Αριστοτέλειο Πανεπιστήμιο Θεσσαλονίκης
Πολυτεχνική Σχολή

Δίκτυα Υπολογιστών II

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Αξίζει να σημειωθεί, μιας και δεν φαίνεται στα wireshark captures, ότι είχαμε δημιουργήσει ένα custom filter: **host 155.207.18.208 and udp** το οποίο το επιλέγαμε προτού αρχίσουμε το capturing των πακέτων.

Figure 1: Echo request code

No.	Time	Source	Destination	Protocol	Length	Info
1	2020-11-23 19:40:03.768368594	192.168.1.50	155.207.18.208	UDP	47	48048 → 38048 Len=5
2	2020-11-23 19:40:05.420911957	155.207.18.208	192.168.1.50	UDP	74	58048 → 48048 Len=32
3	2020-11-23 19:40:05.448599969	192.168.1.50	155.207.18.208	UDP	47	48048 → 38048 Len=5
4	2020-11-23 19:40:06.553035719	155.207.18.208	192.168.1.50	UDP	74	58048 → 48048 Len=32
5	2020-11-23 19:40:06.554043532	192.168.1.50	155.207.18.208	UDP	47	48048 → 38048 Len=5
6	2020-11-23 19:40:08.677328824	155.207.18.208	192.168.1.50	UDP	74	58048 → 48048 Len=32
7	2020-11-23 19:40:08.678744345	192.168.1.50	155.207.18.208	UDP	47	48048 → 38048 Len=5
8	2020-11-23 19:40:10.160612614	155.207.18.208	192.168.1.50	UDP	74	58048 → 48048 Len=32
9	2020-11-23 19:40:10.166538398	192.168.1.50	155.207.18.208	UDP	55	48048 → 38048 Len=13
10	2020-11-23 19:40:10.545951887	155.207.18.208	192.168.1.50	UDP	1066	58048 → 48048 Len=1024
11	2020-11-23 19:40:10.583952179	155.207.18.208	192.168.1.50	UDP	1066	58048 → 48048 Len=1024
12	2020-11-23 19:40:10.621947221	155.207.18.208	192.168.1.50	UDP	1066	58048 → 48048 Len=1024
13	2020-11-23 19:40:10.659929802	155.207.18.208	192.168.1.50	UDP	1066	58048 → 48048 Len=1024
14	2020-11-23 19:40:10.698502992	155.207.18.208	192.168.1.50	UDP	1066	58048 → 48048 Len=1024
15	2020-11-23 19:40:10.736149860	155.207.18.208	192.168.1.50	UDP	1066	58048 → 48048 Len=1024
16	2020-11-23 19:40:10.774405672	155.207.18.208	192.168.1.50	UDP	1066	58048 → 48048 Len=1024
17	2020-11-23 19:40:10.812627546	155.207.18.208	192.168.1.50	UDP	1066	58048 → 48048 Len=1024
18	2020-11-23 19:40:10.850626737	155.207.18.208	192.168.1.50	UDP	1066	58048 → 48048 Len=1024
19	2020-11-23 19:40:10.888953357	155.207.18.208	192.168.1.50	UDP	1066	58048 → 48048 Len=1024
20	2020-11-23 19:40:10.926627034	155.207.18.208	192.168.1.50	UDP	1066	58048 → 48048 Len=1024
21	2020-11-23 19:40:10.965135893	155.207.18.208	192.168.1.50	UDP	1066	58048 → 48048 Len=1024
22	2020-11-23 19:40:11.003159788	155.207.18.208	192.168.1.50	UDP	1066	58048 → 48048 Len=1024
23	2020-11-23 19:40:11.041135160	155.207.18.208	192.168.1.50	UDP	1066	58048 → 48048 Len=1024
24	2020-11-23 19:40:11.079643172	155.207.18.208	192.168.1.50	UDP	1066	58048 → 48048 Len=1024

▶ Frame 8: 74 bytes on wire (592 bits), 74 bytes captured (592 bits) on interface enp2s0, id 0
▶ Ethernet II, Src: zte_1a:b4:0a (d4:76:ea:1a:b4:0a), Dst: HewlettP_96:9d:b6 (40:b0:34:96:9d:b6)
▶ Internet Protocol Version 4, Src: 155.207.18.208, Dst: 192.168.1.50
▶ User Datagram Protocol, Src Port: 58048, Dst Port: 48048
▼ Data (32 bytes)
    Data: 5053544152542032332d31312d323032302031393a34303a3131205053544f50
    [Length: 32]

```
0000  40 b0 34 96 9d b6 d4 76  ea 1a b4 0a 08 00 45 00   @·4····v ······E·
0010  00 3c c1 05 00 00 79 11  10 32 9b cf 12 d0 c0 a8   ·<····y· ·2······
0020  01 32 e2 c0 bb b0 00 28  57 e7 50 53 54 41 52 54   ·2·····( W·PSTART
0030  20 32 33 2d 31 31 2d 32  30 32 30 20 31 39 3a 34    23-11-2 020 19:4
0040  30 3a 31 31 20 50 53 54  4f 50                     0:11 PST OP
```

Figure 2: Echo response time

No.	Time	Source	Destination	Protocol	Length	Info
1	2020-11-23 19:40:03.768368594	192.168.1.50	155.207.18.208	UDP	47	48048 → 38048 Len=5
2	2020-11-23 19:40:05.420911957	155.207.18.208	192.168.1.50	UDP	74	58048 → 48048 Len=32
3	2020-11-23 19:40:05.448599969	192.168.1.50	155.207.18.208	UDP	47	48048 → 38048 Len=5
4	2020-11-23 19:40:06.553035719	155.207.18.208	192.168.1.50	UDP	74	58048 → 48048 Len=32
5	2020-11-23 19:40:06.554043532	192.168.1.50	155.207.18.208	UDP	47	48048 → 38048 Len=5
6	2020-11-23 19:40:08.677328824	155.207.18.208	192.168.1.50	UDP	74	58048 → 48048 Len=32
7	2020-11-23 19:40:08.678744345	192.168.1.50	155.207.18.208	UDP	47	48048 → 38048 Len=5
8	2020-11-23 19:40:10.160612614	155.207.18.208	192.168.1.50	UDP	74	58048 → 48048 Len=32
9	2020-11-23 19:40:10.166538398	192.168.1.50	155.207.18.208	UDP	55	48048 → 38048 Len=13
10	2020-11-23 19:40:10.545951887	155.207.18.208	192.168.1.50	UDP	1066	58048 → 48048 Len=1024
11	2020-11-23 19:40:10.583952179	155.207.18.208	192.168.1.50	UDP	1066	58048 → 48048 Len=1024
12	2020-11-23 19:40:10.621947221	155.207.18.208	192.168.1.50	UDP	1066	58048 → 48048 Len=1024
13	2020-11-23 19:40:10.659929802	155.207.18.208	192.168.1.50	UDP	1066	58048 → 48048 Len=1024
14	2020-11-23 19:40:10.698502992	155.207.18.208	192.168.1.50	UDP	1066	58048 → 48048 Len=1024
15	2020-11-23 19:40:10.736149860	155.207.18.208	192.168.1.50	UDP	1066	58048 → 48048 Len=1024
16	2020-11-23 19:40:10.774405672	155.207.18.208	192.168.1.50	UDP	1066	58048 → 48048 Len=1024
17	2020-11-23 19:40:10.812627546	155.207.18.208	192.168.1.50	UDP	1066	58048 → 48048 Len=1024
18	2020-11-23 19:40:10.850626737	155.207.18.208	192.168.1.50	UDP	1066	58048 → 48048 Len=1024
19	2020-11-23 19:40:10.888953357	155.207.18.208	192.168.1.50	UDP	1066	58048 → 48048 Len=1024
20	2020-11-23 19:40:10.926627034	155.207.18.208	192.168.1.50	UDP	1066	58048 → 48048 Len=1024
21	2020-11-23 19:40:10.965135893	155.207.18.208	192.168.1.50	UDP	1066	58048 → 48048 Len=1024
22	2020-11-23 19:40:11.003159788	155.207.18.208	192.168.1.50	UDP	1066	58048 → 48048 Len=1024
23	2020-11-23 19:40:11.041135160	155.207.18.208	192.168.1.50	UDP	1066	58048 → 48048 Len=1024
24	2020-11-23 19:40:11.079643172	155.207.18.208	192.168.1.50	UDP	1066	58048 → 48048 Len=1024

▶ Frame 9: 55 bytes on wire (440 bits), 55 bytes captured (440 bits) on interface enp2s0, id 0
▶ Ethernet II, Src: HewlettP_96:9d:b6 (40:b0:34:96:9d:b6), Dst: zte_1a:b4:0a (d4:76:ea:1a:b4:0a)
▶ Internet Protocol Version 4, Src: 192.168.1.50, Dst: 155.207.18.208
▶ User Datagram Protocol, Src Port: 48048, Dst Port: 38048
▼ Data (13 bytes)
    Data: 4d373438355544503d31303234
    [Length: 13]

```
0000  d4 76 ea 1a b4 0a 40 b0  34 96 9d b6 08 00 45 00   ·v····@· 4·····E·
0010  00 29 03 41 40 00 40 11  c7 09 c0 a8 01 32 9b cf   ·)·A@·@· ·····2··
0020  12 d0 bb b0 94 a0 00 15  a2 80 4d 37 34 38 35 55   ········ ··M7485U
0030  44 50 3d 31 30 32 34                               DP=1024
```

Figure 3: Image request code

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Figure 4: Image response data

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Figure 5: Echo request code

No.	Time	Source	Destination	Protocol	Length	Info
1	2020-11-23 20:08:46.376918801	192.168.1.50	155.207.18.208	UDP	47	48048 → 38048 Len=5
2	2020-11-23 20:08:47.578418294	155.207.18.208	192.168.1.50	UDP	74	58048 → 48048 Len=32
3	2020-11-23 20:08:47.607870575	192.168.1.50	155.207.18.208	UDP	47	48048 → 38048 Len=5
4	2020-11-23 20:08:49.185488129	155.207.18.208	192.168.1.50	UDP	74	58048 → 48048 Len=32
5	2020-11-23 20:08:49.186724649	192.168.1.50	155.207.18.208	UDP	47	48048 → 38048 Len=5
6	2020-11-23 20:08:51.477643746	155.207.18.208	192.168.1.50	UDP	74	58048 → 48048 Len=32
7	2020-11-23 20:08:51.479524734	192.168.1.50	155.207.18.208	UDP	47	48048 → 38048 Len=5
8	2020-11-23 20:08:52.672395521	155.207.18.208	192.168.1.50	UDP	74	58048 → 48048 Len=32
9	2020-11-23 20:08:52.724512185	192.168.1.50	155.207.18.208	UDP	56	48048 → 38048 Len=14
10	2020-11-23 20:08:52.756087030	155.207.18.208	192.168.1.50	UDP	174	58048 → 48048 Len=132
11	2020-11-23 20:08:52.784143631	155.207.18.208	192.168.1.50	UDP	174	58048 → 48048 Len=132
12	2020-11-23 20:08:52.812950245	155.207.18.208	192.168.1.50	UDP	174	58048 → 48048 Len=132
13	2020-11-23 20:08:52.842156930	155.207.18.208	192.168.1.50	UDP	174	58048 → 48048 Len=132
14	2020-11-23 20:08:52.871130762	155.207.18.208	192.168.1.50	UDP	174	58048 → 48048 Len=132
15	2020-11-23 20:08:52.900334153	155.207.18.208	192.168.1.50	UDP	174	58048 → 48048 Len=132
16	2020-11-23 20:08:52.929329754	155.207.18.208	192.168.1.50	UDP	174	58048 → 48048 Len=132
17	2020-11-23 20:08:52.958593145	155.207.18.208	192.168.1.50	UDP	174	58048 → 48048 Len=132
18	2020-11-23 20:08:52.987145841	155.207.18.208	192.168.1.50	UDP	174	58048 → 48048 Len=132
19	2020-11-23 20:08:53.016102052	155.207.18.208	192.168.1.50	UDP	174	58048 → 48048 Len=132
20	2020-11-23 20:08:53.045384385	155.207.18.208	192.168.1.50	UDP	174	58048 → 48048 Len=132
21	2020-11-23 20:08:53.073955482	155.207.18.208	192.168.1.50	UDP	174	58048 → 48048 Len=132
22	2020-11-23 20:08:53.103137360	155.207.18.208	192.168.1.50	UDP	174	58048 → 48048 Len=132
23	2020-11-23 20:08:53.132135200	155.207.18.208	192.168.1.50	UDP	174	58048 → 48048 Len=132
24	2020-11-23 20:08:53.160933014	155.207.18.208	192.168.1.50	UDP	174	58048 → 48048 Len=132

▶ Frame 8: 74 bytes on wire (592 bits), 74 bytes captured (592 bits) on interface enp2s0, id 0
▶ Ethernet II, Src: zte_1a:b4:0a (d4:76:ea:1a:b4:0a), Dst: HewlettP_96:9d:b6 (40:b0:34:96:9d:b6)
▶ Internet Protocol Version 4, Src: 155.207.18.208, Dst: 192.168.1.50
▶ User Datagram Protocol, Src Port: 58048, Dst Port: 48048
▼ Data (32 bytes)
  Data: 5053544152542032332d31312d323032302032303a30383a3533205053544f50
  [Length: 32]

```
0000  40 b0 34 96 9d b6 d4 76  ea 1a b4 0a 08 00 45 00   @·4····v ······E·
0010  00 3c c1 4f 00 00 79 11  0f e8 9b cf 12 d0 c0 a8   ·<·O··y· ········
0020  01 32 e2 c0 bb b0 00 28  4a f2 50 53 54 41 52 54   ·2·····( J·PSTART
0030  20 32 33 2d 31 31 2d 32  30 32 30 20 32 30 3a 30    23-11-2 020 20:0
0040  38 3a 35 33 20 50 53 54  4f 50                     8:53 PST OP
```

Figure 6: Echo response time

No.	Time	Source	Destination	Protocol	Length	Info
1	2020-11-23 20:08:46.376918801	192.168.1.50	155.207.18.208	UDP	47	48048 → 38048 Len=5
2	2020-11-23 20:08:47.578418294	155.207.18.208	192.168.1.50	UDP	74	58048 → 48048 Len=32
3	2020-11-23 20:08:47.607870575	192.168.1.50	155.207.18.208	UDP	47	48048 → 38048 Len=5
4	2020-11-23 20:08:49.185488129	155.207.18.208	192.168.1.50	UDP	74	58048 → 48048 Len=32
5	2020-11-23 20:08:49.186724649	192.168.1.50	155.207.18.208	UDP	47	48048 → 38048 Len=5
6	2020-11-23 20:08:51.477643746	155.207.18.208	192.168.1.50	UDP	74	58048 → 48048 Len=32
7	2020-11-23 20:08:51.479524734	192.168.1.50	155.207.18.208	UDP	47	48048 → 38048 Len=5
8	2020-11-23 20:08:52.672395521	155.207.18.208	192.168.1.50	UDP	74	58048 → 48048 Len=32
9	2020-11-23 20:08:52.724512185	192.168.1.50	155.207.18.208	UDP	56	48048 → 38048 Len=14
10	2020-11-23 20:08:52.756087030	155.207.18.208	192.168.1.50	UDP	174	58048 → 48048 Len=132
11	2020-11-23 20:08:52.784143631	155.207.18.208	192.168.1.50	UDP	174	58048 → 48048 Len=132
12	2020-11-23 20:08:52.812950245	155.207.18.208	192.168.1.50	UDP	174	58048 → 48048 Len=132
13	2020-11-23 20:08:52.842156930	155.207.18.208	192.168.1.50	UDP	174	58048 → 48048 Len=132
14	2020-11-23 20:08:52.871130762	155.207.18.208	192.168.1.50	UDP	174	58048 → 48048 Len=132
15	2020-11-23 20:08:52.900334153	155.207.18.208	192.168.1.50	UDP	174	58048 → 48048 Len=132
16	2020-11-23 20:08:52.929329754	155.207.18.208	192.168.1.50	UDP	174	58048 → 48048 Len=132
17	2020-11-23 20:08:52.958593145	155.207.18.208	192.168.1.50	UDP	174	58048 → 48048 Len=132
18	2020-11-23 20:08:52.987145841	155.207.18.208	192.168.1.50	UDP	174	58048 → 48048 Len=132
19	2020-11-23 20:08:53.016102052	155.207.18.208	192.168.1.50	UDP	174	58048 → 48048 Len=132
20	2020-11-23 20:08:53.045384385	155.207.18.208	192.168.1.50	UDP	174	58048 → 48048 Len=132
21	2020-11-23 20:08:53.073955482	155.207.18.208	192.168.1.50	UDP	174	58048 → 48048 Len=132
22	2020-11-23 20:08:53.103137360	155.207.18.208	192.168.1.50	UDP	174	58048 → 48048 Len=132
23	2020-11-23 20:08:53.132135200	155.207.18.208	192.168.1.50	UDP	174	58048 → 48048 Len=132
24	2020-11-23 20:08:53.160933014	155.207.18.208	192.168.1.50	UDP	174	58048 → 48048 Len=132

▶ Frame 9: 56 bytes on wire (448 bits), 56 bytes captured (448 bits) on interface enp2s0, id 0
▶ Ethernet II, Src: HewlettP_96:9d:b6 (40:b0:34:96:9d:b6), Dst: zte_1a:b4:0a (d4:76:ea:1a:b4:0a)
▶ Internet Protocol Version 4, Src: 192.168.1.50, Dst: 155.207.18.208
▶ User Datagram Protocol, Src Port: 48048, Dst Port: 38048
▼ Data (14 bytes)
  Data: 4c3232413131383241514635303030
  [Length: 14]

```
0000  d4 76 ea 1a b4 0a 40 b0  34 96 9d b6 08 00 45 00   ·v····@· 4·····E·
0010  00 2a a8 43 40 00 40 11  22 06 c0 a8 01 32 9b cf   ·*·C@·@· "····2··
0020  12 d0 bb b0 94 a0 00 16  9f 69 4c 32 32 41 31 31   ········ ·iL22A11
0030  38 32 41 51 46 35 30 30                            82AQF500
```

Figure 7: Audio request code

Figure 8: Audio response data

3 Ithakicopter TCP version

Αξίζει να σημειωθεί ότι στο input stream , τη στιγμή δημιουργίας TCP socket, δέχομαστε δεδομένα (οδηγίες χρήσης σχετικά με το format του μηνύματος αποστολής για να ληφθούν δεδομένα), προτού γράψουμε κάτι στο output stream. Ενδεικτικά δείχνουμε στο capture (Figure 12) την ωφέλιμη πληροφορία.
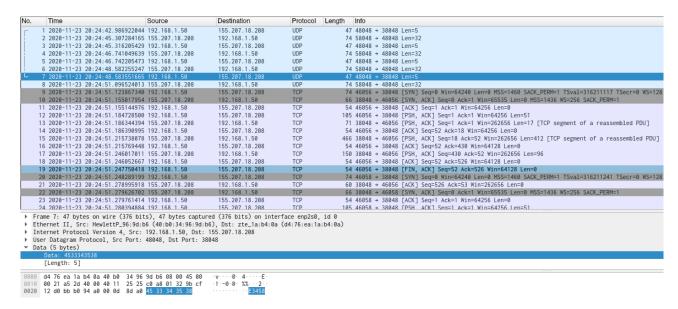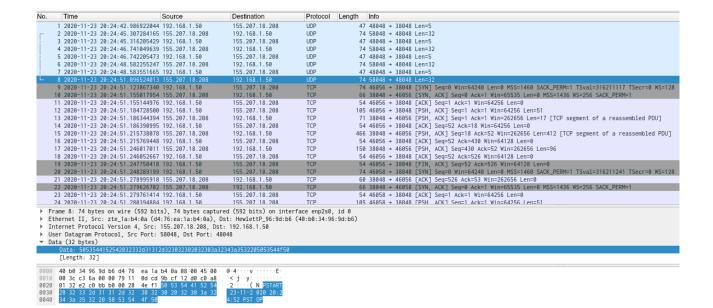

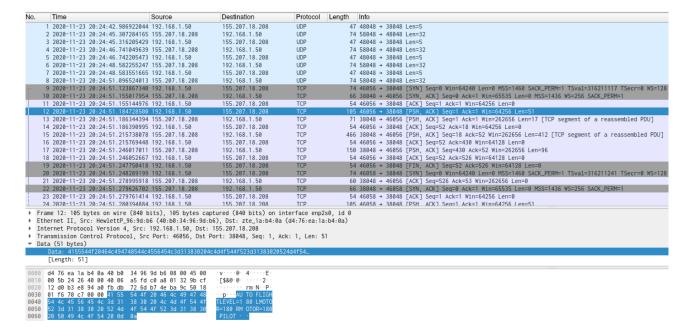Figure 9: Echo request code

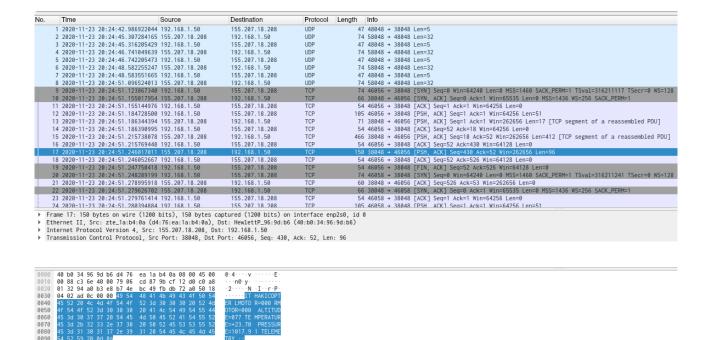Figure 10: Echo response time

Figure 11: Copter output stream

Figure 12: Copter input stream

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Figure 13: Echo request code

Figure 14: Echo response time

Figure 15: Vehicle output stream

Figure 16: Vehicle input stream