

ĐẠI HỌC QUỐC GIA THÀNH PHỐ HỒ CHÍ MINH
TRƯỜNG ĐẠI HỌC BÁCH KHOA
KHOA KHOA HỌC VÀ KỸ THUẬT MÁY TÍNH



MẠNG MÁY TÍNH THỰC HÀNH - CO3094

Báo cáo:

Lab3b

Giảng viên hướng dẫn: Vũ Thành Tài

Sinh viên: Lê Đức Cường

Thành phố Hồ Chí Minh, tháng 3 năm 2025

1 Question 1

Select one UDP packet from your trace. From this packet, determine how many fields there are in the UDP header. (You shouldn't look in the textbook! Answer these questions directly from what you observe in the packet trace.) Name these fields.

4 fields: the source port, destination port, length, and checksum.

```
Time to Live: 128
Protocol: UDP (17)
Header Checksum: 0x0000 [validation disabled]
[Header checksum status: Unverified]
Source Address: 192.168.31.87
Destination Address: 192.168.31.1
[Stream index: 16]
▼ User Datagram Protocol, Src Port: 49664, Dst Port: 53
  Source Port: 49664
  Destination Port: 53
  Length: 44
  Checksum: 0xbfe6 [unverified]
  [Checksum Status: Unverified]
  [Stream index: 4]
  [Stream Packet Number: 1]
  ▸ [Timestamps]
  UDP payload (36 bytes)
  ▸ Domain Name System (query)
```

2 Question 2

By consulting the displayed information in Wireshark's packet content field for this packet, determine the length (in bytes) of each of the UDP header fields.

The UDP header has a fixed length of 8 bytes. Each of these 4 header fields is 2 bytes long.

```
Time to Live: 128
Protocol: UDP (17)
Header Checksum: 0x0000 [validation disabled]
[Header checksum status: Unverified]
Source Address: 192.168.31.87
Destination Address: 192.168.31.1
[Stream index: 16]
▼ User Datagram Protocol, Src Port: 49664, Dst Port: 53
  Source Port: 49664
  Destination Port: 53
  Length: 44
  Checksum: 0xbfe6 [unverified]
  [Checksum Status: Unverified]
  [Stream index: 4]
  [Stream Packet Number: 1]
  ▸ [Timestamps]
  UDP payload (36 bytes)
  ▸ Domain Name System (query)
```

3 Question 3

The value in the Length field is the length of what? (You can consult the text for this answer). Verify your claim with your captured UDP packet.

The length field specifies the number of bytes in the UDP segment (header plus data). An explicit length value is needed since the size of the data field may differ from one UDP segment to the next. The length of UDP payload for selected packet is 36 bytes. 44 bytes - 8 bytes = 36 bytes.

4 Question 4

What is the maximum number of bytes that can be included in a UDP payload? (Hint: the answer to this question can be determined by your answer to 2. above)

The maximum number of bytes that can be included in a UDP payload is $2^{16} - 1 = 65535$ bytes plus the header bytes.

5 Question 5

What is the largest possible source port number? (Hint: see the hint in 4.)

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

6 Question 6

What is the protocol number for UDP? Give your answer in both hexadecimal and decimal notation. To answer this question, you'll need to look into the Protocol field of the IP datagram containing this UDP segment (see Figure 4.13 in the text, and the discussion of IP header fields).

The IP protocol number for UDP is 0x11 hex, which is 17 in decimal value.



```
914 15.728061 192.168.31.1 192.168.31.87 DNS 223 Standard query response 0x6cc7 (27847)
Total Length: 64
Identification: 0x6cc7 (27847)
000. .... = Flags: 0x0
...0 0000 0000 0000 = Fragment Offset: 0
Time to Live: 128
Protocol: UDP (17)
Header Checksum: 0x0000 [validation disabled]
[Header checksum status: Unverified]
Source Address: 192.168.31.87
Destination Address: 192.168.31.1
[Stream index: 16]
User Datagram Protocol, Src Port: 49664, Dst Port: 53
Source Port: 49664
Destination Port: 53
Length: 44
Checksum: 0xbfe6 [unverified]
[Checksum Status: Unverified]
[Stream index: 4]
[Stream Packet Number: 1]
```

7 Question 7

Examine a pair of UDP packets in which your host sends the first UDP packet and the second UDP packet is a reply to this first UDP packet. (Hint: for a second packet to be sent in response to a first packet, the sender of the first packet should be the destination of the second packet). Describe the relationship between the port numbers in the two packets.

No.	Time	Source	Destination	Protocol	Length	Info
794	8.393271	142.250.4.190	192.168.31.87	UDP	68	443 → 50709 Len=26
795	8.488792	192.168.31.87	74.125.24.94	QUIC	152	Protected Payload (KP0), DCID=e7e9d1648...
797	8.551688	74.125.24.94	192.168.31.87	QUIC	71	Protected Payload (KP0)
798	8.557147	74.125.24.94	192.168.31.87	QUIC	157	Protected Payload (KP0)
799	8.557147	74.125.24.94	192.168.31.87	QUIC	64	Protected Payload (KP0)
800	8.557530	192.168.31.87	74.125.24.94	QUIC	77	Protected Payload (KP0), DCID=e7e9d1648...
804	8.584669	192.168.31.87	74.125.24.94	QUIC	74	Protected Payload (KP0), DCID=e7e9d1648...
808	8.646136	74.125.24.94	192.168.31.87	QUIC	66	Protected Payload (KP0)
911	15.677847	192.168.31.87	192.168.31.1	DNS	78	Standard query 0xfd70 A edge.microsoft...
912	15.678117	192.168.31.87	192.168.31.1	DNS	78	Standard query 0xd85b HTTPS edge.micros...
913	15.726632	192.168.31.1	192.168.31.87	DNS	219	Standard query response 0xfd70 A edge.m...
914	15.728061	192.168.31.1	192.168.31.87	DNS	223	Standard query response 0xd85b HTTPS ed...
940	16.946764	192.168.31.87	74.125.200.113	UDP	1288	49947 → 443 Len=1246
941	16.946936	192.168.31.87	74.125.200.113	UDP	745	49947 → 443 Len=703
942	16.997914	74.125.200.113	192.168.31.87	UDP	69	443 → 49947 Len=27
943	17.032723	192.168.31.87	74.125.200.113	UDP	74	49947 → 443 Len=32
Frame 911: 78 bytes on wire (624 bits), 78 bytes captured (624 bits) on interface 0						
Ethernet II, Src: Intel_93:30:aa (54:6c:eb:93:30:aa), Dst: Intel_82:6f:4b:64:2b:0e (54:00:0c:6f:4b:64:2b:0e)						
Internet Protocol Version 4, Src: 192.168.31.87, Dst: 192.168.31.1						
User Datagram Protocol, Src Port: 49664, Dst Port: 53						
Source Port: 49664						
Destination Port: 53						
Length: 44						
Checksum: 0xbfe6 [unverified]						
[Checksum Status: Unverified]						
[Stream index: 4]						
[Stream Packet Number: 1]						
Timestamps						
UDP payload (36 bytes)						
0000	cc d8 43 cb 41 1f 54 6c	eb 93 30 aa 08 00 45 00	...			
0010	00 40 6c c7 00 00 80 11	00 00 c0 a8 1f 57 c0 a8	...			
0020	1f 01 c2 00 00 35 00 2c	bf e6 fd 70 01 00 00 01	...			
0030	00 00 00 00 00 04 65	64 67 65 09 6d 69 63 72	...			
0040	6f 73 6f 66 74 03 63 6f	6d 00 00 01 00 01	...			os



794	8.393271	142.250.4.190	192.168.31.87	UDP	68 443 → 50709 Len=26	
795	8.488792	192.168.31.87	74.125.24.94	QUIC	152 Protected Payload (KP0), DCID=e7e9d1648...	
797	8.551688	74.125.24.94	192.168.31.87	QUIC	71 Protected Payload (KP0)	
798	8.557147	74.125.24.94	192.168.31.87	QUIC	157 Protected Payload (KP0)	
799	8.557147	74.125.24.94	192.168.31.87	QUIC	64 Protected Payload (KP0)	
800	8.557530	192.168.31.87	74.125.24.94	QUIC	77 Protected Payload (KP0), DCID=e7e9d1648...	
804	8.584669	192.168.31.87	74.125.24.94	QUIC	74 Protected Payload (KP0), DCID=e7e9d1648...	
808	8.646136	74.125.24.94	192.168.31.87	QUIC	66 Protected Payload (KP0)	
911	15.677847	192.168.31.87	192.168.31.1	DNS	78 Standard query 0xfd70 A edge.microsoft...	
912	15.678117	192.168.31.87	192.168.31.1	DNS	78 Standard query 0xd85b HTTPS edge.micros...	
913	15.726632	192.168.31.1	192.168.31.87	DNS	219 Standard query response 0xfd70 A edge.m...	
914	15.728061	192.168.31.1	192.168.31.87	DNS	223 Standard query response 0xd85b HTTPS ed...	
940	16.946764	192.168.31.87	74.125.200.113	UDP	1288 49947 → 443 Len=1246	
941	16.946936	192.168.31.87	74.125.200.113	UDP	745 49947 → 443 Len=703	
942	16.997914	74.125.200.113	192.168.31.87	UDP	69 443 → 49947 Len=27	
943	17.032723	192.168.31.87	74.125.200.113	UDP	74 49947 → 443 Len=32	

Frame 913: 219 bytes on wire (1752 bits), 219 bytes captured (1752 bits) on interface 0	0000	54 6c eb 93 30 aa cc d8 43 cb 41 1f 08 00 45 00	TI
Ethernet II, Src: XiaomiMobile_cb:41:1f (cc:d8:43:41:1f:08:00), Dst: 192.168.31.87 (08:00:27:12:34:56)	0010	00 cd 00 00 40 00 40 11 7a 77 c0 a8 1f 01 c0 a8	..
Internet Protocol Version 4, Src: 192.168.31.1, Destination: 192.168.31.87	0020	1f 57 00 35 c2 00 00 b9 b8 6e fd 70 81 80 00 01	..w
User Datagram Protocol, Src Port: 53, Dst Port: 443	0030	00 05 00 00 00 00 04 65 64 67 65 09 6d 69 63 72	..
Source Port: 53	0040	6f 73 6f 66 74 03 63 6f 6d 00 00 01 00 01 c0 0c	os
Destination Port: 49664	0050	00 05 00 01 00 00 01 2c 00 20 0b 65 64 67 65 2d	..
Length: 185	0060	64 6f 6d 61 69 6e 0e 74 72 61 66 66 69 63 6d 61	do
Checksum: 0xb86e [unverified]	0070	6e 61 67 65 72 03 6e 65 74 00 c0 30 00 05 00 01	na
[Checksum Status: Unverified]	0080	00 00 00 01 00 27 12 65 64 67 65 2d 6d 69 63 72	..
[Stream index: 4]	0090	6f 73 6f 66 74 2d 63 6f 6d 07 61 78 2d 30 30 30	os
[Stream Packet Number: 2]	00a0	32 00 61 78 2d 6d 73 65 64 67 65 c0 4b c0 5c 00	2
[Timestamps]	00b0	05 00 01 00 00 00 01 00 02 c0 6f c0 6f 00 01 00	..
UDP payload (177 bytes)	00c0	01 00 00 00 01 00 04 96 ab 1b 0b c0 6f 00 01 00	..
Domain Name System (response)	00d0	01 00 00 00 01 00 04 96 ab 1c 0b	..
Transaction ID: 0xfd70			
Flags: 0x8180 Standard query response, No error			
Questions: 1			
Answer RRs: 5			

The source port of the UDP packet sent by the host is the same as the destination port of the reply packet, and conversely the destination port of the UDP packet sent by the host is the same as the source port of the reply packet.