Google Cyber Security

3rd Exercise

Wireshark & Nmap

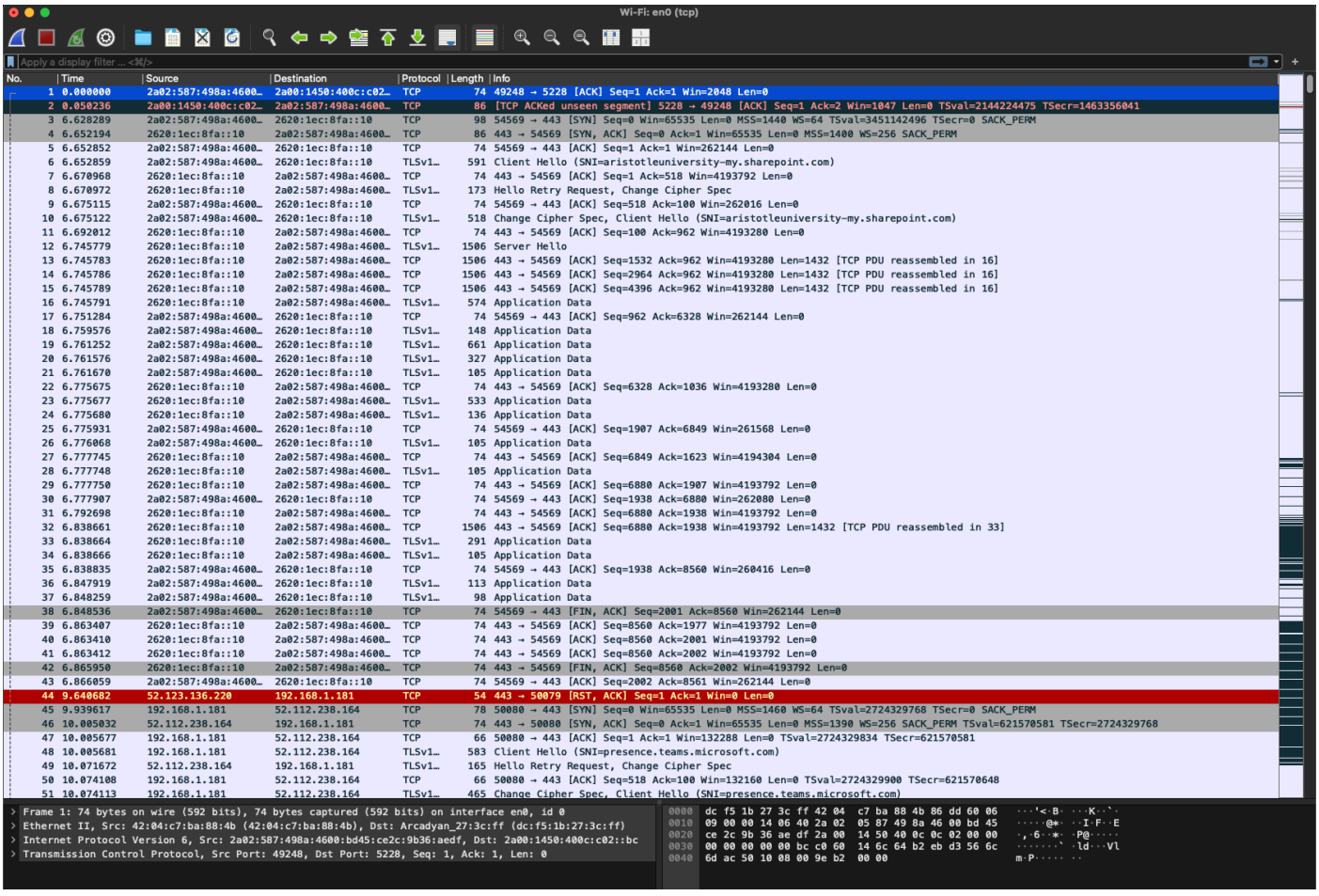
Full Name: Klajdi Cami

Wireshark

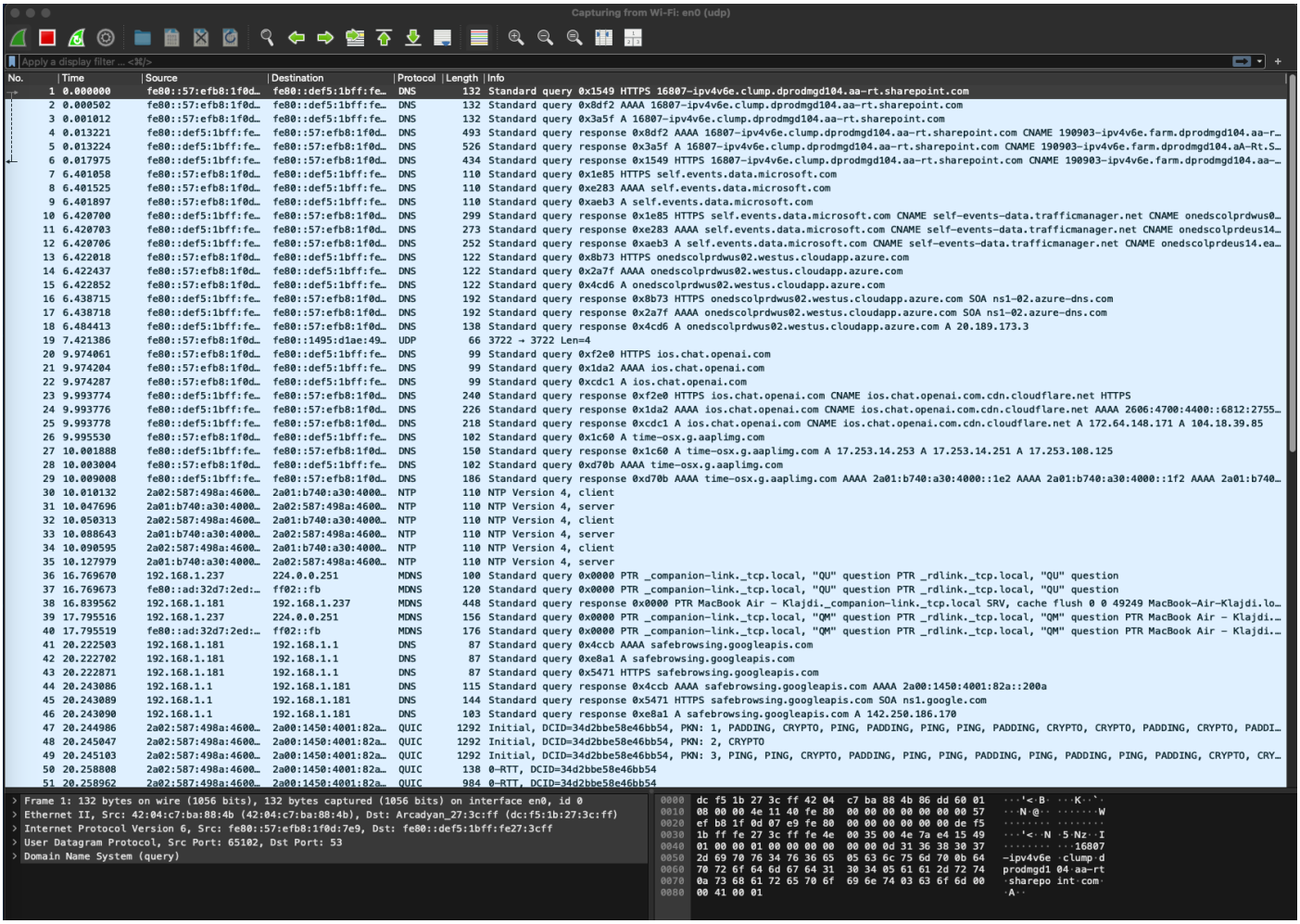
Activity 1: Perform a packet capture using the capture filter a) **tcp** and b) **udp**.

Solution:

a) tcp



b) udp



Activity 2: Load the file **capture_data.pcapng**, which can be found on **eLearning**, and apply the following rules using the **display filter**:

a) Apply a display filter so that only **IPv4** packets are displayed.

b) Apply a display filter so that only **IPv6** packets are displayed.

c) Apply a display filter so that only packets using the **ARP protocol** are displayed.

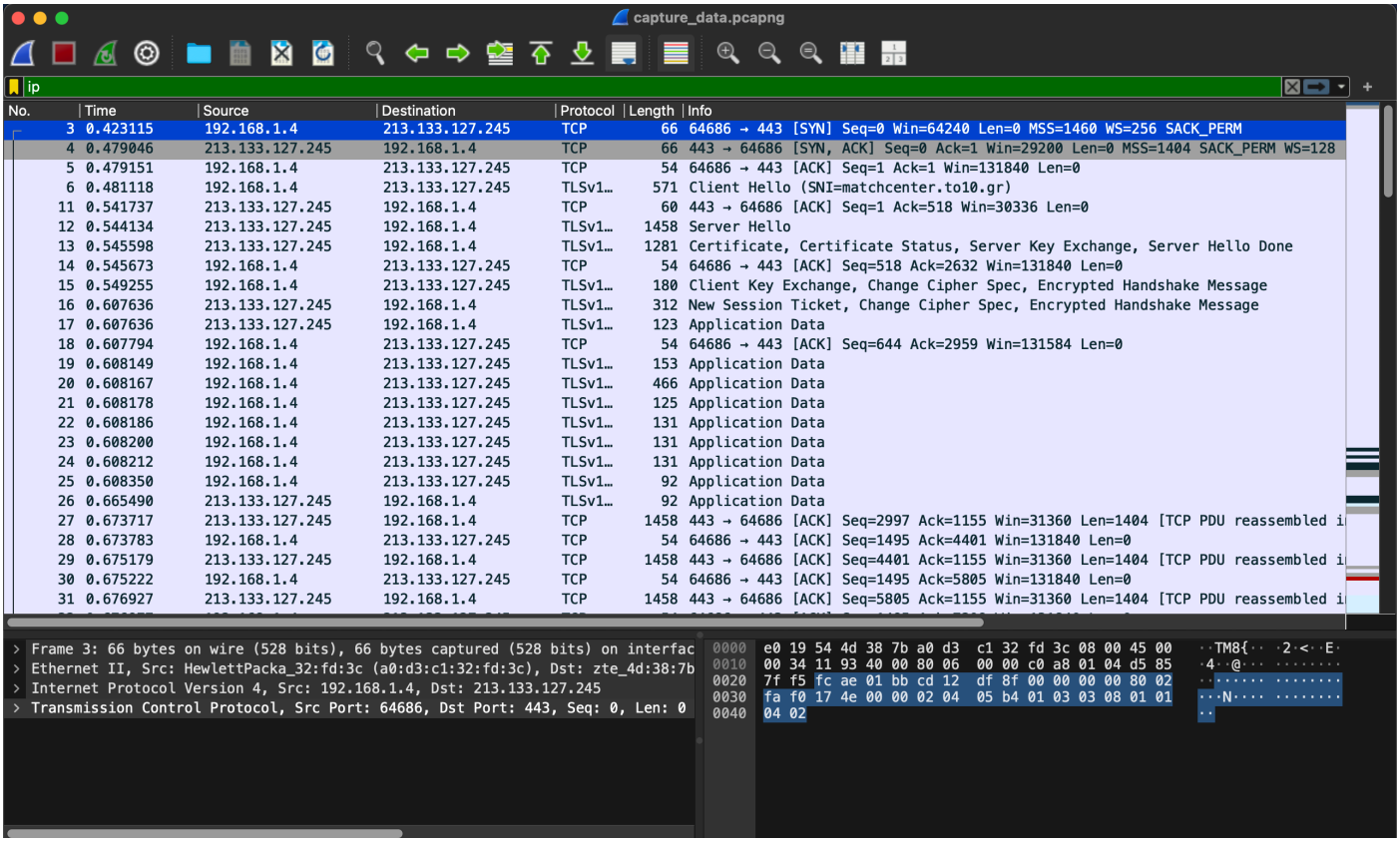
d) Apply a display filter so that only packets using the **ARP protocol** and having a destination MAC address of **20:23:51:42:60:8a** are displayed.

e) Apply a display filter so that only packets with a **source address of 192.168.1.4** and using the **TCP protocol** are displayed.

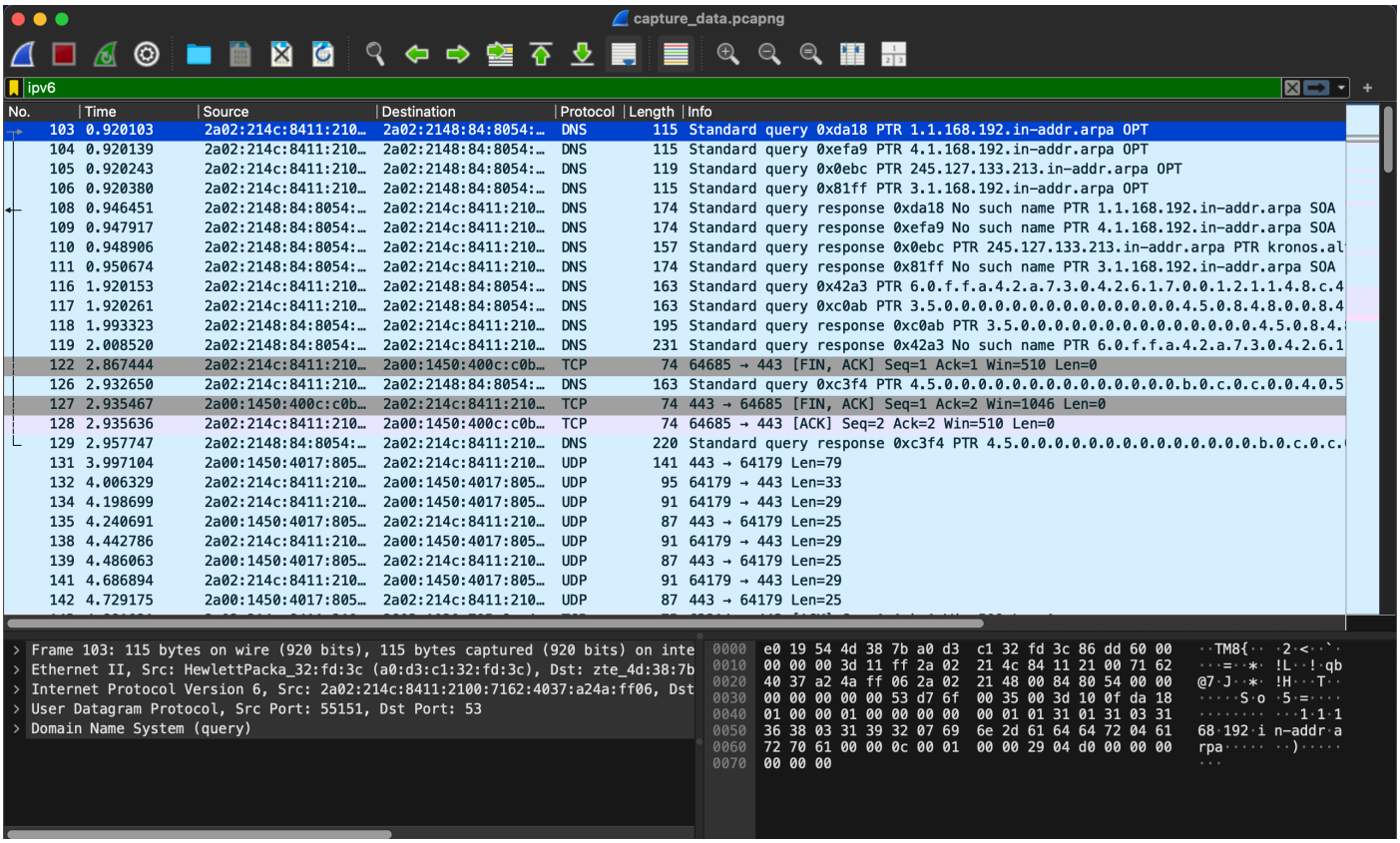
f) Apply a display filter so that only packets with a **frame size greater than 1458B** are displayed.

Solution:

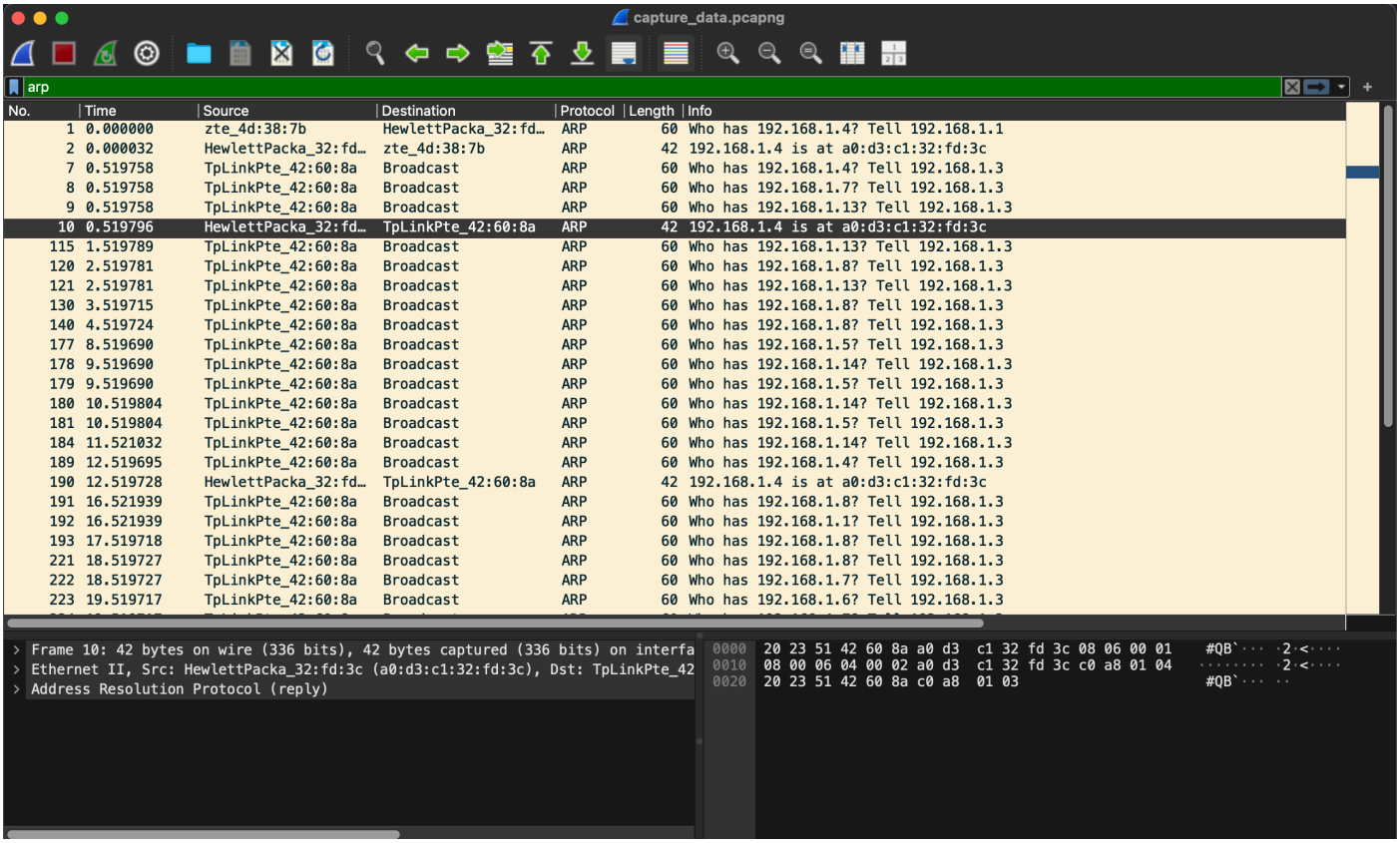
a)


capture_data.pcapng
ip
No. Time Source Destination Protocol Length Info
3 0.423115 192.168.1.4 213.133.127.245 TCP 66 64686 → 443 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 WS=256 SACK_PERM
4 0.479046 213.133.127.245 192.168.1.4 TCP 66 443 → 64686 [SYN, ACK] Seq=0 Ack=1 Win=29200 Len=0 MSS=1404 SACK_PERM WS=128
5 0.479151 192.168.1.4 213.133.127.245 TCP 54 64686 → 443 [ACK] Seq=1 Ack=1 Win=131840 Len=0
6 0.481118 192.168.1.4 213.133.127.245 TLSv1… 571 Client Hello (SNI=matchcenter.to10.gr)
11 0.541737 213.133.127.245 192.168.1.4 TCP 60 443 → 64686 [ACK] Seq=1 Ack=518 Win=30336 Len=0
12 0.544134 213.133.127.245 192.168.1.4 TLSv1… 1458 Server Hello
13 0.545598 213.133.127.245 192.168.1.4 TLSv1… 1281 Certificate, Certificate Status, Server Key Exchange, Server Hello Done
14 0.545673 192.168.1.4 213.133.127.245 TCP 54 64686 → 443 [ACK] Seq=518 Ack=2632 Win=131840 Len=0
15 0.549255 192.168.1.4 213.133.127.245 TLSv1… 180 Client Key Exchange, Change Cipher Spec, Encrypted Handshake Message
16 0.607636 213.133.127.245 192.168.1.4 TLSv1… 312 New Session Ticket, Change Cipher Spec, Encrypted Handshake Message
17 0.607636 213.133.127.245 192.168.1.4 TLSv1… 123 Application Data
18 0.607794 192.168.1.4 213.133.127.245 TCP 54 64686 → 443 [ACK] Seq=644 Ack=2959 Win=131584 Len=0
19 0.608149 192.168.1.4 213.133.127.245 TLSv1… 153 Application Data
20 0.608167 192.168.1.4 213.133.127.245 TLSv1… 466 Application Data
21 0.608178 192.168.1.4 213.133.127.245 TLSv1… 125 Application Data
22 0.608186 192.168.1.4 213.133.127.245 TLSv1… 131 Application Data
23 0.608200 192.168.1.4 213.133.127.245 TLSv1… 131 Application Data
24 0.608212 192.168.1.4 213.133.127.245 TLSv1… 131 Application Data
25 0.608350 192.168.1.4 213.133.127.245 TLSv1… 92 Application Data
26 0.665490 213.133.127.245 192.168.1.4 TLSv1… 92 Application Data
27 0.673717 213.133.127.245 192.168.1.4 TCP 1458 443 → 64686 [ACK] Seq=2997 Ack=1155 Win=31360 Len=1404 [TCP PDU reassembled i
28 0.673783 192.168.1.4 213.133.127.245 TCP 54 64686 → 443 [ACK] Seq=1495 Ack=4401 Win=131840 Len=0
29 0.675179 213.133.127.245 192.168.1.4 TCP 1458 443 → 64686 [ACK] Seq=4401 Ack=1155 Win=31360 Len=1404 [TCP PDU reassembled i
30 0.675222 192.168.1.4 213.133.127.245 TCP 54 64686 → 443 [ACK] Seq=1495 Ack=5805 Win=131840 Len=0
31 0.676927 213.133.127.245 192.168.1.4 TCP 1458 443 → 64686 [ACK] Seq=5805 Ack=1155 Win=31360 Len=1404 [TCP PDU reassembled i
Frame 3: 66 bytes on wire (528 bits), 66 bytes captured (528 bits) on interfac
Ethernet II, Src: HewlettPacka_32:fd:3c (a0:d3:c1:32:fd:3c), Dst: zte_4d:38:7b
Internet Protocol Version 4, Src: 192.168.1.4, Dst: 213.133.127.245
Transmission Control Protocol, Src Port: 64686, Dst Port: 443, Seq: 0, Len: 0
0000 e0 19 54 4d 38 7b a0 d3 c1 32 fd 3c 08 00 45 00
0010 00 34 11 93 40 00 80 06 00 00 c0 a8 01 04 d5 85
0020 7f f5 fc ae 01 bb cd 12 df 8f 00 00 00 00 80 02
0030 fa f0 17 4e 00 00 02 04 05 b4 01 03 03 08 01 01
0040 04 02

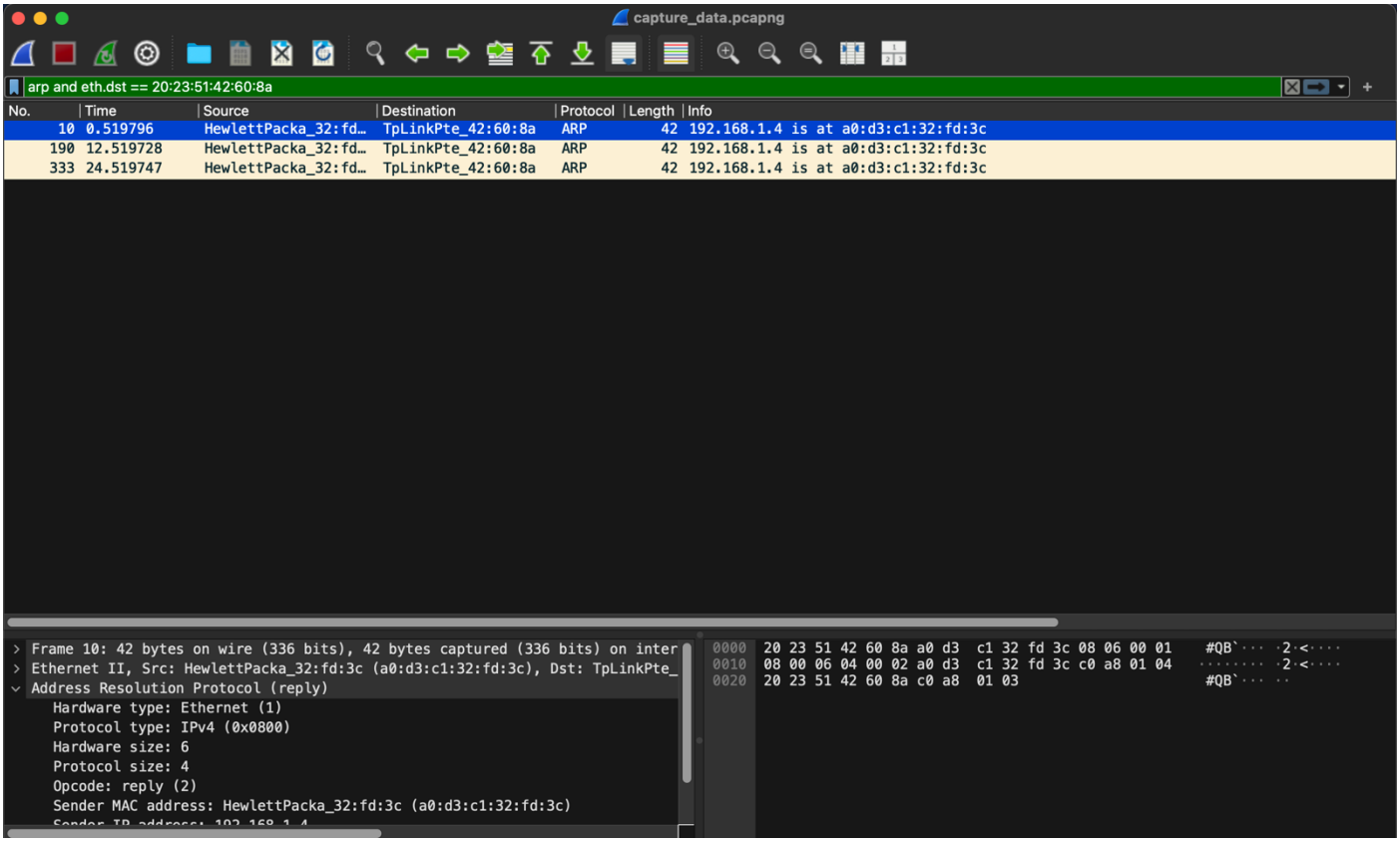
b)


capture_data.pcapng
ipv6
No. Time Source Destination Protocol Length Info
103 0.920103 2a02:214c:8411:210… 2a02:2148:84:8054:… DNS 115 Standard query 0xda18 PTR 1.1.168.192.in-addr.arpa OPT
104 0.920139 2a02:214c:8411:210… 2a02:2148:84:8054:… DNS 115 Standard query 0xefa9 PTR 4.1.168.192.in-addr.arpa OPT
105 0.920243 2a02:214c:8411:210… 2a02:2148:84:8054:… DNS 119 Standard query 0x0ebc PTR 245.127.133.213.in-addr.arpa OPT
106 0.920380 2a02:214c:8411:210… 2a02:2148:84:8054:… DNS 115 Standard query 0x81ff PTR 3.1.168.192.in-addr.arpa OPT
108 0.946451 2a02:2148:84:8054:… 2a02:214c:8411:210… DNS 174 Standard query response 0xda18 No such name PTR 1.1.168.192.in-addr.arpa SOA
109 0.947917 2a02:2148:84:8054:… 2a02:214c:8411:210… DNS 174 Standard query response 0xefa9 No such name PTR 4.1.168.192.in-addr.arpa SOA
110 0.948906 2a02:2148:84:8054:… 2a02:214c:8411:210… DNS 157 Standard query response 0x0ebc PTR 245.127.133.213.in-addr.arpa PTR kronos.al
111 0.950674 2a02:2148:84:8054:… 2a02:214c:8411:210… DNS 174 Standard query response 0x81ff No such name PTR 3.1.168.192.in-addr.arpa SOA
116 1.920153 2a02:214c:8411:210… 2a02:2148:84:8054:… DNS 163 Standard query 0x42a3 PTR 6.0.f.f.a.4.2.a.7.3.0.4.2.6.1.7.0.0.1.2.1.1.4.8.c.4
117 1.920261 2a02:214c:8411:210… 2a02:2148:84:8054:… DNS 163 Standard query 0xc0ab PTR 3.5.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.4.5.0.8.4.8.0.0.8.4
118 1.993323 2a02:2148:84:8054:… 2a02:214c:8411:210… DNS 195 Standard query response 0xc0ab PTR 3.5.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.4.5.0.8.4.
119 2.008520 2a02:2148:84:8054:… 2a02:214c:8411:210… DNS 231 Standard query response 0x42a3 No such name PTR 6.0.f.f.a.4.2.a.7.3.0.4.2.6.1
122 2.867444 2a02:214c:8411:210… 2a00:1450:400c:c0b… TCP 74 64685 → 443 [FIN, ACK] Seq=1 Ack=1 Win=510 Len=0
126 2.932650 2a02:214c:8411:210… 2a02:2148:84:8054:… DNS 163 Standard query 0xc3f4 PTR 4.5.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.b.0.c.0.c.0.0.4.0.5
127 2.935467 2a00:1450:400c:c0b… 2a02:214c:8411:210… TCP 74 443 → 64685 [FIN, ACK] Seq=1 Ack=2 Win=1046 Len=0
128 2.935636 2a02:214c:8411:210… 2a00:1450:400c:c0b… TCP 74 64685 → 443 [ACK] Seq=2 Ack=2 Win=510 Len=0
129 2.957747 2a02:2148:84:8054:… 2a02:214c:8411:210… DNS 220 Standard query response 0xc3f4 PTR 4.5.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.b.0.c.0.c.
131 3.997104 2a00:1450:4017:805… 2a02:214c:8411:210… UDP 141 443 → 64179 Len=79
132 4.006329 2a02:214c:8411:210… 2a00:1450:4017:805… UDP 95 64179 → 443 Len=33
134 4.198699 2a02:214c:8411:210… 2a00:1450:4017:805… UDP 91 64179 → 443 Len=29
135 4.240691 2a00:1450:4017:805… 2a02:214c:8411:210… UDP 87 443 → 64179 Len=25
138 4.442786 2a02:214c:8411:210… 2a00:1450:4017:805… UDP 91 64179 → 443 Len=29
139 4.486063 2a00:1450:4017:805… 2a02:214c:8411:210… UDP 87 443 → 64179 Len=25
141 4.686894 2a02:214c:8411:210… 2a00:1450:4017:805… UDP 91 64179 → 443 Len=29
142 4.729175 2a00:1450:4017:805… 2a02:214c:8411:210… UDP 87 443 → 64179 Len=25
Frame 103: 115 bytes on wire (920 bits), 115 bytes captured (920 bits) on inte
Ethernet II, Src: HewlettPacka_32:fd:3c (a0:d3:c1:32:fd:3c), Dst: zte_4d:38:7b
Internet Protocol Version 6, Src: 2a02:214c:8411:2100:7162:4037:a24a:ff06, Dst
User Datagram Protocol, Src Port: 55151, Dst Port: 53
Domain Name System (query)
0000 e0 19 54 4d 38 7b a0 d3 c1 32 fd 3c 86 dd 60 00
0010 00 00 00 3d 11 ff 2a 02 21 4c 84 11 21 00 71 62
0020 40 37 a2 4a ff 06 2a 02 21 48 00 84 80 54 00 00
0030 00 00 00 00 00 53 d7 6f 00 35 00 3d 10 0f da 18
0040 01 00 00 01 00 00 00 00 00 01 01 31 01 31 03 31
0050 36 38 03 31 39 32 07 69 6e 2d 61 64 64 72 04 61
0060 72 70 61 00 00 0c 00 01 00 00 29 04 d0 00 00 00
0070 00 00 00

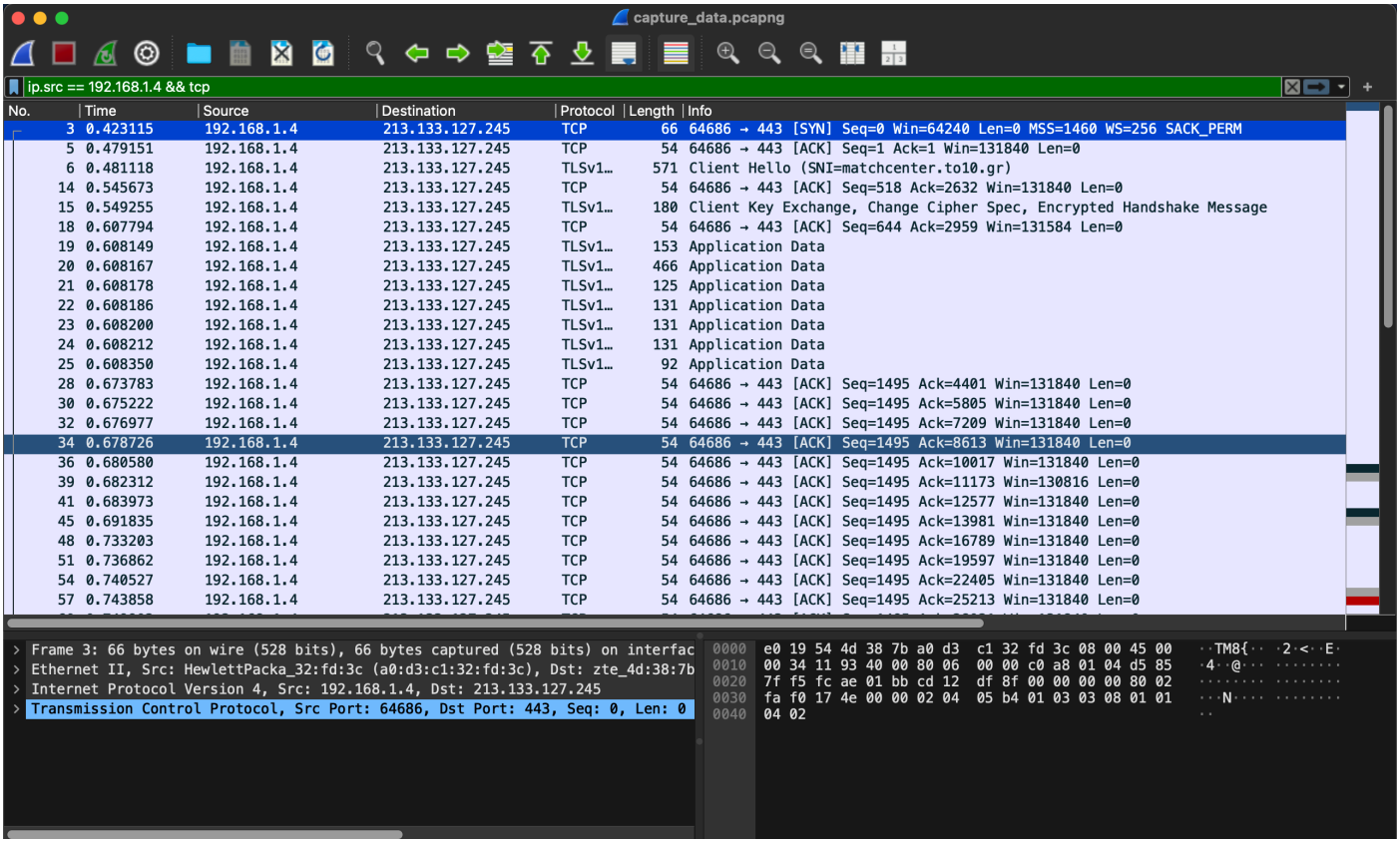
c)


capture_data.pcapng
arp
No. Time Source Destination Protocol Length Info
1 0.000000 zte_4d:38:7b HewlettPacka_32:fd… ARP 60 Who has 192.168.1.4? Tell 192.168.1.1
2 0.000032 HewlettPacka_32:fd… zte_4d:38:7b ARP 42 192.168.1.4 is at a0:d3:c1:32:fd:3c
7 0.519758 TpLinkPte_42:60:8a Broadcast ARP 60 Who has 192.168.1.4? Tell 192.168.1.3
8 0.519758 TpLinkPte_42:60:8a Broadcast ARP 60 Who has 192.168.1.7? Tell 192.168.1.3
9 0.519758 TpLinkPte_42:60:8a Broadcast ARP 60 Who has 192.168.1.13? Tell 192.168.1.3
10 0.519796 HewlettPacka_32:fd… TpLinkPte_42:60:8a ARP 42 192.168.1.4 is at a0:d3:c1:32:fd:3c
115 1.519789 TpLinkPte_42:60:8a Broadcast ARP 60 Who has 192.168.1.13? Tell 192.168.1.3
120 2.519781 TpLinkPte_42:60:8a Broadcast ARP 60 Who has 192.168.1.8? Tell 192.168.1.3
121 2.519781 TpLinkPte_42:60:8a Broadcast ARP 60 Who has 192.168.1.13? Tell 192.168.1.3
130 3.519715 TpLinkPte_42:60:8a Broadcast ARP 60 Who has 192.168.1.8? Tell 192.168.1.3
140 4.519724 TpLinkPte_42:60:8a Broadcast ARP 60 Who has 192.168.1.8? Tell 192.168.1.3
177 8.519690 TpLinkPte_42:60:8a Broadcast ARP 60 Who has 192.168.1.5? Tell 192.168.1.3
178 9.519690 TpLinkPte_42:60:8a Broadcast ARP 60 Who has 192.168.1.14? Tell 192.168.1.3
179 9.519690 TpLinkPte_42:60:8a Broadcast ARP 60 Who has 192.168.1.5? Tell 192.168.1.3
180 10.519804 TpLinkPte_42:60:8a Broadcast ARP 60 Who has 192.168.1.14? Tell 192.168.1.3
181 10.519804 TpLinkPte_42:60:8a Broadcast ARP 60 Who has 192.168.1.5? Tell 192.168.1.3
184 11.521032 TpLinkPte_42:60:8a Broadcast ARP 60 Who has 192.168.1.14? Tell 192.168.1.3
189 12.519695 TpLinkPte_42:60:8a Broadcast ARP 60 Who has 192.168.1.4? Tell 192.168.1.3
190 12.519728 HewlettPacka_32:fd… TpLinkPte_42:60:8a ARP 42 192.168.1.4 is at a0:d3:c1:32:fd:3c
191 16.521939 TpLinkPte_42:60:8a Broadcast ARP 60 Who has 192.168.1.8? Tell 192.168.1.3
192 16.521939 TpLinkPte_42:60:8a Broadcast ARP 60 Who has 192.168.1.1? Tell 192.168.1.3
193 17.519718 TpLinkPte_42:60:8a Broadcast ARP 60 Who has 192.168.1.8? Tell 192.168.1.3
221 18.519727 TpLinkPte_42:60:8a Broadcast ARP 60 Who has 192.168.1.8? Tell 192.168.1.3
222 18.519727 TpLinkPte_42:60:8a Broadcast ARP 60 Who has 192.168.1.7? Tell 192.168.1.3
223 19.519717 TpLinkPte_42:60:8a Broadcast ARP 60 Who has 192.168.1.6? Tell 192.168.1.3
Frame 10: 42 bytes on wire (336 bits), 42 bytes captured (336 bits) on interfa
Ethernet II, Src: HewlettPacka_32:fd:3c (a0:d3:c1:32:fd:3c), Dst: TpLinkPte_42
Address Resolution Protocol (reply)
0000 20 23 51 42 60 8a a0 d3 c1 32 fd 3c 08 06 00 01
0010 08 00 06 04 00 02 a0 d3 c1 32 fd 3c c0 a8 01 04
0020 20 23 51 42 60 8a c0 a8 01 03

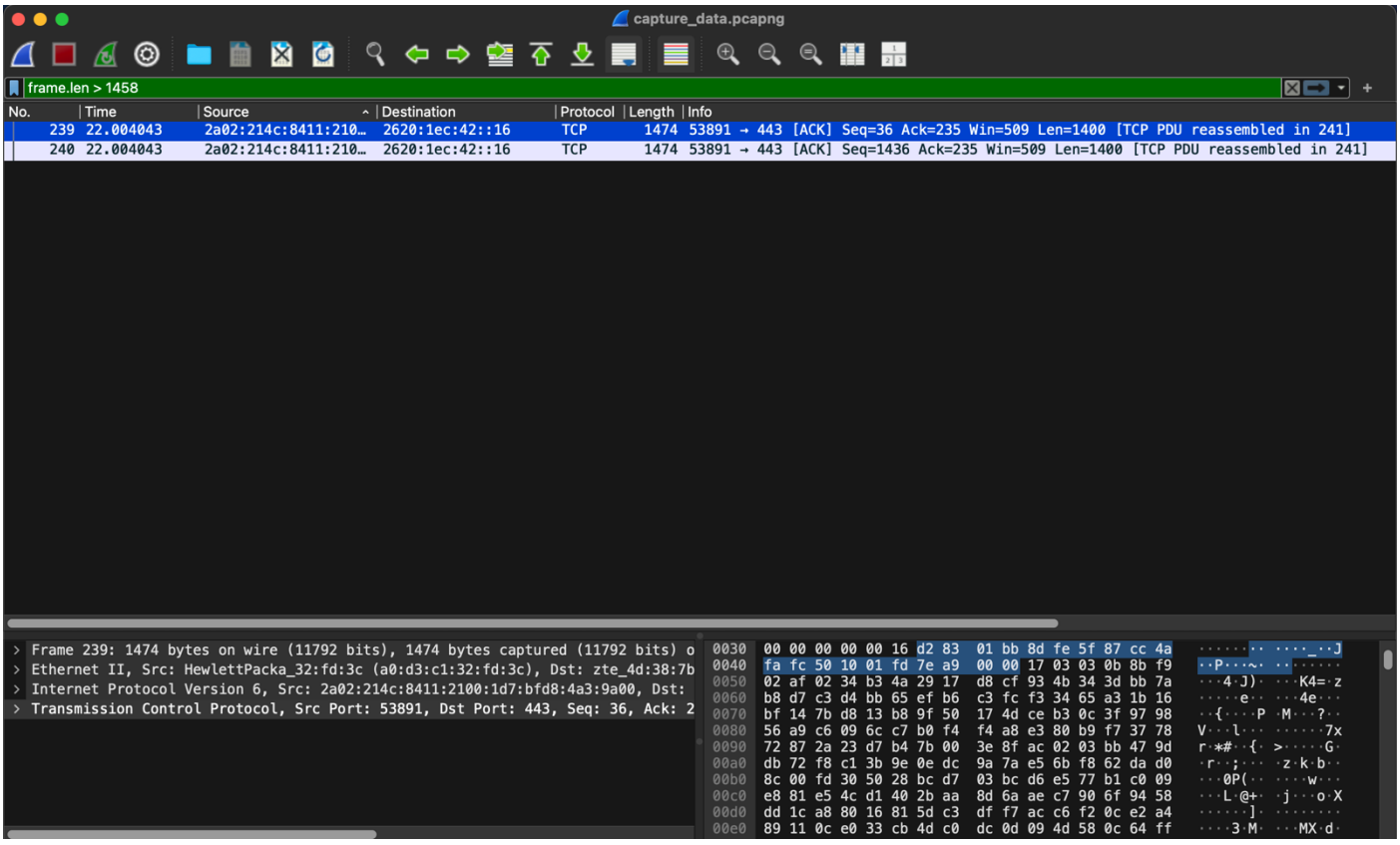
d)


capture_data.pcapng
arp and eth.dst == 20:23:51:42:60:8a
No. Time Source Destination Protocol Length Info
10 0.519796 HewlettPacka_32:fd… TpLinkPte_42:60:8a ARP 42 192.168.1.4 is at a0:d3:c1:32:fd:3c
190 12.519728 HewlettPacka_32:fd… TpLinkPte_42:60:8a ARP 42 192.168.1.4 is at a0:d3:c1:32:fd:3c
333 24.519747 HewlettPacka_32:fd… TpLinkPte_42:60:8a ARP 42 192.168.1.4 is at a0:d3:c1:32:fd:3c
Frame 10: 42 bytes on wire (336 bits), 42 bytes captured (336 bits) on inter
Ethernet II, Src: HewlettPacka_32:fd:3c (a0:d3:c1:32:fd:3c), Dst: TpLinkPte_
Address Resolution Protocol (reply)
Hardware type: Ethernet (1)
Protocol type: IPv4 (0x0800)
Hardware size: 6
Protocol size: 4
Opcode: reply (2)
Sender MAC address: HewlettPacka_32:fd:3c (a0:d3:c1:32:fd:3c)
0000 20 23 51 42 60 8a a0 d3 c1 32 fd 3c 08 06 00 01
0010 08 00 06 04 00 02 a0 d3 c1 32 fd 3c c0 a8 01 04
0020 20 23 51 42 60 8a c0 a8 01 03

e)


capture_data.pcapng
ip.src == 192.168.1.4 && tcp
No. Time Source Destination Protocol Length Info
3 0.423115 192.168.1.4 213.133.127.245 TCP 66 64686 → 443 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 WS=256 SACK_PERM
5 0.479151 192.168.1.4 213.133.127.245 TCP 54 64686 → 443 [ACK] Seq=1 Ack=1 Win=131840 Len=0
6 0.481118 192.168.1.4 213.133.127.245 TLSv1… 571 Client Hello (SNI=matchcenter.to10.gr)
14 0.545673 192.168.1.4 213.133.127.245 TCP 54 64686 → 443 [ACK] Seq=518 Ack=2632 Win=131840 Len=0
15 0.549255 192.168.1.4 213.133.127.245 TLSv1… 180 Client Key Exchange, Change Cipher Spec, Encrypted Handshake Message
18 0.607794 192.168.1.4 213.133.127.245 TCP 54 64686 → 443 [ACK] Seq=644 Ack=2959 Win=131584 Len=0
19 0.608149 192.168.1.4 213.133.127.245 TLSv1… 153 Application Data
20 0.608167 192.168.1.4 213.133.127.245 TLSv1… 466 Application Data
21 0.608178 192.168.1.4 213.133.127.245 TLSv1… 125 Application Data
22 0.608186 192.168.1.4 213.133.127.245 TLSv1… 131 Application Data
23 0.608200 192.168.1.4 213.133.127.245 TLSv1… 131 Application Data
24 0.608212 192.168.1.4 213.133.127.245 TLSv1… 131 Application Data
25 0.608350 192.168.1.4 213.133.127.245 TLSv1… 92 Application Data
28 0.673783 192.168.1.4 213.133.127.245 TCP 54 64686 → 443 [ACK] Seq=1495 Ack=4401 Win=131840 Len=0
30 0.675222 192.168.1.4 213.133.127.245 TCP 54 64686 → 443 [ACK] Seq=1495 Ack=5805 Win=131840 Len=0
32 0.676977 192.168.1.4 213.133.127.245 TCP 54 64686 → 443 [ACK] Seq=1495 Ack=7209 Win=131840 Len=0
34 0.678726 192.168.1.4 213.133.127.245 TCP 54 64686 → 443 [ACK] Seq=1495 Ack=8613 Win=131840 Len=0
36 0.680580 192.168.1.4 213.133.127.245 TCP 54 64686 → 443 [ACK] Seq=1495 Ack=10017 Win=131840 Len=0
39 0.682312 192.168.1.4 213.133.127.245 TCP 54 64686 → 443 [ACK] Seq=1495 Ack=11173 Win=130816 Len=0
41 0.683973 192.168.1.4 213.133.127.245 TCP 54 64686 → 443 [ACK] Seq=1495 Ack=12577 Win=131840 Len=0
45 0.691835 192.168.1.4 213.133.127.245 TCP 54 64686 → 443 [ACK] Seq=1495 Ack=13981 Win=131840 Len=0
48 0.733203 192.168.1.4 213.133.127.245 TCP 54 64686 → 443 [ACK] Seq=1495 Ack=16789 Win=131840 Len=0
51 0.736862 192.168.1.4 213.133.127.245 TCP 54 64686 → 443 [ACK] Seq=1495 Ack=19597 Win=131840 Len=0
54 0.740527 192.168.1.4 213.133.127.245 TCP 54 64686 → 443 [ACK] Seq=1495 Ack=22405 Win=131840 Len=0
57 0.743858 192.168.1.4 213.133.127.245 TCP 54 64686 → 443 [ACK] Seq=1495 Ack=25213 Win=131840 Len=0
Frame 3: 66 bytes on wire (528 bits), 66 bytes captured (528 bits) on interfac
Ethernet II, Src: HewlettPacka_32:fd:3c (a0:d3:c1:32:fd:3c), Dst: zte_4d:38:7b
Internet Protocol Version 4, Src: 192.168.1.4, Dst: 213.133.127.245
Transmission Control Protocol, Src Port: 64686, Dst Port: 443, Seq: 0, Len: 0
0000 e0 19 54 4d 38 7b a0 d3 c1 32 fd 3c 08 00 45 00
0010 00 34 11 93 40 00 80 06 00 00 c0 a8 01 04 d5 85
0020 7f f5 fc ae 01 bb cd 12 df 8f 00 00 00 00 80 02
0030 fa f0 17 4e 00 00 02 04 05 b4 01 03 03 08 01 01
0040 04 02

f)


capture_data.pcapng
frame.len > 1458
No. Time Source Destination Protocol Length Info
239 22.004043 2a02:214c:8411:210… 2620:1ec:42::16 TCP 1474 53891 → 443 [ACK] Seq=36 Ack=235 Win=509 Len=1400 [TCP PDU reassembled in 241]
240 22.004043 2a02:214c:8411:210… 2620:1ec:42::16 TCP 1474 53891 → 443 [ACK] Seq=1436 Ack=235 Win=509 Len=1400 [TCP PDU reassembled in 241]
Frame 239: 1474 bytes on wire (11792 bits), 1474 bytes captured (11792 bits) o
Ethernet II, Src: HewlettPacka_32:fd:3c (a0:d3:c1:32:fd:3c), Dst: zte_4d:38:7b
Internet Protocol Version 6, Src: 2a02:214c:8411:2100:1d7:bfd8:4a3:9a00, Dst:
Transmission Control Protocol, Src Port: 53891, Dst Port: 443, Seq: 36, Ack: 2
0030 00 00 00 00 00 16 d2 83 01 bb 8d fe 5f 87 cc 4a
0040 fa fc 50 10 01 fd 7e a9 00 00 17 03 03 0b 8b f9
0050 02 af 02 34 b3 4a 29 17 d8 cf 93 4b 34 3d bb 7a
0060 b8 d7 c3 d4 bb 65 ef b6 c3 fc f3 34 65 a3 1b 16
0070 bf 14 7b d8 13 b8 9f 50 17 4d ce b3 0c 3f 97 98
0080 56 a9 c6 09 6c c7 b0 f4 f4 a8 e3 80 b9 f7 37 78
0090 72 87 2a 23 d7 b4 7b 00 3e 8f ac 02 03 bb 47 9d
00a0 db 72 f8 c1 3b 9e 0e dc 9a 7a e5 6b f8 62 da d0
00b0 8c 00 fd 30 50 28 bc d7 03 bc d6 e5 77 b1 c0 09
00c0 e8 81 e5 4c d1 40 2b aa 8d 6a ae c7 90 6f 94 58
00d0 dd 1c a8 80 16 81 5d c3 df f7 ac c6 f2 0c e2 a4
00e0 89 11 0c e0 33 cb 4d c0 dc 0d 09 4d 58 0c 64 ff

Activity 3: In the same file (**capture_data.pcapng**):

a) Apply a display filter so that only packets with a **destination MAC address** set to the **broadcast address** and using the **UDP protocol** are displayed.

b) By exploring the **single packet** that results from the filter using the **packet details pane**, report the following:

i. **Header length** (IP layer)

ii. **Total packet size** (IP layer)

iii. **Source MAC address** (Ethernet layer)

iv. **Source and destination IP addresses**

v. **Source and destination port numbers** (Transport layer - UDP)

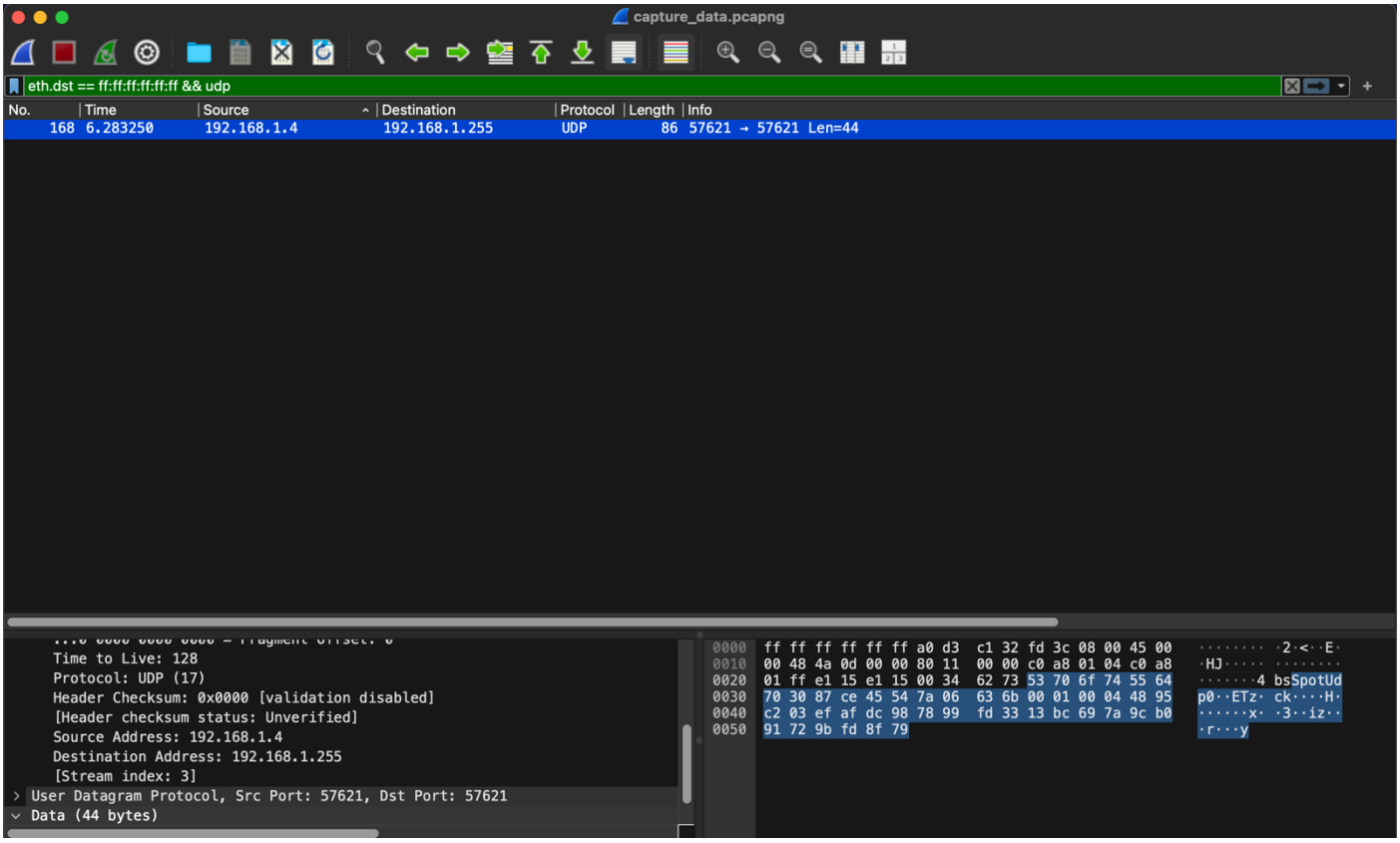
vi. **Header length** (Transport layer - UDP)

vii. **Total packet size** (Transport layer - UDP)

viii. **Payload size** (Transport layer - UDP)

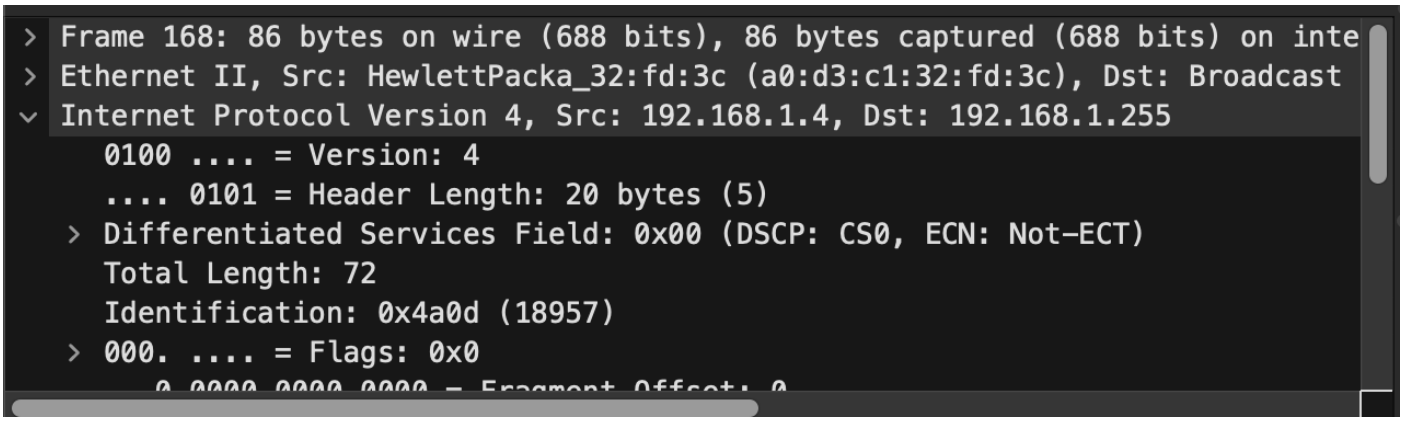
Solution:

a)



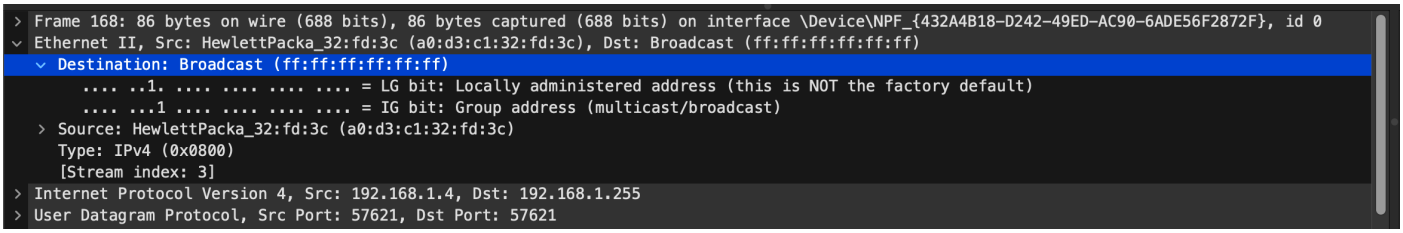
b)

i) 20 Bytes

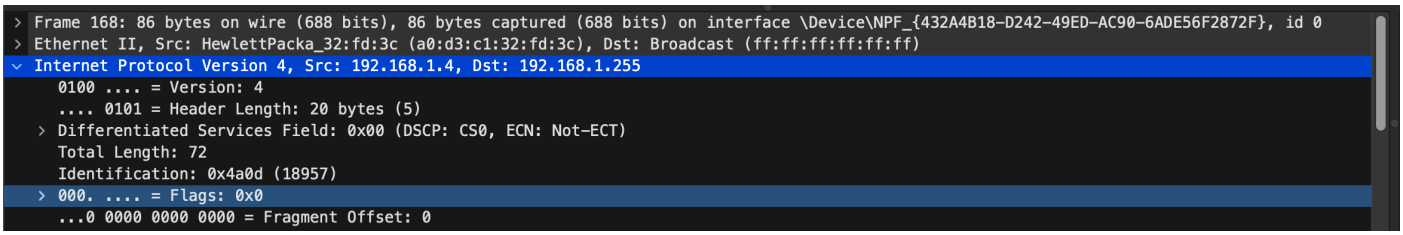


ii) 72

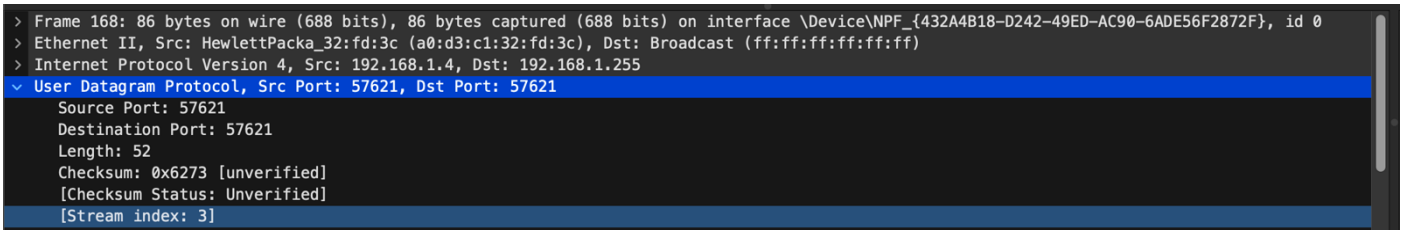
iii) ff:ff:ff:ff:ff:ff



iv) 192:168:1.4



v) 57621



vi) 8

vii) 44

viii) 52

Activity 4: Load the file **http_capture.pcapng**, which can be found on **eLearning**, and apply the following rules using the **display filter**:

a) Apply a display filter so that only packets using the **HTTP protocol** and having a **packet size of 301** are displayed.

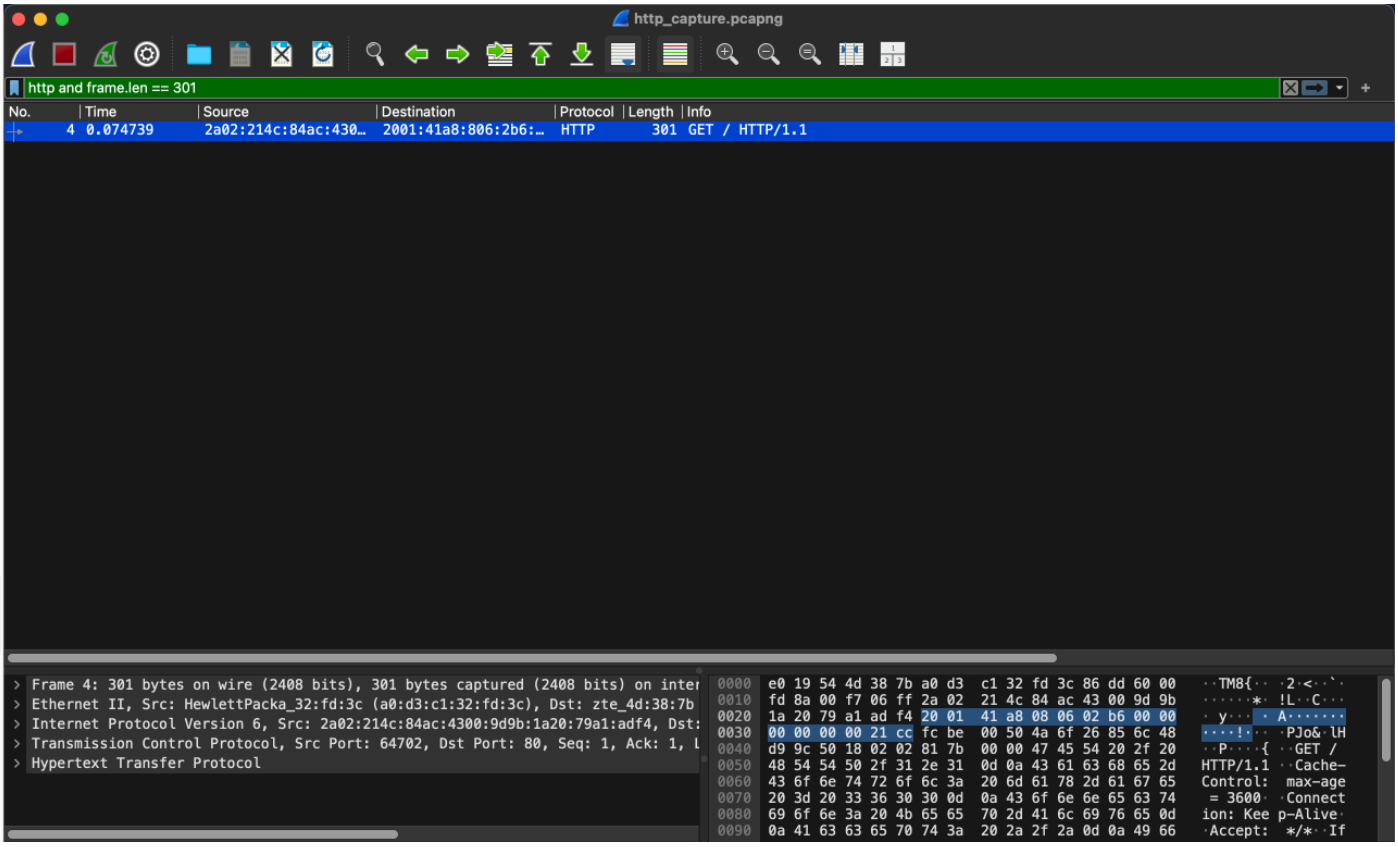
b) By exploring the **single packet** that results from the filter using the **packet** and **byte details pane**, report the following:

i. Provide in **hexadecimal format** the values of **Next Header** and **Hop Limit** (IP layer).

ii. Provide in **hexadecimal format** the **source and destination port numbers**, as well as the **sequence number** for this packet (Transport Layer).

Solution:

a)



b)

i)

Next Header: 0x06 (TCP)

Hop Limit: 0xFF (255)

ii)

Field	Decimal Format	Hexadecimal Format
Source Port	64702	0xFCEE
Destination Port	80	0x0050

Sequence Number	1248798341	0x4A7F7C65

Nmap

Activity 5: Perform a **port scanning** on the domain **www.in.gr** using the methods mentioned in the previous slides. Which of the methods was the most time-consuming and why?

Solution:

1) SYN Scan (sudo nmap -sS www.in.gr)

Advantages:

Fast, because it does not complete the **TCP handshake**.

Stealthy, meaning it is hard to detect by the server.

Disadvantages:

Requires **root privileges** (sudo).

Can be **filtered** by **firewalls** and **IDS**.

2) TCP Connect Scan (nmap -sT www.in.gr)

Advantages:

Does **not require root privileges**.

More **reliable**, as it completes the **TCP handshake**.

Disadvantages:

Slower than SYN Scan, as it performs a full **TCP handshake** (**SYN-ACK-ACK**).

Easier to **detect** by **firewalls** and **IDS**.

3) ACK Scan (sudo nmap -sA www.in.gr)

Advantages:

Useful for **firewall detection** (determines if a port is **filtered** or not).

Does **not scan for open/closed ports**, but checks if a firewall exists.

Disadvantages:

Cannot detect if a port is **open or closed**—only if it is **filtered**.

Does not reveal active services, as it does not receive standard responses.

4) UDP Scan (sudo nmap -sU www.in.gr)

Advantages:

Useful for detecting **UDP services** (e.g., **DNS, DHCP, SNMP, NTP**).

Used when looking for **services that are not detected** in TCP scanning.

Disadvantages:

The slowest method, because **UDP lacks a SYN-ACK mechanism**, meaning **Nmap must wait for timeouts**.

If a **firewall** is present, **UDP packets may be filtered**, making it even **slower**.

Cannot always detect closed ports, due to a lack of responses.