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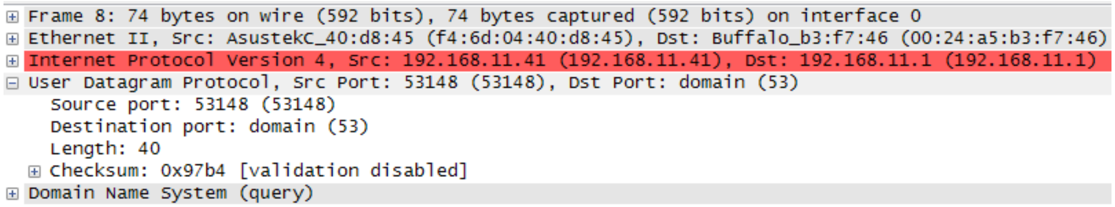
CS4480

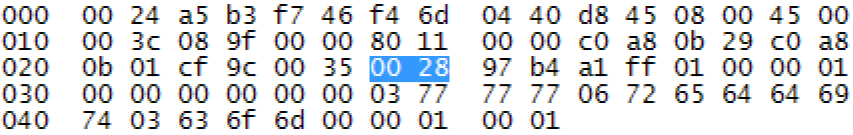
WS Lab 5

1) There are four headers in UDP: Source Port, Destination Port, Length and Checksum. They are seen in the following image:



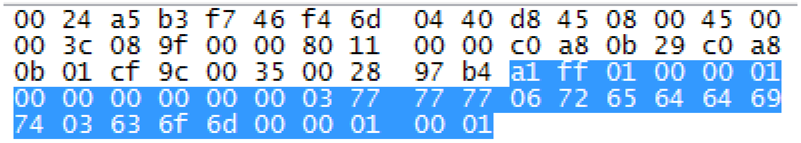
```
⊞ Frame 8: 74 bytes on wire (592 bits), 74 bytes captured (592 bits) on interface 0
⊞ Ethernet II, Src: AsustekC_40:d8:45 (f4:6d:04:40:d8:45), Dst: Buffalo_b3:f7:46 (00:24:a5:b3:f7:46)
⊞ Internet Protocol Version 4, Src: 192.168.11.41 (192.168.11.41), Dst: 192.168.11.1 (192.168.11.1)
⊟ User Datagram Protocol, Src Port: 53148 (53148), Dst Port: domain (53)
    Source port: 53148 (53148)
    Destination port: domain (53)
    Length: 40
  ⊞ Checksum: 0x97b4 [validation disabled]
⊞ Domain Name System (query)
```

2) The length of each field is two bytes (16 bits). Below is an image taken showing the two bytes of the length field when length in the above image was selected:



```
000  00 24 a5 b3 f7 46 f4 6d  04 40 d8 45 08 00 45 00
010  00 3c 08 9f 00 00 80 11  00 00 c0 a8 0b 29 c0 a8
020  0b 01 cf 9c 00 35 00 28  97 b4 a1 ff 01 00 00 01
030  00 00 00 00 00 00 03 77  77 77 06 72 65 64 64 69
040  74 03 63 6f 6d 00 00 01  00 01
```

3) The length field is the length in bytes of the datagram (header + data). Below we see the DNS query highlighted and see it is 32 bytes long. When we add the 8 byte header to this, we get 40 bytes, the same as the length field:

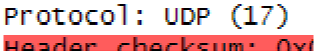


```
00 24 a5 b3 f7 46 f4 6d  04 40 d8 45 08 00 45 00
00 3c 08 9f 00 00 80 11  00 00 c0 a8 0b 29 c0 a8
0b 01 cf 9c 00 35 00 28  97 b4 a1 ff 01 00 00 01
00 00 00 00 00 00 03 77  77 77 06 72 65 64 64 69
74 03 63 6f 6d 00 00 01  00 01
```

4) The Most data in a UDP packet possible is Max IP packet size - IPv4 Header – UDP header. If we assume the IPv4 header is 20 bytes, and the max packet size is 2^{16}-1 (lax length field), we get 65,535-20-8 = 65,507. If we ignore the IPv4 constraint, we get 65,535 (max of 16 bit number) -8 (header), or 65,527.

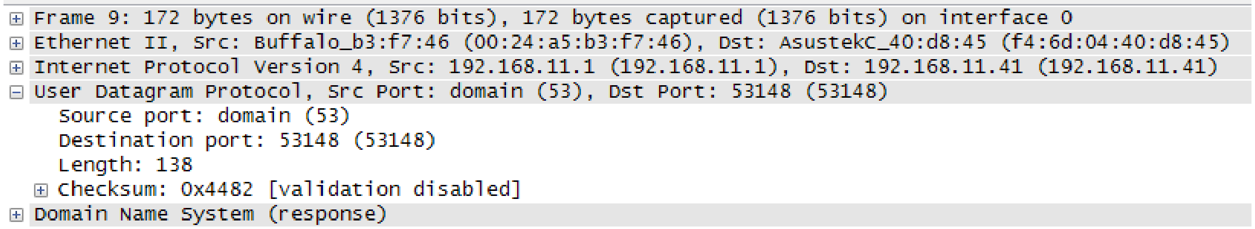
5) The largest possible source is 2^{16}-1 or 65,535. Due to the field being a 16 bit number.

6) The protocol number of UDP is 17 as seen in the below image. In hex this is 0x11.



```
Protocol: UDP (17)
Header checksum: 0x
```

7) Below is an image of the UDP reply to the query seen in question 1. We see that the port numbers are matching, but switched. That is, in the response the source port is the destination port of the original query, and in the response the destination port is the source port of the original query.



```
⊞ Frame 9: 172 bytes on wire (1376 bits), 172 bytes captured (1376 bits) on interface 0
⊞ Ethernet II, Src: Buffalo_b3:f7:46 (00:24:a5:b3:f7:46), Dst: AsustekC_40:d8:45 (f4:6d:04:40:d8:45)
⊞ Internet Protocol Version 4, Src: 192.168.11.1 (192.168.11.1), Dst: 192.168.11.41 (192.168.11.41)
⊟ User Datagram Protocol, Src Port: domain (53), Dst Port: 53148 (53148)
    Source port: domain (53)
    Destination port: 53148 (53148)
    Length: 138
  ⊞ Checksum: 0x4482 [validation disabled]
⊞ Domain Name System (response)
```