

# 浙江大学



课程名称： 计算机网络与通信

报告题目： DHCP

指导老师： 徐文渊

学 院： 电气工程学院

专业与班级： 自动化 1703

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## PART A:DHCP

C:\WINDOWS\system32\cmd.exe

```
C:\Users\Rookie>ipconfig /release
```

Windows IP 配置

不能在 本地连接\* 3 上执行任何操作，它已断开媒体连接。  
不能在 本地连接\* 4 上执行任何操作，它已断开媒体连接。  
不能在 蓝牙网络连接 上执行任何操作，它已断开媒体连接。

以太网适配器 以太网:

媒体状态 . . . . . : 媒体已断开连接  
连接特定的 DNS 后缀 . . . . . :

无线局域网适配器 本地连接\* 3:

媒体状态 . . . . . : 媒体已断开连接  
连接特定的 DNS 后缀 . . . . . :

无线局域网适配器 本地连接\* 4:

媒体状态 . . . . . : 媒体已断开连接  
连接特定的 DNS 后缀 . . . . . :

以太网适配器 以太网 2:

媒体状态 . . . . . : 媒体已断开连接  
连接特定的 DNS 后缀 . . . . . :

无线局域网适配器 WLAN:

连接特定的 DNS 后缀 . . . . . :  
IPv6 地址 . . . . . : 240e:470:275:c407:c54a:4218:1208:e4ef  
临时 IPv6 地址. . . . . : 240e:470:275:c407:c0e1:a7c6:2041:bdde  
本地链接 IPv6 地址. . . . . : fe80::c54a:4218:1208:e4ef%4  
默认网关. . . . . : fe80::4c49:e3ff:fee0:ede2%4

以太网适配器 蓝牙网络连接:

媒体状态 . . . . . : 媒体已断开连接  
连接特定的 DNS 后缀 . . . . . :

```
C:\Users\Rookie>ipconfig /renew
```

C:\WINDOWS\system32\cmd.exe

C:\Users\Rookie>ipconfig /renew

Windows IP 配置

不能在 以太网 上执行任何操作，它已断开媒体连接。  
不能在 本地连接\* 3 上执行任何操作，它已断开媒体连接。  
不能在 本地连接\* 4 上执行任何操作，它已断开媒体连接。  
不能在 以太网 2 上执行任何操作，它已断开媒体连接。  
不能在 蓝牙网络连接 上执行任何操作，它已断开媒体连接。

以太网适配器 以太网:

媒体状态 . . . . . : 媒体已断开连接  
连接特定的 DNS 后缀 . . . . . :

无线局域网适配器 本地连接\* 3:

媒体状态 . . . . . : 媒体已断开连接  
连接特定的 DNS 后缀 . . . . . :

无线局域网适配器 本地连接\* 4:

媒体状态 . . . . . : 媒体已断开连接  
连接特定的 DNS 后缀 . . . . . :

以太网适配器 以太网 2:

媒体状态 . . . . . : 媒体已断开连接  
连接特定的 DNS 后缀 . . . . . :

无线局域网适配器 WLAN:

连接特定的 DNS 后缀 . . . . . :  
IPv6 地址 . . . . . : 240e:470:275:c407:c54a:4218:1208:e4ef  
临时 IPv6 地址. . . . . : 240e:470:275:c407:c0e1:a7c6:2041:bddc  
本地链接 IPv6 地址. . . . . : fe80::c54a:4218:1208:e4ef%4  
IPv4 地址 . . . . . : 192.168.43.182  
子网掩码 . . . . . : 255.255.255.0  
默认网关. . . . . : fe80::4c49:e3ff:fee0:ede2%4  
192.168.43.1

以太网适配器 蓝牙网络连接:

C:\WINDOWS\system32\cmd.exe

192.168.43.1

以太网适配器 蓝牙网络连接:

媒体状态 . . . . . : 媒体已断开连接  
连接特定的 DNS 后缀 . . . . . :

C:\Users\Rookie>ipconfig /release

Windows IP 配置

不能在 本地连接\* 3 上执行任何操作，它已断开媒体连接。  
不能在 本地连接\* 4 上执行任何操作，它已断开媒体连接。  
不能在 蓝牙网络连接 上执行任何操作，它已断开媒体连接。

以太网适配器 以太网:

媒体状态 . . . . . : 媒体已断开连接  
连接特定的 DNS 后缀 . . . . . :

无线局域网适配器 本地连接\* 3:

媒体状态 . . . . . : 媒体已断开连接  
连接特定的 DNS 后缀 . . . . . :

无线局域网适配器 本地连接\* 4:

媒体状态 . . . . . : 媒体已断开连接  
连接特定的 DNS 后缀 . . . . . :

以太网适配器 以太网 2:

媒体状态 . . . . . : 媒体已断开连接  
连接特定的 DNS 后缀 . . . . . :

无线局域网适配器 WLAN:

连接特定的 DNS 后缀 . . . . . :  
IPv6 地址 . . . . . : 240e:470:275:c407:c54a:4218:1208:e4ef  
临时 IPv6 地址. . . . . : 240e:470:275:c407:c0e1:a7c6:2041:bddc  
本地链接 IPv6 地址. . . . . : fe80::c54a:4218:1208:e4ef%4  
默认网关. . . . . : fe80::4c49:e3ff:fee0:ede2%4

```
C:\WINDOWS\system32\cmd.exe
媒体状态 . . . . . : 媒体已断开连接
连接特定的 DNS 后缀 . . . . . :

C:\Users\Rookie>ipconfig /renew

Windows IP 配置

不能在 以太网 上执行任何操作，它已断开媒体连接。
不能在 本地连接* 3 上执行任何操作，它已断开媒体连接。
不能在 本地连接* 4 上执行任何操作，它已断开媒体连接。
不能在 以太网 2 上执行任何操作，它已断开媒体连接。
不能在 蓝牙网络连接 上执行任何操作，它已断开媒体连接。

以太网适配器 以太网:

    媒体状态 . . . . . : 媒体已断开连接
    连接特定的 DNS 后缀 . . . . . :

无线局域网适配器 本地连接* 3:

    媒体状态 . . . . . : 媒体已断开连接
    连接特定的 DNS 后缀 . . . . . :

无线局域网适配器 本地连接* 4:

    媒体状态 . . . . . : 媒体已断开连接
    连接特定的 DNS 后缀 . . . . . :

以太网适配器 以太网 2:

    媒体状态 . . . . . : 媒体已断开连接
    连接特定的 DNS 后缀 . . . . . :

无线局域网适配器 WLAN:

    连接特定的 DNS 后缀 . . . . . :
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    临时 IPv6 地址. . . . . : 240e:470:275:c407:c0e1:a7c6:2041:bddc
    本地链接 IPv6 地址. . . . . : fe80::c54a:4218:1208:e4ef%4
    IPv4 地址 . . . . . : 192.168.43.182
    子网掩码 . . . . . : 255.255.255.0
    默认网关. . . . . : fe80::4c49:e3ff:fee0:ede2%4
                        192.168.43.1
```

1. Are DHCP messages sent over UDP or TCP? Which field in the IP header indicates the type?

They are sent over UDP as is shown in the second picture.  
The protocol field in the IP header indicates the type.

No.	Time	Source	Destination	Protocol	Length	Info
22	13.363844	0.0.0.0	255.255.255.255	DHCP	344	DHCP Discover - Transaction ID 0xc9d94bd3
33	13.375824	192.168.43.1	192.168.43.182	DHCP	351	DHCP Offer - Transaction ID 0xc9d94bd3
34	13.377399	0.0.0.0	255.255.255.255	DHCP	370	DHCP Request - Transaction ID 0xc9d94bd3
37	13.407724	192.168.43.1	192.168.43.182	DHCP	371	DHCP ACK - Transaction ID 0xc9d94bd3
224	18.942233	192.168.43.182	192.168.43.1	DHCP	342	DHCP Release - Transaction ID 0xd6ab0eb4
281	21.290673	0.0.0.0	255.255.255.255	DHCP	344	DHCP Discover - Transaction ID 0xc30fa52c
282	21.303189	192.168.43.1	192.168.43.182	DHCP	351	DHCP Offer - Transaction ID 0xc30fa52c
283	21.305379	0.0.0.0	255.255.255.255	DHCP	370	DHCP Request - Transaction ID 0xc30fa52c
284	21.323363	192.168.43.1	192.168.43.182	DHCP	371	DHCP ACK - Transaction ID 0xc30fa52c

  

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> Frame 22: 344 bytes on wire (2752 bits), 344 bytes captured (2752 bits) on interface 0

> Ethernet II, Src: IntelCor\_01:3c:90 (38:ba:f8:01:3c:90), Dst: Broadcast (ff:ff:ff:ff:ff:ff)

> Internet Protocol Version 4, Src: 0.0.0.0, Dst: 255.255.255.255

0100 .... = Version: 4

.... 0101 = Header Length: 20 bytes (5)

> Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)

Total Length: 330

Identification: 0xbf6c (49004)

> Flags: 0x0000

Time to live: 128

Protocol: UDP (17)

Header checksum: 0x7a37 [validation disabled]

## 2. Which version of IP protocol has been used?

As is shown below, the version is IPv4.

> Internet Protocol Version 4, Src: 0.0.0.0, Dst: 255.255.255.255
0100 .... = Version: 4
.... 0101 = Header Length: 20 bytes (5)
> Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)
0000 00.. = Differentiated Services Codepoint: Default (0)
.... ..00 = Explicit Congestion Notification: Not ECN-Capable Transport (0)
Total Length: 330
Identification: 0xbf6c (49004)
> Flags: 0x0000
Time to live: 128
Protocol: UDP (17)
Header checksum: 0x7a37 [validation disabled]

## 3. Select the first four-packet Discover/Offer/Request/ACK packets. From those packets, determine how many fields there are in the UDP/TCP header. Name these fields.

The first four-packets are shown below, in the first picture.

There are four fields in the UDP packets. They are listed below:

1.Source Port; 2.Destination Port; 3.Length; 4.Checksum

No.	Time	Source	Destination	Protocol	Length	Info
22	13.363844	0.0.0.0	255.255.255.255	DHCP	344	DHCP Discover - Transaction ID 0xc9d94bd3
33	13.375824	192.168.43.1	192.168.43.182	DHCP	351	DHCP Offer - Transaction ID 0xc9d94bd3
34	13.377399	0.0.0.0	255.255.255.255	DHCP	370	DHCP Request - Transaction ID 0xc9d94bd3
37	13.407724	192.168.43.1	192.168.43.182	DHCP	371	DHCP ACK - Transaction ID 0xc9d94bd3

```

> Frame 22: 344 bytes on wire (2752 bits), 344 bytes captured (2752 bits) on interface 0
> Ethernet II, Src: IntelCor_01:3c:90 (38:ba:f8:01:3c:90), 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: 310
  Checksum: 0x47ff [unverified]
  [Checksum Status: Unverified]
  [Stream index: 2]
  > [Timestamps]
> Dynamic Host Configuration Protocol (Discover)

```

4. What is the LENGTH field in UDP header? What does the value of the LENGTH field in the UDP header mean: header size, or datagram payload size? Verify your claim with the Discover packet.

The length field in UDP header is 310.

The value of the LENGTH field in the UDP header means payload size.

5. What are the source and destination port numbers of the DHCP Discover packet and the DHCP Offer packets?

As is shown in the following picture, the source and destination port numbers of the DHCP Discover packet are 68 and 67. By contrast, the source and destination port numbers of the DHCP Offer packet are 67 and 68.

No.	Time	Source	Destination	Protocol	Length	Info
22	13.363844	0.0.0.0	255.255.255.255	DHCP	344	DHCP Discover - Transaction ID 0xc9d94bd3
33	13.375824	192.168.43.1	192.168.43.182	DHCP	351	DHCP Offer - Transaction ID 0xc9d94bd3
34	13.377399	0.0.0.0	255.255.255.255	DHCP	370	DHCP Request - Transaction ID 0xc9d94bd3
37	13.407724	192.168.43.1	192.168.43.182	DHCP	371	DHCP ACK - Transaction ID 0xc9d94bd3
224	18.942233	192.168.43.182	192.168.43.1	DHCP	342	DHCP Release - Transaction ID 0xd6ab0eb4
281	21.290673	0.0.0.0	255.255.255.255	DHCP	344	DHCP Discover - Transaction ID 0xc30fa52c
282	21.303189	192.168.43.1	192.168.43.182	DHCP	351	DHCP Offer - Transaction ID 0xc30fa52c
283	21.305379	0.0.0.0	255.255.255.255	DHCP	370	DHCP Request - Transaction ID 0xc30fa52c
284	21.323363	192.168.43.1	192.168.43.182	DHCP	371	DHCP ACK - Transaction ID 0xc30fa52c

  

```

> Frame 22: 344 bytes on wire (2752 bits), 344 bytes captured (2752 bits) on interface 0
> Ethernet II, Src: IntelCor_01:3c:90 (38:ba:f8:01:3c:90), 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)

```

No.	Time	Source	Destination	Protocol	Length	Info
22	13.363844	0.0.0.0	255.255.255.255	DHCP	344	DHCP Discover - Transaction ID 0xc9d94bd3
33	13.375824	192.168.43.1	192.168.43.182	DHCP	351	DHCP Offer - Transaction ID 0xc9d94bd3
34	13.377399	0.0.0.0	255.255.255.255	DHCP	370	DHCP Request - Transaction ID 0xc9d94bd3
37	13.407724	192.168.43.1	192.168.43.182	DHCP	371	DHCP ACK - Transaction ID 0xc9d94bd3
224	18.942233	192.168.43.182	192.168.43.1	DHCP	342	DHCP Release - Transaction ID 0xd6ab0eb4
281	21.290673	0.0.0.0	255.255.255.255	DHCP	344	DHCP Discover - Transaction ID 0xc30fa52c
282	21.303189	192.168.43.1	192.168.43.182	DHCP	351	DHCP Offer - Transaction ID 0xc30fa52c
283	21.305379	0.0.0.0	255.255.255.255	DHCP	370	DHCP Request - Transaction ID 0xc30fa52c
284	21.323363	192.168.43.1	192.168.43.182	DHCP	371	DHCP ACK - Transaction ID 0xc30fa52c

  

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> Frame 33: 351 bytes on wire (2808 bits), 351 bytes captured (2808 bits) on interface 0

> Ethernet II, Src: 4e:49:e3:e0:ed:e2 (4e:49:e3:e0:ed:e2), Dst: IntelCor\_01:3c:90 (38:ba:f8:01:3c:90)

> Internet Protocol Version 4, Src: 192.168.43.1, Dst: 192.168.43.182

> User Datagram Protocol, Src Port: 67, Dst Port: 68

> Dynamic Host Configuration Protocol (Offer)

## 6. What is the largest possible source port number?

The largest possible source port number is  $2^{16} - 1 = 65535$

## 7. What is the Ethernet MAC address of the client?

The MAC address of the client is 38:ba:f8:01:3c:90

Client IP address: 0.0.0.0
Your (client) IP address: 192.168.43.182
Next server IP address: 192.168.43.1
Relay agent IP address: 0.0.0.0
Client MAC address: IntelCor_01:3c:90 (38:ba:f8:01:3c:90)
Client hardware address padding: 00000000000000000000
Server host name not given
Boot file name not given
Magic cookie: DHCP

8. Note that the client uses DHCP to obtain an IP address, among other things. But a client'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.

Discover: 0.0.0.0/255.255.255.255

Offer: 192.168.43.1/192.168.43.182



Request: 0.0.0.0/255.255.255.255

ACK:192.168.43.1/192.168.43.1

dhcp						
No.	Time	Source	Destination	Protocol	Length	Info
22	13.363844	0.0.0.0	255.255.255.255	DHCP	344	DHCP Discover - Transaction ID 0xc9d94bd3
33	13.375824	192.168.43.1	192.168.43.182	DHCP	351	DHCP Offer - Transaction ID 0xc9d94bd3
34	13.377399	0.0.0.0	255.255.255.255	DHCP	370	DHCP Request - Transaction ID 0xc9d94bd3
37	13.407724	192.168.43.1	192.168.43.182	DHCP	371	DHCP ACK - Transaction ID 0xc9d94bd3

## 9. What is the IP address of your computer after sending the DHCP Discover packet?

It's 192.168.43.182

No.	Time	Source	Destination	Protocol	Length	Info
22	13.363844	0.0.0.0	255.255.255.255	DHCP	344	DHCP Discover - Transaction ID 0xc9d94bd3
33	13.375824	192.168.43.1	192.168.43.182	DHCP	351	DHCP Offer - Transaction ID 0xc9d94bd3
34	13.377399	0.0.0.0	255.255.255.255	DHCP	370	DHCP Request - Transaction ID 0xc9d94bd3
37	13.407724	192.168.43.1	192.168.43.182	DHCP	371	DHCP ACK - Transaction ID 0xc9d94bd3
224	18.942233	192.168.43.182	192.168.43.1	DHCP	342	DHCP Release - Transaction ID 0xd6ab0eb4
281	21.290673	0.0.0.0	255.255.255.255	DHCP	344	DHCP Discover - Transaction ID 0xc30fa52c
282	21.303189	192.168.43.1	192.168.43.182	DHCP	351	DHCP Offer - Transaction ID 0xc30fa52c
283	21.305379	0.0.0.0	255.255.255.255	DHCP	370	DHCP Request - Transaction ID 0xc30fa52c
284	21.323363	192.168.43.1	192.168.43.182	DHCP	371	DHCP ACK - Transaction ID 0xc30fa52c

## 10. Are all four packets being broadcasted? If some of them are unicasted, explain how each packet can reach its destination?

Only DHCP discover and DHCP request are broadcasted. Other packets can reach its destination through CHADDR, namely the MAC address.

No.	Time	Source	Destination	Protocol	Length	Info
22	13.363844	0.0.0.0	255.255.255.255	DHCP	344	DHCP Discover - Transaction ID 0xc9d94bd3
33	13.375824	192.168.43.1	192.168.43.182	DHCP	351	DHCP Offer - Transaction ID 0xc9d94bd3
34	13.377399	0.0.0.0	255.255.255.255	DHCP	370	DHCP Request - Transaction ID 0xc9d94bd3
37	13.407724	192.168.43.1	192.168.43.182	DHCP	371	DHCP ACK - Transaction ID 0xc9d94bd3
224	18.942233	192.168.43.182	192.168.43.1	DHCP	342	DHCP Release - Transaction ID 0xd6ab0eb4

## 11. What is the IP address the DHCP server offered?

It's 192.168.43.182

No.	Time	Source	Destination	Protocol	Length	Info
22	13.363844	0.0.0.0	255.255.255.255	DHCP	344	DHCP Discover - Transaction ID 0xc9d94bd3
33	13.375824	192.168.43.1	192.168.43.182	DHCP	351	DHCP Offer - Transaction ID 0xc9d94bd3
34	13.377399	0.0.0.0	255.255.255.255	DHCP	370	DHCP Request - Transaction ID 0xc9d94bd3
37	13.407724	192.168.43.1	192.168.43.182	DHCP	371	DHCP ACK - Transaction ID 0xc9d94bd3
224	18.942233	192.168.43.182	192.168.43.1	DHCP	342	DHCP Release - Transaction ID 0xd6ab0eb4
281	21.290673	0.0.0.0	255.255.255.255	DHCP	344	DHCP Discover - Transaction ID 0xc30fa52c
282	21.303189	192.168.43.1	192.168.43.182	DHCP	351	DHCP Offer - Transaction ID 0xc30fa52c
283	21.305379	0.0.0.0	255.255.255.255	DHCP	370	DHCP Request - Transaction ID 0xc30fa52c
284	21.323363	192.168.43.1	192.168.43.182	DHCP	371	DHCP ACK - Transaction ID 0xc30fa52c

**12. What are the transaction-IDs in all captured packets? Are they the same? What is the purpose of the ID?**

From the picture, we can find that the transaction-IDs in all captured packets in one 'Discover- Offer-Request-ACK' circular are the same, while the transaction-IDs between different circulars are different.

In the first circular, the transaction ID is 0xc9d94bd3.

In the second circular, the transaction ID is 0xc30fa52c.

And in the Release progress, the transaction ID is 0xd6ab0eb4.

The purpose of the transaction ID is to distinguish the data between every DHCP set.

No.	Time	Source	Destination	Protocol	Length	Info
22	13.363844	0.0.0.0	255.255.255.255	DHCP	344	DHCP Discover - Transaction ID 0xc9d94bd3
33	13.375824	192.168.43.1	192.168.43.182	DHCP	351	DHCP Offer - Transaction ID 0xc9d94bd3
34	13.377399	0.0.0.0	255.255.255.255	DHCP	370	DHCP Request - Transaction ID 0xc9d94bd3
37	13.407724	192.168.43.1	192.168.43.182	DHCP	371	DHCP ACK - Transaction ID 0xc9d94bd3
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282	21.303189	192.168.43.1	192.168.43.182	DHCP	351	DHCP Offer - Transaction ID 0xc30fa52c
283	21.305379	0.0.0.0	255.255.255.255	DHCP	370	DHCP Request - Transaction ID 0xc30fa52c
284	21.323363	192.168.43.1	192.168.43.182	DHCP	371	DHCP ACK - Transaction ID 0xc30fa52c

**13. When DHCP server is not directly connected on the same subnet as the client, a DHCP relay agent is used to relay DHCP messages between the client and the DHCP server. What is the IP address of the DHCP server in your experiment? Is there a relay agent in your experiment? If so what is the IP address of the agent?**

The IP address of the DHCP server in my experiment is 192.168.43.1.

NO relay agent in my experiment.

No.	Time	Source	Destination	Protocol	Length	Info
22	13.363844	0.0.0.0	255.255.255.255	DHCP	344	DHCP Discover - Transaction ID 0xc9d94bd3
33	13.375824	192.168.43.1	192.168.43.182	DHCP	351	DHCP Offer - Transaction ID 0xc9d94bd3
34	13.377399	0.0.0.0	255.255.255.255	DHCP	370	DHCP Request - Transaction ID 0xc9d94bd3
37	13.407724	192.168.43.1	192.168.43.182	DHCP	371	DHCP ACK - Transaction ID 0xc9d94bd3
224	18.942233	192.168.43.182	192.168.43.1	DHCP	342	DHCP Release - Transaction ID 0xd6ab0eb4
281	21.290673	0.0.0.0	255.255.255.255	DHCP	344	DHCP Discover - Transaction ID 0xc30fa52c
282	21.303189	192.168.43.1	192.168.43.182	DHCP	351	DHCP Offer - Transaction ID 0xc30fa52c
283	21.305379	0.0.0.0	255.255.255.255	DHCP	370	DHCP Request - Transaction ID 0xc30fa52c
284	21.323363	192.168.43.1	192.168.43.182	DHCP	371	DHCP ACK - Transaction ID 0xc30fa52c

**14. Explain the purpose of the router and subnet mask lines in the DHCP offer message. What is the maximum number of hosts possible on this subnet?**

The routers option specifies a list of IP addresses for routers on the client's subnet.

The subnet mask lines in the DHCP offer message offers a subnet mask for the client, so as to distinguish the subnet.

The maximum number of hosts is 256

No.	Time	Source	Destination	Protocol	Length	Info
22	13.363844	0.0.0.0	255.255.255.255	DHCP	344	DHCP Discover - Transaction ID 0xc9d94bd3
33	13.375824	192.168.43.1	192.168.43.182	DHCP	351	DHCP Offer - Transaction ID 0xc9d94bd3
34	13.377399	0.0.0.0	255.255.255.255	DHCP	370	DHCP Request - Transaction ID 0xc9d94bd3
37	13.407724	192.168.43.1	192.168.43.182	DHCP	371	DHCP ACK - Transaction ID 0xc9d94bd3
224	18.942233	192.168.43.182	192.168.43.1	DHCP	342	DHCP Release - Transaction ID 0xd6ab0eb4
281	21.290673	0.0.0.0	255.255.255.255	DHCP	344	DHCP Discover - Transaction ID 0xc30fa52c
282	21.303189	192.168.43.1	192.168.43.182	DHCP	351	DHCP Offer - Transaction ID 0xc30fa52c
283	21.305379	0.0.0.0	255.255.255.255	DHCP	370	DHCP Request - Transaction ID 0xc30fa52c
284	21.323363	192.168.43.1	192.168.43.182	DHCP	371	DHCP ACK - Transaction ID 0xc30fa52c

  

> Option: (54) DHCP Server Identifier (192.168.43.1)  
 > Option: (51) IP Address Lease Time  
 > Option: (58) Renewal Time Value  
 > Option: (59) Rebinding Time Value  
 > Option: (1) Subnet Mask (255.255.255.0)  
     Length: 4  
     Subnet Mask: 255.255.255.0  
 > Option: (28) Broadcast Address (192.168.43.255)  
 > Option: (3) Router  
     Length: 4  
     Router: 192.168.43.1  
 > Option: (6) Domain Name Server  
 > Option: (43) Vendor-Specific Information  
 > Option: (255) End

15. What is the purpose of the DHCP release message? Does the DHCP server issue an acknowledgment of receipt of the client's DHCP release request?

The purpose of the DHCP release message is to disconnect the current network connection. After the client is disconnected, the DHCP server never issue any acknowledgments.

No.	Time	Source	Destination	Protocol	Length	Info
22	13.363844	0.0.0.0	255.255.255.255	DHCP	344	DHCP Discover - Transaction ID 0xc9d94bd3
33	13.375824	192.168.43.1	192.168.43.182	DHCP	351	DHCP Offer - Transaction ID 0xc9d94bd3
34	13.377399	0.0.0.0	255.255.255.255	DHCP	370	DHCP Request - Transaction ID 0xc9d94bd3
37	13.407724	192.168.43.1	192.168.43.182	DHCP	371	DHCP ACK - Transaction ID 0xc9d94bd3
224	18.942233	192.168.43.182	192.168.43.1	DHCP	342	DHCP Release - Transaction ID 0xd6ab0eb4
281	21.290673	0.0.0.0	255.255.255.255	DHCP	344	DHCP Discover - Transaction ID 0xc30fa52c
282	21.303189	192.168.43.1	192.168.43.182	DHCP	351	DHCP Offer - Transaction ID 0xc30fa52c
283	21.305379	0.0.0.0	255.255.255.255	DHCP	370	DHCP Request - Transaction ID 0xc30fa52c
284	21.323363	192.168.43.1	192.168.43.182	DHCP	371	DHCP ACK - Transaction ID 0xc30fa52c

## Part B: Ping

```
C:\WINDOWS\system32\cmd.exe

Microsoft Windows [版本 10.0.18362.418]
(c) 2019 Microsoft Corporation。保留所有权利。

C:\Users\Rookie>ping -n 10 www.baidu.com

正在 Ping www.a.shifen.com [183.232.231.172] 具有 32 字节的数据:
来自 183.232.231.172 的回复: 字节=32 时间=49ms TTL=55
来自 183.232.231.172 的回复: 字节=32 时间=214ms TTL=55
来自 183.232.231.172 的回复: 字节=32 时间=40ms TTL=55
来自 183.232.231.172 的回复: 字节=32 时间=55ms TTL=55
来自 183.232.231.172 的回复: 字节=32 时间=59ms TTL=55
来自 183.232.231.172 的回复: 字节=32 时间=114ms TTL=55
来自 183.232.231.172 的回复: 字节=32 时间=104ms TTL=55
来自 183.232.231.172 的回复: 字节=32 时间=108ms TTL=55
来自 183.232.231.172 的回复: 字节=32 时间=81ms TTL=55
来自 183.232.231.172 的回复: 字节=32 时间=64ms TTL=55

183.232.231.172 的 Ping 统计信息:
    数据包: 已发送 = 10, 已接收 = 10, 丢失 = 0 (0% 丢失),
    往返行程的估计时间(以毫秒为单位):
        最短 = 40ms, 最长 = 214ms, 平均 = 88ms
```

### 1. Which field in the IP header indicates this is an ICMP packet?

The protocol indicates that this is an ICMP packet.

No.	Time	Source	Destination	Protocol	Length	Info
1	10:14:25.671511	192.168.43.118	180.101.49.12	ICMP	74	Echo (ping) request id=0x0001, seq=1/256, ttl=64 (reply in 2)
2	10:14:25.714748	180.101.49.12	192.168.43.118	ICMP	74	Echo (ping) reply id=0x0001, seq=1/256, ttl=52 (request in 1)
3	10:14:26.675702	192.168.43.118	180.101.49.12	ICMP	74	Echo (ping) request id=0x0001, seq=2/512, ttl=64 (reply in 4)
4	10:14:26.718266	180.101.49.12	192.168.43.118	ICMP	74	Echo (ping) reply id=0x0001, seq=2/512, ttl=52 (request in 3)
5	10:14:27.686019	192.168.43.118	180.101.49.12	ICMP	74	Echo (ping) request id=0x0001, seq=3/768, ttl=64 (reply in 6)
6	10:14:28.005511	180.101.49.12	192.168.43.118	ICMP	74	Echo (ping) reply id=0x0001, seq=3/768, ttl=52 (request in 5)
7	10:14:28.695131	192.168.43.118	180.101.49.12	ICMP	74	Echo (ping) request id=0x0001, seq=4/1024, ttl=64 (reply in 8)
8	10:14:28.754079	180.101.49.12	192.168.43.118	ICMP	74	Echo (ping) reply id=0x0001, seq=4/1024, ttl=52 (request in 7)
9	10:14:29.699531	192.168.43.118	180.101.49.12	ICMP	74	Echo (ping) request id=0x0001, seq=5/1280, ttl=64 (reply in 10)
10	10:14:29.732952	180.101.49.12	192.168.43.118	ICMP	74	Echo (ping) reply id=0x0001, seq=5/1280, ttl=52 (request in 9)
11	10:14:30.706954	192.168.43.118	180.101.49.12	ICMP	74	Echo (ping) request id=0x0001, seq=6/1536, ttl=64 (reply in 12)

> Frame 1: 74 bytes on wire (592 bits), 74 bytes captured (592 bits) on interface 0

> Ethernet II, Src: IntelCor\_9a:21:99 (7c:67:a2:9a:21:99), Dst: Huawei\_99:5a:d8 (54:25:ea:99:5a:d8)

> Internet Protocol Version 4, Src: 192.168.43.118, Dst: 180.101.49.12

> 0100 .... = Version: 4

> .... 0101 = Header Length: 20 bytes (5)

> Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)

> Total Length: 60

> Identification: 0xf58c (62860)

> Flags: 0x0000

> Time to live: 64

> Protocol: ICMP (1)

> Header checksum: 0xb3a4 [validation disabled]

> Payload checksum: 0xb3a4 [validation disabled]

### 2. Why is it that an ICMP packet does not have source and destination port numbers?

Because it was designed to communicate network-layer information between hosts and routers rather than application layer processes. So it doesn't need port numbers.

### 3. Examine one of the ping request packets sent by your host. What are the ICMP type

and code numbers? What other fields does this ICMP packet have? How many bytes are the checksum, sequence number and identifier fields?

The type number is 8 and the code number is 0.

Other fields include checksum, identifier (BE), identifier (LE), sequence number (BE), sequence number (LE) and data.

Checksum, sequence number and identifier fields are all 2 bytes.

```
> Frame 1: 74 bytes on wire (592 bits), 74 bytes captured (592 bits) on interface 0
> Ethernet II, Src: IntelCor_9a:21:99 (7c:67:a2:9a:21:99), Dst: HuaweiTe_99:5a:d8 (54:25:ea:99:5a:d8)
> Internet Protocol Version 4, Src: 192.168.43.118, Dst: 180.101.49.12
  v Internet Control Message Protocol
    Type: 8 (Echo (ping) request)
    Code: 0
    Checksum: 0x4d5a [correct]
    [Checksum Status: Good]
    Identifier (BE): 1 (0x0001)
    Identifier (LE): 256 (0x0100)
    Sequence number (BE): 1 (0x0001)
    Sequence number (LE): 256 (0x0100)
    [Response frame: 2]
  > Data (32 bytes)
```

4. Examine the corresponding ping reply packet. What are the ICMP type and code numbers? What other fields does this ICMP packet have? How many bytes are the checksum, sequence number and identifier fields?

The type number is 0 and the code number is 0.

Other fields include checksum, identifier (BE), identifier (LE), sequence number (BE), sequence number (LE), response time and data.

Checksum, sequence number and identifier fields are all 2 bytes.

```
> Frame 2: 74 bytes on wire (592 bits), 74 bytes captured (592 bits) on interface 0
> Ethernet II, Src: HuaweiTe_99:5a:d8 (54:25:ea:99:5a:d8), Dst: IntelCor_9a:21:99 (7c:67:a2:9a:21:99)
> Internet Protocol Version 4, Src: 180.101.49.12, Dst: 192.168.43.118
  v Internet Control Message Protocol
    Type: 0 (Echo (ping) reply)
    Code: 0
    Checksum: 0x555a [correct]
    [Checksum Status: Good]
    Identifier (BE): 1 (0x0001)
    Identifier (LE): 256 (0x0100)
    Sequence number (BE): 1 (0x0001)
    Sequence number (LE): 256 (0x0100)
    [Request frame: 1]
    [Response time: 43.237 ms]
  > Data (32 bytes)
```