

Student Information

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No.	Time	Source	Destination	Protocol	Length	Info
11	3.432142	192.168.1.2	192.168.1.1	DNS	71	Standard query 0xfacd A www.nyu.edu
32	3.608791	192.168.1.1	192.168.1.2	DNS	178	Standard query response 0xfacd A www.nyu.edu CNAME d1q5ku5vnwkd

> Frame 11: 71 bytes on wire (568 bits), 71 bytes captured (568 bits)

> Ethernet II, Src: Apple_18:03:f1 (50:ed:3c:18:03:f1), Dst: zte_b1:ad:d8 (5c:a4:f4:b1:ad:d8)

> Internet Protocol Version 4, Src: 192.168.1.2, Dst: 192.168.1.1

▼ User Datagram Protocol, Src Port: 62495, Dst Port: 53

- Source Port: 62495
- Destination Port: 53
- Length: 37
- Checksum: 0x2a80 [unverified]
- [Checksum Status: Unverified]
- [Stream index: 0]
- > [Timestamps]
- UDP payload (29 bytes)

▼ Domain Name System (query response)

- Transaction ID: 0xfacd
- > Flags: 0x0100 Standard query response
- Questions: 1
- Answer RRs: 0
- Authority RRs: 0
- Additional RRs: 0
- ▼ Queries
 - > www.nyu.edu: type A, class IN
 - [Response In: 32]

Answer 1.a

The packet number of the first UDP segment in my trace file is 11.

Answer 1.b

DNS is being carried as an application-layer payload.

Answer 1.c

There are 4 fields in the UDP header.

Answer 1.d

The names of these fields are Source Port, Destination Port, Length, Checksum.

Answer 2

The UDP header is an 8-byte fixed and straightforward header. Furthermore, simple math lets us see how many bytes are allocated for the UDP header. The header size is the **total length - payload length** = 37 - 29 = 8. Each of the fields is 2 bytes.

Answer 3

Since the length field in the UDP header is 2 bytes, the maximum possible value is $2^{16}-1$ bytes. Since we are asked to find the maximum payload size, we should subtract the header length, which is 8 bytes. The result is $2^{16} - 1 - 8 = 65527$ bytes.

```
Internet Protocol Version 4, Src: 192.168.1.2, Dst: 192.168.1.1
  0100 .... = Version: 4
  .... 0101 = Header Length: 20 bytes (5)
  > Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)
    Total Length: 57
    Identification: 0x2218 (8728)
  > 000. .... = Flags: 0x0
    ...0 0000 0000 0000 = Fragment Offset: 0
    Time to Live: 64
  Protocol: UDP (17)
  Header Checksum: 0xd548 [validation disabled]
  [Header checksum status: Unverified]
  Source Address: 192.168.1.2
  Destination Address: 192.168.1.1
```

Answer 4

As highlighted in the figure above, the protocol number for UDP is 17.

No.	Time	Source	Destination	Protocol	Length	Info
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32	3.608791	192.168.1.1	192.168.1.2	DNS	178	Standard query response 0xfacd A www.nyu.edu CNAME d1q5ku5vnwkd

> Frame 11: 71 bytes on wire (568 bits), 71 bytes captured (568 bits)

> Ethernet II, Src: Apple_18:03:f1 (50:ed:3c:18:03:f1), Dst: zte_b1:ad:d8 (5c:a4:f4:b1:ad:d8)

> Internet Protocol Version 4, Src: 192.168.1.2, Dst: 192.168.1.1

User Datagram Protocol, Src Port: 62495, Dst Port: 53

Source Port: 62495

Destination Port: 53

Length: 37

Checksum: 0x2a80 [unverified]

[Checksum Status: Unverified]

[Stream index: 0]

[Timestamps]

UDP payload (29 bytes)

Domain Name System (query)

Transaction ID: 0xfacd

Flags: 0x0100 Standard query

Questions: 1

Answer RRs: 0

Authority RRs: 0

Additional RRs: 0

Queries

www.nyu.edu: type A, class IN

[Response In: 32]

Answer 5.a

The packet number of the first of these two UDP segments in the trace file is 11. Its destination port and IP address are equal to the second packet's source port and IP address. Furthermore, Wireshark provides additional information regarding request/response packet matching, which can be seen at the bottom of the image above.

Response In: 32

No.	Time	Source	Destination	Protocol	Length	Info
11	3.432142	192.168.1.2	192.168.1.1	DNS	71	Standard query 0xfacd A www.nyu.edu
32	3.608791	192.168.1.1	192.168.1.2	DNS	178	Standard query response 0xfacd A www.nyu.edu CNAME d1q5ku5vnwkd

> Frame 32: 178 bytes on wire (1424 bits), 178 bytes captured (1424 bits)

> Ethernet II, Src: zte_b1:ad:d8 (5c:a4:f4:b1:ad:d8), Dst: Apple_18:03:f1 (50:ed:3c:18:03:f1)

> Internet Protocol Version 4, Src: 192.168.1.1, Dst: 192.168.1.2

User Datagram Protocol, Src Port: 53, Dst Port: 62495

Source Port: 53

Destination Port: 62495

Length: 144

Checksum: 0x834a [unverified]

[Checksum Status: Unverified]

[Stream index: 0]

[Timestamps]

UDP payload (136 bytes)

Answer 5.b

The packet number of the second of these two UDP segments in the trace file is 32. Its destination port and IP address are equal to the first packet's source port and IP address.