使得设备能够快速接入网络，并在需要时自动更新或释放 IP 地址，从而确保网络资源的高效利用和网络的稳定运行。