

3η Σειρά  
Ασκήσεων  
Δίκτυα  
Υπολογιστών

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Ομάδα χρηστών στο Eclass: 860

# Άσκηση 1

1.1 Η φωτογραφία την οποία επιλέξαμε φαίνεται στο λινκ:

[http://mscis.cs.aueb.gr//admin/dsContent/UserData/97316/0001%20\(19\).jpg](http://mscis.cs.aueb.gr//admin/dsContent/UserData/97316/0001%20(19).jpg)

1.2 Πετυχημένη λήψη με την εντολή wget.

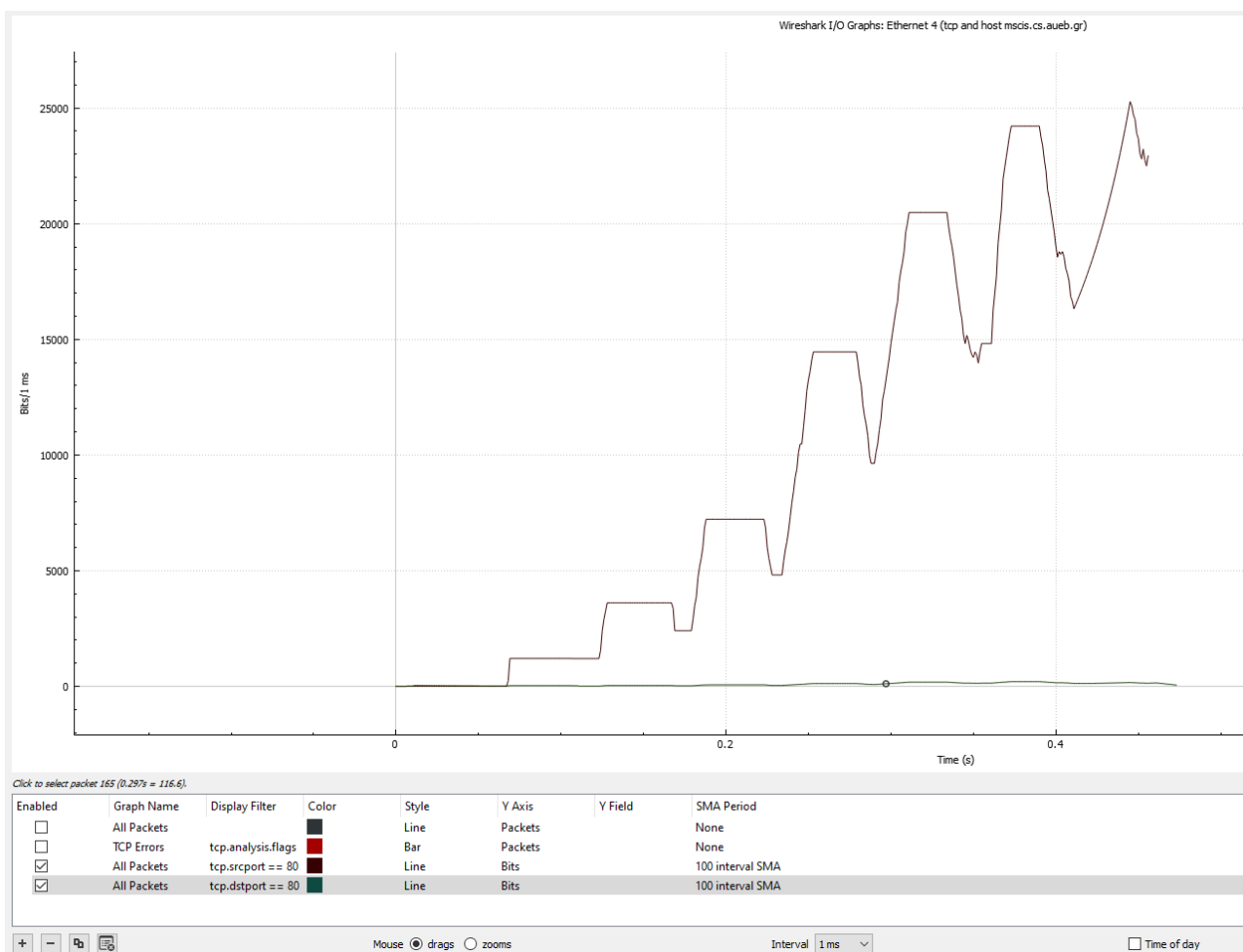
```
Command Prompt
C:\Program Files (x86)\GnuWin32\bin>wget http://mscis.cs.aueb.gr//admin/dsContent/UserData/97316/0001%20(19).jpg
SYSTEM_WGETRC = c:/program~1/wget/etc/wgetrc
syswgetrc = C:\Program Files (x86)\GnuWin32/etc/wgetrc
--2021-05-23 17:15:59-- http://mscis.cs.aueb.gr//admin/dsContent/UserData/97316/0001%20(19).jpg
Resolving mscis.cs.aueb.gr... 77.235.42.198
Connecting to mscis.cs.aueb.gr|77.235.42.198|:80... connected.
HTTP request sent, awaiting response... 200 OK
Length: 536997 (524K) [image/jpeg]
Saving to: `0001 (19).jpg.1'

100%[=====] 536,997 1.62M/s in 0.3s

2021-05-23 17:16:00 (1.62 MB/s) - `0001 (19).jpg.1' saved [536997/536997]

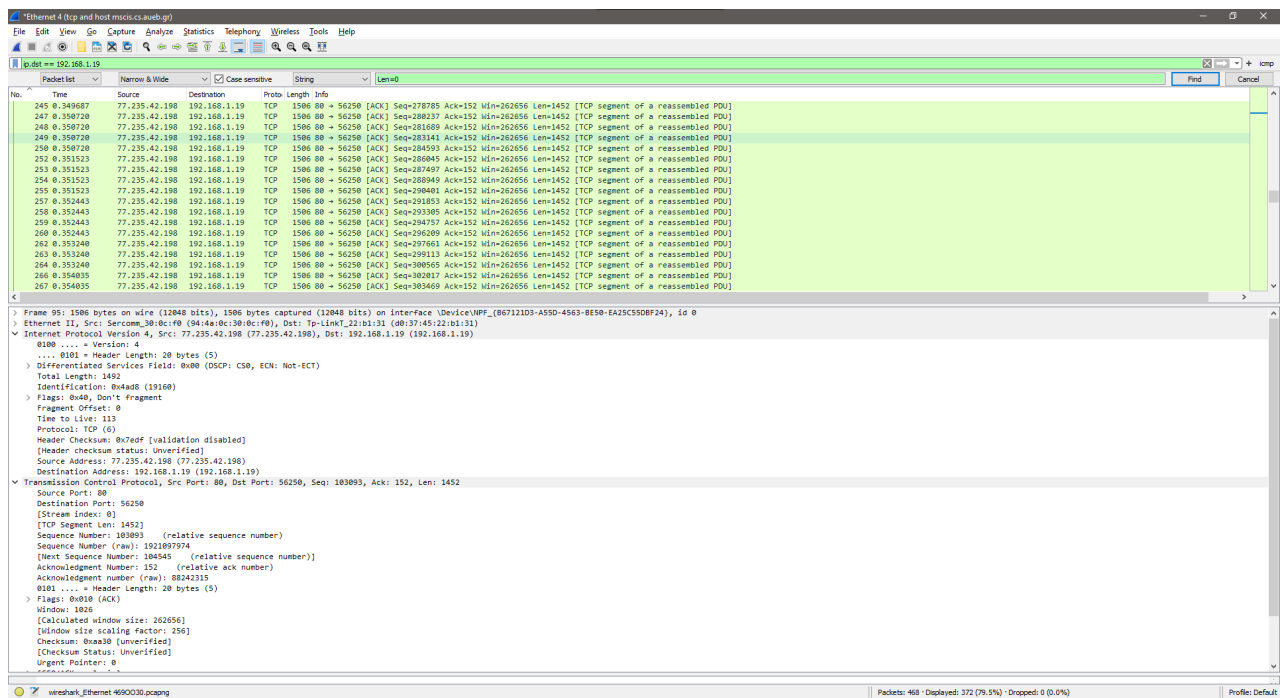
C:\Program Files (x86)\GnuWin32\bin>
```

1.6

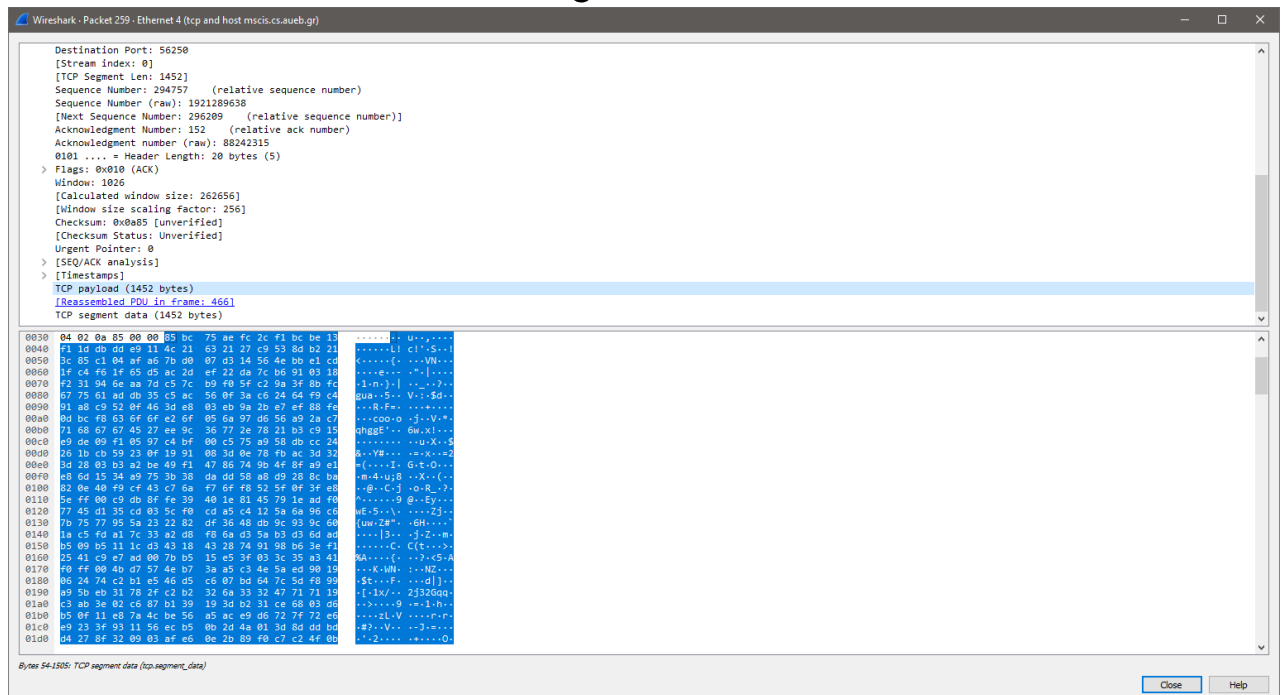


1.6-a. Ο ρυθμός λήψης δεδομένων είναι 990 segments/second και 25274000 bits/second.

1.6-b. Για να βρούμε το ποσοστό ρυθμού λήψης του περιεχομένου αναζητήσαμε βάση της IP, όταν είναι η δικιά μας διεύθυνση στο ipdst τότε είναι αυτά τα πακέτα που στέλλονται σε εμάς άρα και η λήψη του περιεχομένου. Από τα 468 πακέτα στη λήψη του περιεχομένου συμμετέχουν τα 372 δηλαδή το 79.5%.



Όπως φαίνετε μπορούμε να δούμε το ωφέλιμο φορτίο ενός TCP πακέτου και είναι 1452 bytes





1.6-c. Για να βρούμε τα πακέτα που έχουν ACK φιλτράρουμε βάση tcp and !tcp.len = 0, από τα 468 πακέτα εμφανίζονται 372 πακέτα και ο ρυθμός των ACK πακέτων είναι 787 packet/second και ο ρυθμός αποστολής δεδομένων είναι 9141792 bits/second.

No.	Time	Source	Destination	Proto	Length	Info
121	0.289623	77.235.42.198	192.168.1.19	TCP	1500	80 → 56250 [ACK] Seq=135585 Ack=152 Win=262656 Len=0 [TCP segment of a reassembled PDU]
122	0.289623	77.235.42.198	192.168.1.19	TCP	1500	80 → 56250 [PSH, ACK] Seq=135837 Ack=152 Win=262656 Len=1452 [TCP segment of a reassembled PDU]
123	0.289623	77.235.42.198	192.168.1.19	TCP	1500	80 → 56250 [ACK] Seq=136489 Ack=152 Win=262656 Len=1452 [TCP segment of a reassembled PDU]
124	0.289623	77.235.42.198	192.168.1.19	TCP	1500	80 → 56250 [ACK] Seq=137941 Ack=152 Win=262656 Len=1452 [TCP segment of a reassembled PDU]
126	0.290452	77.235.42.198	192.168.1.19	TCP	1500	80 → 56250 [ACK] Seq=139393 Ack=152 Win=262656 Len=1452 [TCP segment of a reassembled PDU]
127	0.290452	77.235.42.198	192.168.1.19	TCP	1500	80 → 56250 [ACK] Seq=140845 Ack=152 Win=262656 Len=1452 [TCP segment of a reassembled PDU]
128	0.290452	77.235.42.198	192.168.1.19	TCP	1500	80 → 56250 [ACK] Seq=142297 Ack=152 Win=262656 Len=1452 [TCP segment of a reassembled PDU]
129	0.290452	77.235.42.198	192.168.1.19	TCP	1500	80 → 56250 [ACK] Seq=143749 Ack=152 Win=262656 Len=1452 [TCP segment of a reassembled PDU]
131	0.291531	77.235.42.198	192.168.1.19	TCP	1500	80 → 56250 [ACK] Seq=145201 Ack=152 Win=262656 Len=1452 [TCP segment of a reassembled PDU]
132	0.291531	77.235.42.198	192.168.1.19	TCP	1500	80 → 56250 [ACK] Seq=146653 Ack=152 Win=262656 Len=1452 [TCP segment of a reassembled PDU]
133	0.291531	77.235.42.198	192.168.1.19	TCP	1500	80 → 56250 [ACK] Seq=148105 Ack=152 Win=262656 Len=1452 [TCP segment of a reassembled PDU]
134	0.291531	77.235.42.198	192.168.1.19	TCP	1500	80 → 56250 [ACK] Seq=149557 Ack=152 Win=262656 Len=1452 [TCP segment of a reassembled PDU]
135	0.291531	77.235.42.198	192.168.1.19	TCP	1500	80 → 56250 [ACK] Seq=151009 Ack=152 Win=262656 Len=1452 [TCP segment of a reassembled PDU]
137	0.292460	77.235.42.198	192.168.1.19	TCP	1500	80 → 56250 [ACK] Seq=152461 Ack=152 Win=262656 Len=1452 [TCP segment of a reassembled PDU]
138	0.292460	77.235.42.198	192.168.1.19	TCP	1500	80 → 56250 [ACK] Seq=153913 Ack=152 Win=262656 Len=1452 [TCP segment of a reassembled PDU]
139	0.292460	77.235.42.198	192.168.1.19	TCP	1500	80 → 56250 [ACK] Seq=155365 Ack=152 Win=262656 Len=1452 [TCP segment of a reassembled PDU]
141	0.293633	77.235.42.198	192.168.1.19	TCP	1500	80 → 56250 [ACK] Seq=156817 Ack=152 Win=262656 Len=1452 [TCP segment of a reassembled PDU]
142	0.293633	77.235.42.198	192.168.1.19	TCP	1500	80 → 56250 [ACK] Seq=158269 Ack=152 Win=262656 Len=1452 [TCP segment of a reassembled PDU]
143	0.293633	77.235.42.198	192.168.1.19	TCP	1500	80 → 56250 [ACK] Seq=159721 Ack=152 Win=262656 Len=1452 [TCP segment of a reassembled PDU]
144	0.293633	77.235.42.198	192.168.1.19	TCP	1500	80 → 56250 [ACK] Seq=161173 Ack=152 Win=262656 Len=1452 [TCP segment of a reassembled PDU]
145	0.293633	77.235.42.198	192.168.1.19	TCP	1500	80 → 56250 [ACK] Seq=162625 Ack=152 Win=262656 Len=1452 [TCP segment of a reassembled PDU]
146	0.293633	77.235.42.198	192.168.1.19	TCP	1500	80 → 56250 [ACK] Seq=164077 Ack=152 Win=262656 Len=1452 [TCP segment of a reassembled PDU]
148	0.294716	77.235.42.198	192.168.1.19	TCP	1500	80 → 56250 [ACK] Seq=165529 Ack=152 Win=262656 Len=1452 [TCP segment of a reassembled PDU]
149	0.294716	77.235.42.198	192.168.1.19	TCP	1500	80 → 56250 [ACK] Seq=166981 Ack=152 Win=262656 Len=1452 [TCP segment of a reassembled PDU]
150	0.294716	77.235.42.198	192.168.1.19	TCP	1500	80 → 56250 [ACK] Seq=168433 Ack=152 Win=262656 Len=1452 [TCP segment of a reassembled PDU]
152	0.296428	77.235.42.198	192.168.1.19	TCP	1500	80 → 56250 [ACK] Seq=169885 Ack=152 Win=262656 Len=1452 [TCP segment of a reassembled PDU]
153	0.296428	77.235.42.198	192.168.1.19	TCP	1500	80 → 56250 [ACK] Seq=171337 Ack=152 Win=262656 Len=1452 [TCP segment of a reassembled PDU]
154	0.296428	77.235.42.198	192.168.1.19	TCP	1500	80 → 56250 [ACK] Seq=172789 Ack=152 Win=262656 Len=1452 [TCP segment of a reassembled PDU]
155	0.296428	77.235.42.198	192.168.1.19	TCP	1500	80 → 56250 [ACK] Seq=174241 Ack=152 Win=262656 Len=1452 [TCP segment of a reassembled PDU]
156	0.296428	77.235.42.198	192.168.1.19	TCP	1500	80 → 56250 [ACK] Seq=175693 Ack=152 Win=262656 Len=1452 [TCP segment of a reassembled PDU]
157	0.296428	77.235.42.198	192.168.1.19	TCP	1500	80 → 56250 [ACK] Seq=177145 Ack=152 Win=262656 Len=1452 [TCP segment of a reassembled PDU]
159	0.297157	77.235.42.198	192.168.1.19	TCP	1500	80 → 56250 [ACK] Seq=178597 Ack=152 Win=262656 Len=1452 [TCP segment of a reassembled PDU]
160	0.297157	77.235.42.198	192.168.1.19	TCP	1500	80 → 56250 [ACK] Seq=180049 Ack=152 Win=262656 Len=1452 [TCP segment of a reassembled PDU]

> Frame 134: 1506 bytes on wire (12048 bits), 1506 bytes captured (12048 bits) on Interface DeviceWPF\_{B67121D3-A550-4563-BE56-EA25C550BF24}, id 0  
> Ethernet II, Src: Sercom\_38:0C:F8 (94:4A:0C:38:0C:F8), Dst: Tp-LinkT\_22:01:31 (08:37:45:12:01:31)  
> Internet Protocol Version 4, Src: 77.235.42.198 (77.235.42.198), Dst: 192.168.1.19 (192.168.1.19)  
0100 .... : Version: 4  
... 0101 = Header Length: 20 bytes (5)  
0 Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)  
Total Length: 1492  
Identification: 0x4af0 (19195)  
Flags: 0x00, Don't Fragment  
Fragment Offset: 0  
Time to Live: 113  
Protocol: TCP (6)  
Header Checksum: 0x7ebc [validation disabled]  
[Header checksum Unverified]  
Source Address: 77.235.42.198 (77.235.42.198)  
Destination Address: 192.168.1.19 (192.168.1.19)  
> Transmission Control Protocol, Src Port: 80, Dst Port: 56250, Seq: 149557, Ack: 152, Len: 1452  
Source Port: 80  
Destination Port: 56250  
[Stream Index: 0]

Flags (2 bits) (p-Flag), 1 byte

Packets: 468 · Displayed: 372 (79.5%) · Dropped: 0 (0.0%)

Profile: Default

1.6-d. Φαίνονται τα Delay ACKs όπως αναφέρεται στην εκφώνηση. Στο sequence number φαίνεται η τιμή ακολουθίας στο next sequence φαίνεται η επόμενη τιμή του πακέτου που πρέπει να ακολουθεί και στο Acknowledgment Number φαίνεται η επόμενη τιμή του πακέτου επιβεβαίωσης.

No.	Time	Source	Destination	Proto	Length	Info
445	0.451097	192.168.1.19	77.235.42.198	TCP	54	56250 → 80 [ACK] Seq=152 Ack=514089 Win=1059848 Len=0
446	0.451097	77.235.42.198	192.168.1.19	TCP	1500	80 → 56250 [ACK] Seq=514089 Ack=152 Win=262656 Len=1452 [TCP segment of a reassembled PDU]
447	0.451097	77.235.42.198	192.168.1.19	TCP	1500	80 → 56250 [ACK] Seq=515461 Ack=152 Win=262656 Len=1452 [TCP segment of a reassembled PDU]
448	0.451097	77.235.42.198	192.168.1.19	TCP	1500	80 → 56250 [ACK] Seq=516913 Ack=152 Win=262656 Len=1452 [TCP segment of a reassembled PDU]
449	0.451721	192.168.1.19	77.235.42.198	TCP	54	56250 → 80 [ACK] Seq=518365 Ack=152 Win=1059848 Len=0
450	0.452736	77.235.42.198	192.168.1.19	TCP	1500	80 → 56250 [ACK] Seq=518365 Ack=152 Win=262656 Len=1452 [TCP segment of a reassembled PDU]
451	0.452736	77.235.42.198	192.168.1.19	TCP	1500	80 → 56250 [ACK] Seq=519817 Ack=152 Win=262656 Len=1452 [TCP segment of a reassembled PDU]
452	0.452736	77.235.42.198	192.168.1.19	TCP	1500	80 → 56250 [ACK] Seq=521269 Ack=152 Win=262656 Len=1452 [TCP segment of a reassembled PDU]
453	0.452791	192.168.1.19	77.235.42.198	TCP	54	56250 → 80 [ACK] Seq=522721 Ack=152 Win=1059848 Len=0
454	0.453922	77.235.42.198	192.168.1.19	TCP	1500	80 → 56250 [ACK] Seq=524173 Ack=152 Win=262656 Len=1452 [TCP segment of a reassembled PDU]
455	0.453922	77.235.42.198	192.168.1.19	TCP	1500	80 → 56250 [ACK] Seq=525625 Ack=152 Win=262656 Len=1452 [TCP segment of a reassembled PDU]
456	0.453922	77.235.42.198	192.168.1.19	TCP	1500	80 → 56250 [ACK] Seq=527077 Ack=152 Win=262656 Len=1452 [TCP segment of a reassembled PDU]
457	0.453922	77.235.42.198	192.168.1.19	TCP	1500	80 → 56250 [ACK] Seq=528529 Ack=152 Win=262656 Len=1452 [TCP segment of a reassembled PDU]
458	0.454098	77.235.42.198	192.168.1.19	TCP	1500	80 → 56250 [ACK] Seq=529981 Ack=152 Win=262656 Len=1452 [TCP segment of a reassembled PDU]
459	0.454098	77.235.42.198	192.168.1.19	TCP	1500	80 → 56250 [ACK] Seq=531433 Ack=152 Win=262656 Len=1452 [TCP segment of a reassembled PDU]
460	0.454098	77.235.42.198	192.168.1.19	TCP	1500	80 → 56250 [ACK] Seq=532885 Ack=152 Win=262656 Len=1452 [TCP segment of a reassembled PDU]
461	0.454098	77.235.42.198	192.168.1.19	TCP	1500	80 → 56250 [ACK] Seq=534337 Ack=152 Win=262656 Len=1452 [TCP segment of a reassembled PDU]
462	0.454771	192.168.1.19	77.235.42.198	TCP	54	56250 → 80 [ACK] Seq=535789 Ack=152 Win=1059848 Len=0
463	0.455141	77.235.42.198	192.168.1.19	TCP	1500	80 → 56250 [ACK] Seq=537241 Ack=152 Win=262656 Len=1452 [TCP segment of a reassembled PDU]
464	0.455141	77.235.42.198	192.168.1.19	TCP	1500	80 → 56250 [ACK] Seq=538693 Ack=152 Win=262656 Len=1452 [TCP segment of a reassembled PDU]
465	0.455141	77.235.42.198	192.168.1.19	TCP	1500	80 → 56250 [ACK] Seq=540145 Ack=152 Win=262656 Len=1452 [TCP segment of a reassembled PDU]
466	0.455141	77.235.42.198	192.168.1.19	TCP	1500	80 → 56250 [ACK] Seq=541597 Ack=152 Win=262656 Len=1452 [TCP segment of a reassembled PDU]
467	0.455141	77.235.42.198	192.168.1.19	TCP	1500	80 → 56250 [ACK] Seq=543049 Ack=152 Win=262656 Len=1452 [TCP segment of a reassembled PDU]
468	0.473278	192.168.1.19	77.235.42.198	TCP	54	56250 → 80 [ACK] Seq=537241 Ack=152 Win=1059848 Len=0

> Frame 466: 87 bytes on wire (696 bits), 87 bytes captured (696 bits) on Interface DeviceWPF\_{B67121D3-A550-4563-BE56-EA25C550BF24}, id 0  
> Ethernet II, Src: Sercom\_38:0C:F8 (94:4A:0C:38:0C:F8), Dst: Tp-LinkT\_22:01:31 (08:37:45:12:01:31)  
> Internet Protocol Version 4, Src: 77.235.42.198 (77.235.42.198), Dst: 192.168.1.19 (192.168.1.19)  
> Transmission Control Protocol, Src Port: 80, Dst Port: 56250, Seq: 537241, Ack: 152, Len: 33  
Source Port: 80  
Destination Port: 56250  
[Stream Index: 0]  
[TCP Segment Len: 33]  
Sequence Number: 537241 (relative sequence number)  
Sequence Number (raw): 1921532122  
[Next Sequence Number: 537274 (relative sequence number)]  
Acknowledgment Number: 152 (relative ack number)  
Acknowledgment number (raw): 88242315  
0101 .... : Header Length: 20 bytes (5)  
Flags: 0x018 (PSH, ACK)  
Window: 1826  
[Calculated window size: 262656]  
[Window size scaling factor: 256]  
Checksum: 0x243b [unverified]  
[Checksum Status: Unverified]  
Urgent Pointer: 0  
> [SEQ/ACK analysis]  
> [Timestamps]  
TCP payload (33 bytes)  
TCP segment data (33 bytes)  
> [371] Reassembled TCP Segments (537273 bytes): #5(1452), #6(1452), #8(1452), #9(1452), #10(1452), #11(1452), #12(1452), #14(1452), #15(1452), #16(1452), #18(1452), #19(1452), #20(1452), #22(1452), #23(1452), #24(1452), #25(1452), #27(1452), ]  
> [Bytes Received: 372 (80.0%)]  
> [Bytes Transmitted: 372 (80.0%)]  
> [JPG File Interchange Format]

Frame 466 (87 bytes) · Reassembled TCP Segments (537273 bytes)

Flags: 0x018 (PSH, ACK)

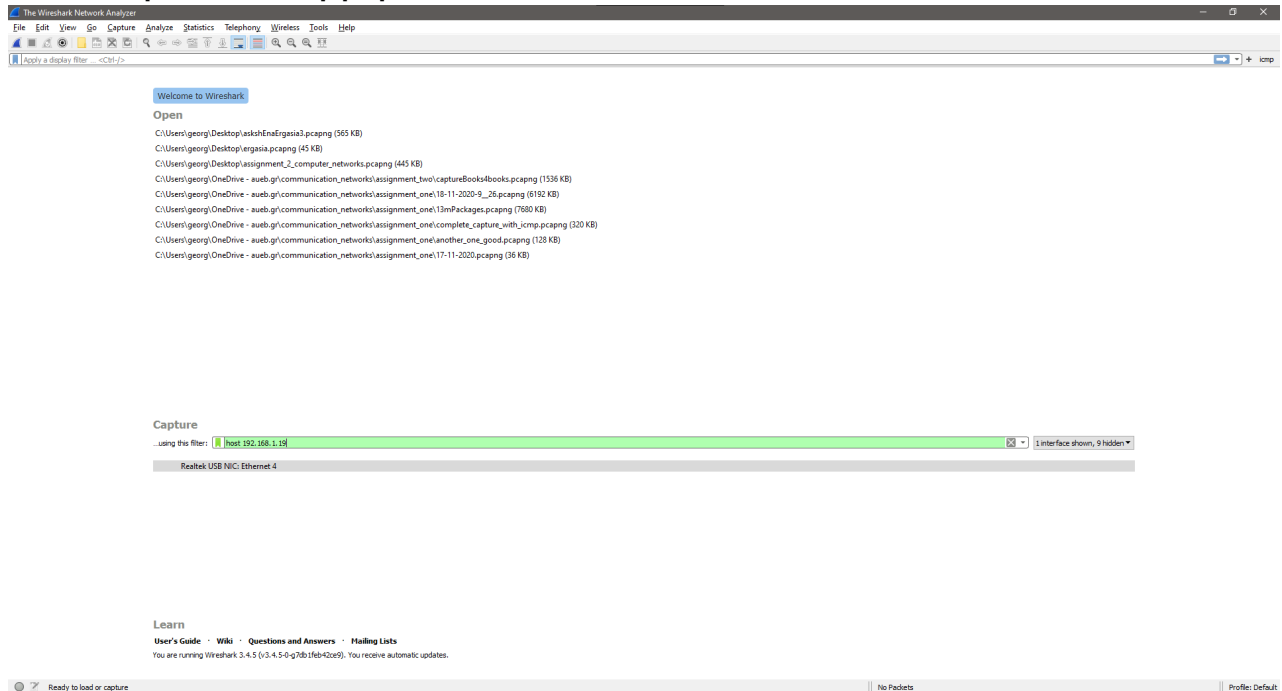
Acknowledgment Number (tcp.ack), 4 bytes

Packets: 468 · Displayed: 468 (100.0%) · Dropped: 0 (0.0%)

Profile: Default

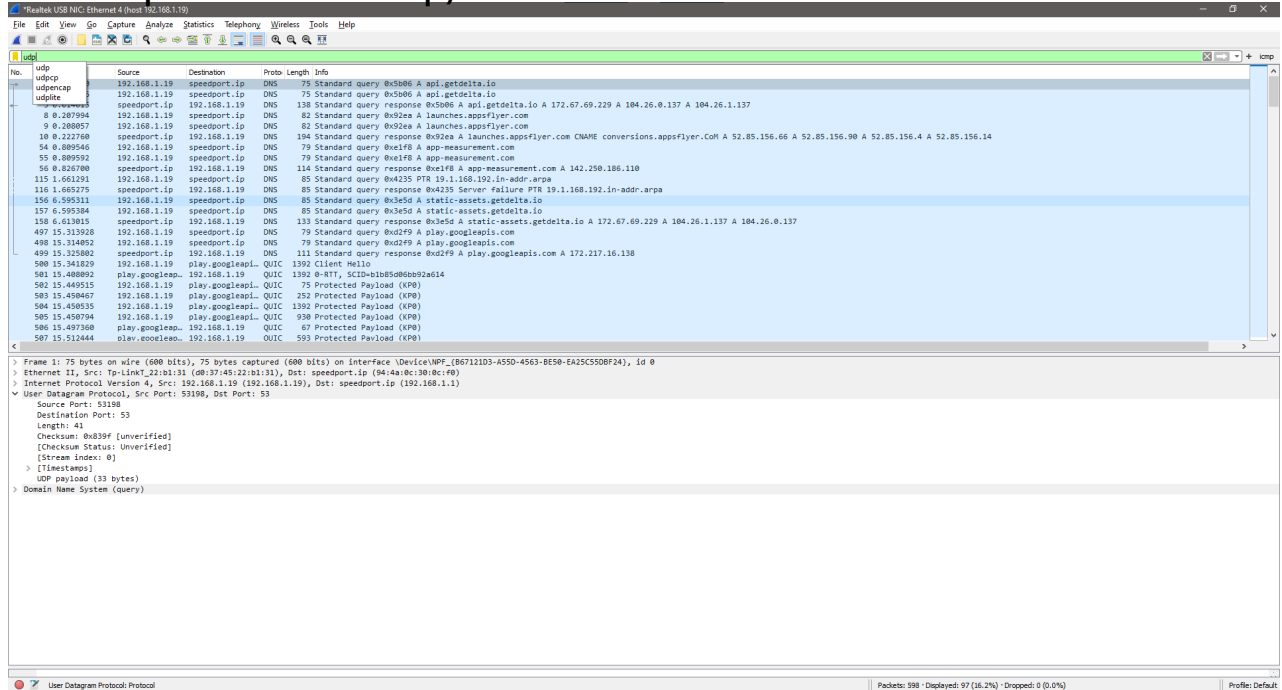
# Άσκηση 2

## α. Φίλτρο σύλληψης.



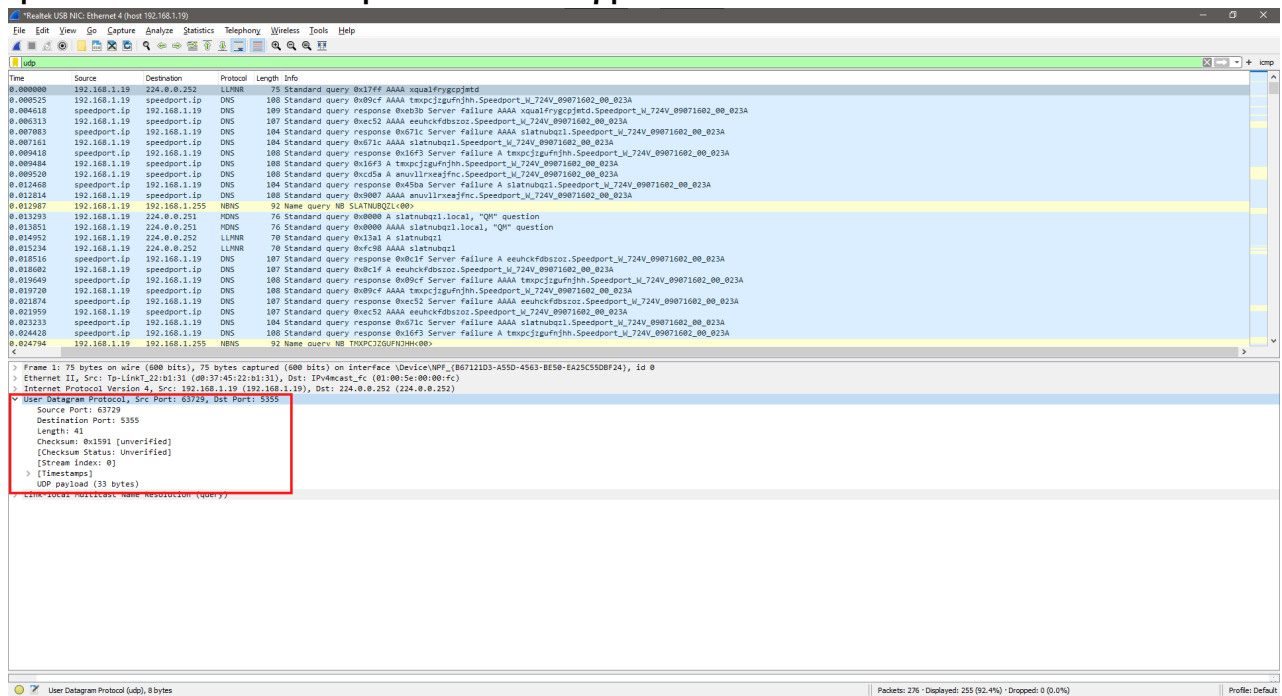
The Wireshark Network Analyzer interface is shown. The top menu bar includes File, Edit, View, Go, Capture, Analyze, Statistics, Telephony, Wireless, Tools, and Help. The main window displays the 'Welcome to Wireshark' dialog, which lists several capture files and their sizes. Below this, the 'Capture' section shows a list of network interfaces, with 'Realtek USB N/C Ethernet 4' selected. The 'Learn' section provides links to the User's Guide, Wiki, Questions and Answers, and Training Lists.

## β. Φίλτρο απεικόνισης.



The Wireshark Network Analyzer interface is shown, displaying a packet capture on the 'Realtek USB N/C Ethernet 4' interface. The packet list shows a series of DNS queries and responses. The packet details pane shows the structure of a DNS query, including the domain name system (query) and the user datagram protocol (UDP) payload.

c. Τα ονόματα και μήκη των πεδίων της επικεφαλίδας φαίνονται στο παρακάτω στιγμιότυπο.



d. Όπως φαίνεται στο παραπάνω στιγμιότυπο το μέγεθος είναι 41 και το payload είναι 33 άρα το μέγεθος της επικεφαλίδας του UDP είναι 8 bytes.

e. Όπως φαίνεται παρακάτω είναι UDP(17).

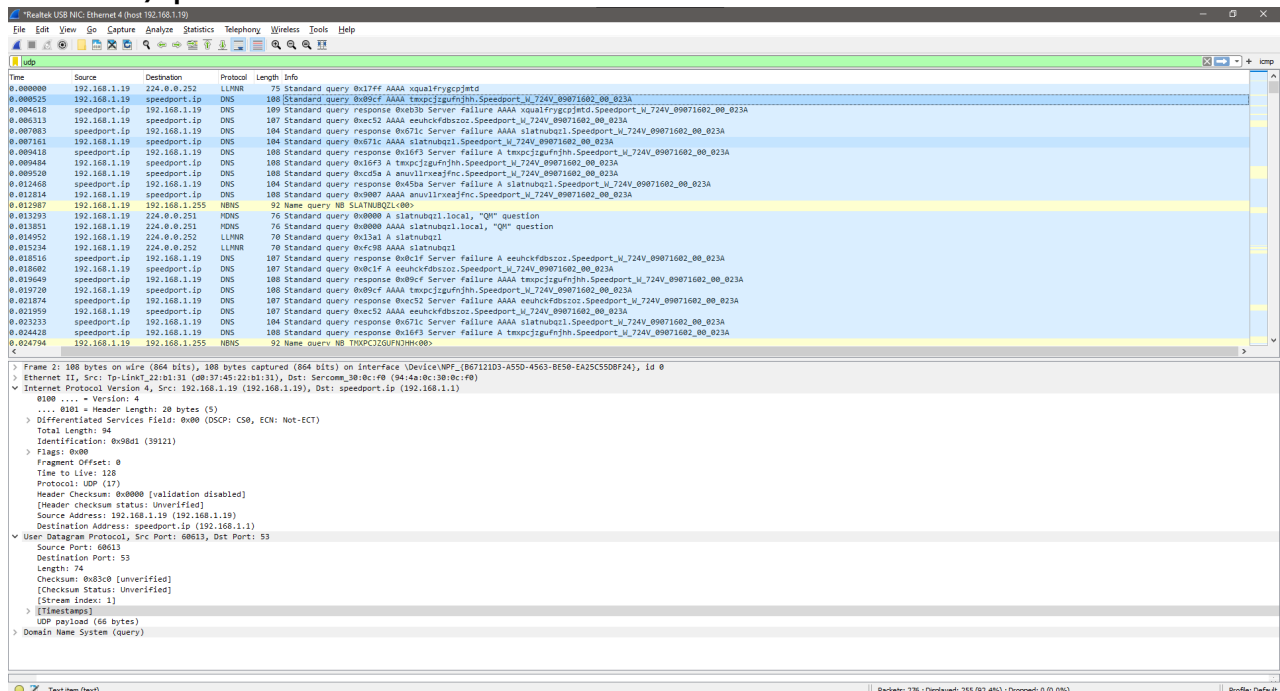
```
Internet Protocol Version 4, Src: 192.168.1.19 (192.168.1.19), Dst: 224.0.0.252 (224.0.0.252)
  0100 .... = Version: 4
  .... 0101 = Header Length: 20 bytes (5)
  > Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)
    Total Length: 61
    Identification: 0x052c (1324)
  > Flags: 0x00
    Fragment Offset: 0
    Time to Live: 1
  Protocol: UDP (17)
  Header Checksum: 0x0000 [validation disabled]
  [Header checksum status: Unverified]
  Source Address: 192.168.1.19 (192.168.1.19)
  Destination Address: 224.0.0.252 (224.0.0.252)
```

f. Το μέγεθος του τμήματος αυτού είναι 41 bytes.

g. Το πεδίο μήκους καθορίζει τον αριθμό των byte στο τμήμα UDP (κεφαλίδα συν δεδομένα).

h. Ο μέγιστος αριθμός byte που μπορούν να συμπεριληφθούν σε ωφέλιμο φορτίο UDP είναι  $(2^{16} - 1)$  byte plus τα byte κεφαλίδας. Αυτό δίνει  $65535 \text{ bytes} - 8 \text{ bytes} = 65527 \text{ bytes}$ .

## i. Όπως φαίνεται IP, στο πεδίο Protocol είναι το UDP.



Time	Source	Destination	Protocol	Length	Info
0.000000	192.168.1.19	224.0.0.252	LLMNR	75	Standard query 0x17ff AAAA txmxcjzgfufnjhh.Speedport_W_724V_09071602_00_023A
0.000525	192.168.1.19	speedport.ip	DNS	100	Standard query 0x09cf AAAA txmxcjzgfufnjhh.Speedport_W_724V_09071602_00_023A
0.004618	speedport.ip	192.168.1.19	DNS	100	Standard query response 0xb3b Server failure AAAA txmxcjzgfufnjhh.Speedport_W_724V_09071602_00_023A
0.005133	192.168.1.19	speedport.ip	DNS	107	Standard query 0xec53 AAAA euehckfbdsoz.Speedport_W_724V_09071602_00_023A
0.007083	speedport.ip	192.168.1.19	DNS	104	Standard query response 0x571c Server failure AAAA slatnubqll.Speedport_W_724V_09071602_00_023A
0.007161	192.168.1.19	speedport.ip	DNS	104	Standard query 0xb71c AAAA slatnubqll.Speedport_W_724V_09071602_00_023A
0.009418	speedport.ip	192.168.1.19	DNS	100	Standard query response 0x16f3 Server failure A txmxcjzgfufnjhh.Speedport_W_724V_09071602_00_023A
0.009484	192.168.1.19	speedport.ip	DNS	100	Standard query 0x16f3 A txmxcjzgfufnjhh.Speedport_W_724V_09071602_00_023A
0.009520	192.168.1.19	speedport.ip	DNS	100	Standard query 0xcdda A anuvllrxexjfc.Speedport_W_724V_09071602_00_023A
0.012408	speedport.ip	192.168.1.19	DNS	104	Standard query response 0x5b0a Server failure A slatnubqll.Speedport_W_724V_09071602_00_023A
0.012814	192.168.1.19	speedport.ip	DNS	100	Standard query 0x9007 AAAA anuvllrxexjfc.Speedport_W_724V_09071602_00_023A
0.012987	192.168.1.19	192.168.1.255	NBNS	92	Name query NB SLATNUBQLL<0>
0.013293	192.168.1.19	224.0.0.251	MDNS	70	Standard query 0x0000 A slatnubqll.local, "QI" question
0.013851	192.168.1.19	224.0.0.251	MDNS	70	Standard query 0x0000 AAAA slatnubqll.local, "QI" question
0.014952	192.168.1.19	224.0.0.252	LLMNR	70	Standard query 0x13a1 A slatnubqll
0.015234	192.168.1.19	224.0.0.252	LLMNR	70	Standard query 0xfcd0 AAAA slatnubqll
0.015516	speedport.ip	192.168.1.19	DNS	107	Standard query response 0xbcf Server failure A euehckfbdsoz.Speedport_W_724V_09071602_00_023A
0.016682	192.168.1.19	speedport.ip	DNS	107	Standard query 0xbcf A euehckfbdsoz.Speedport_W_724V_09071602_00_023A
0.016689	speedport.ip	192.168.1.19	DNS	100	Standard query response 0xbcf Server failure AAAA txmxcjzgfufnjhh.Speedport_W_724V_09071602_00_023A
0.019720	192.168.1.19	speedport.ip	DNS	100	Standard query 0x09cf AAAA txmxcjzgfufnjhh.Speedport_W_724V_09071602_00_023A
0.021874	speedport.ip	192.168.1.19	DNS	107	Standard query response 0xec52 Server failure AAAA euehckfbdsoz.Speedport_W_724V_09071602_00_023A
0.021959	192.168.1.19	speedport.ip	DNS	107	Standard query 0xec52 AAAA euehckfbdsoz.Speedport_W_724V_09071602_00_023A
0.023233	speedport.ip	192.168.1.19	DNS	104	Standard query response 0x571c Server failure AAAA slatnubqll.Speedport_W_724V_09071602_00_023A
0.024428	speedport.ip	192.168.1.19	DNS	100	Standard query response 0x16f3 Server failure A txmxcjzgfufnjhh.Speedport_W_724V_09071602_00_023A
0.024734	192.168.1.19	192.168.1.255	NBNS	92	Name query NB TXMPCJZGUFNJHH<0>

Frame 2: 100 bytes on wire (800 bits), 100 bytes captured (800 bits) on interface \Device\NPF\_{B07121D3-A550-4563-BE50-EA25C550B2F4}, id 0  
> Ethernet II, Src: Tp-Lint\_221b131 (08:17:45:12:1b:13), Dst: Sercom\_3018c1f0 (04:4a:8c:18:04:c0)  
Internet Protocol Version 4, Src: 192.168.1.19 (192.168.1.19), Dst: speedport.ip (192.168.1.1)  
0100 .... \* Version: 4  
.... 0101 \* Header Length: 20 bytes (5)  
> Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)  
Total Length: 94  
Identification: 0x06d1 (39121)  
> Flags: 0x00  
Fragment Offset: 0  
Time to Live: 128  
Protocol: UDP (17)  
Header Checksum: 0x0000 [validation disabled]  
[Header checksum status: Unverified]  
Source Address: 192.168.1.19 (192.168.1.19)  
Destination Address: speedport.ip (192.168.1.1)  
User Datagram Protocol, Src Port: 60613, Dst Port: 53  
Source Port: 60613  
Destination Port: 53  
Length: 74  
Checksum: 0x83c0 [unverified]  
[Checksum Status: Unverified]  
[Stream index: 1]  
> [Timestamps]  
UDP payload (66 bytes)  
Domain Name System (query)  
Transaction ID: 0x09cf  
> Flags: 0x0100 Standard query  
Questions: 1  
Answer RRs: 0  
Authority RRs: 0  
Additional RRs: 0  
Queries  
> txmxcjzgfufnjhh.Speedport\_W\_724V\_09071602\_00\_023A: type AAAA, class IN  
Name: txmxcjzgfufnjhh.Speedport\_W\_724V\_09071602\_00\_023A  
[Name Length: 48]  
[Label Count: 2]  
Type: AAAA (IPv6 Address) (28)  
Class: IN (0x0001)  
[\[Response In: 19\]](#)

j. Η IP του DNS όπως φαίνεται παραπάνω είναι το speedport.ip με ip = 192.168.1.1 δηλαδή η διεύθυνση του τοπικού δικτύου μας που μεσολαβεί με τον έξω κόσμο.

κ. Στο παρακάτω στιγμιότυπο φαίνεται πως είναι DNS για εγγραφή τύπου A και το Destination port είναι 53.

▼ User Datagram Protocol, Src Port: 60613, Dst Port: 53  
Source Port: 60613  
Destination Port: 53  
Length: 74  
Checksum: 0x83c0 [unverified]  
[Checksum Status: Unverified]  
[Stream index: 1]  
> [Timestamps]  
UDP payload (66 bytes)  
▼ Domain Name System (query)  
Transaction ID: 0x09cf  
> Flags: 0x0100 Standard query  
Questions: 1  
Answer RRs: 0  
Authority RRs: 0  
Additional RRs: 0  
▼ Queries  
> txmxcjzgfufnjhh.Speedport\_W\_724V\_09071602\_00\_023A: type AAAA, class IN  
Name: txmxcjzgfufnjhh.Speedport\_W\_724V\_09071602\_00\_023A  
[Name Length: 48]  
[Label Count: 2]  
Type: AAAA (IPv6 Address) (28)  
Class: IN (0x0001)  
[\[Response In: 19\]](#)

# Άσκηση 3

a.

http		
No.	Time	Source
189	3.493898	192.1
194	3.534519	WWW-C

b. HTTP 1.1 ο υπολογιστής μας και HTTP 1.1 ο εξυπηρετητής

```
▼ Hypertext Transfer Protocol
  ▼ GET / HTTP/1.1\r\n
    > [Expert Info (Chat/Sequence): GET / HTTP/1.1\r\n]
      Request Method: GET
      Request URI: /
      Request Version: HTTP/1.1
      Host: www.aueb.gr\r\n
      Connection: keep-alive\r\n

  Hypertext Transfer Protocol
    ▼ HTTP/1.1 301 Moved Permanently\r\n
      > [Expert Info (Chat/Sequence): HTTP/1.1 301 Moved Permanently\r\n]
        Response Version: HTTP/1.1
        Status Code: 301
        [Status Code Description: Moved Permanently]
        Response Phrase: Moved Permanently
```

c. Όπως φαίνεται δέχεται Ελληνικά και Αγγλικά

```
Accept-Language: en-US,en;q=0.9,el;q=0.8\r\n
```

d. Χρησιμοποιήσαμε tcp.dstport == 80

tcp.dstport == 80							
No.	Time	Source	Destination	Protocol	Length	Info	
179	3.449870	192.168.1.18	www-cl.aueb.gr	TCP	66	54915 → 80	[SYN] Seq=0 Win=64240 Len=0 MSS=1460 WS=256 SACK_PERM=1
180	3.450074	192.168.1.18	www-cl.aueb.gr	TCP	66	54916 → 80	[SYN] Seq=0 Win=64240 Len=0 MSS=1460 WS=256 SACK_PERM=1

e. Χρησιμοποιήσαμε http and ip.src == 192.168.1.18, όπου είναι η δικιά μας IP.

http and ip.src == 192.168.1.18							
No.	Time	Source	Destination	Protocol	Length	Info	
189	3.493898	192.168.1.18	www-cl.aueb.gr	HTTP	589	GET / HTTP/1.1	

f. Για να περιγράψουμε αυτά τα πεδία των τμημάτων πρέπει να



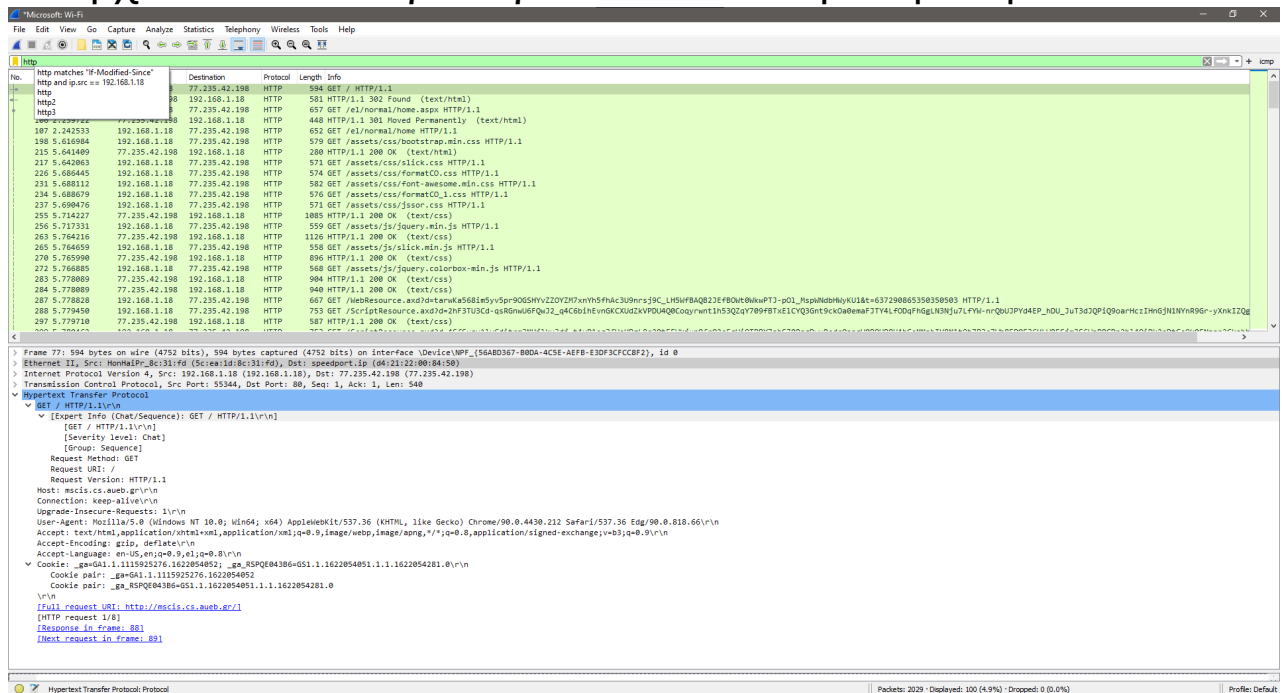
g. Πραγματοποιείται ένα SYN το οποίο αποστέλνεται από τον υπολογιστή μας, δηλαδή ζητάει επιβεβαίωση, ο εξυπηρετητής απαντάει με SYN,ACK δίνοντας επιβεβαίωση και ο υπολογιστής μας απαντάει στο τέλος πως έλαβε την επιβεβαίωση με ένα ACK και με το ACK πραγματοποιείται η σύνδεση.

(tcp.seq == 1 && tcp.ack == 1&&tcp.len==0 && !tcp.flags.fin == 1)    tcp.flags.syn==1						
No.	Time	Source	Destination	Protocol	Length	Info
179	3.449870	192.168.1.18	www-cl.aueb.gr	TCP	66	54915 → 80 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 WS=256 SACK_PERM=1
180	3.450074	192.168.1.18	www-cl.aueb.gr	TCP	66	54916 → 80 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 WS=256 SACK_PERM=1
186	3.491433	192.168.1.18	Wd-prOd-SS-eu-...	TCP	66	54917 → 443 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 WS=256 SACK_PERM=1
187	3.493599	www-cl.aueb.gr	192.168.1.18	TCP	66	80 → 54915 [SYN, ACK] Seq=0 Ack=1 Win=29200 Len=0 MSS=1436 SACK_PERM=1 WS=128
188	3.493646	192.168.1.18	www-cl.aueb.gr	TCP	54	54915 → 80 [ACK] Seq=1 Ack=1 Win=132096 Len=0
190	3.496455	www-cl.aueb.gr	192.168.1.18	TCP	66	80 → 54916 [SYN, ACK] Seq=0 Ack=1 Win=29200 Len=0 MSS=1436 SACK_PERM=1 WS=128
191	3.496480	192.168.1.18	www-cl.aueb.gr	TCP	54	54916 → 80 [ACK] Seq=1 Ack=1 Win=132096 Len=0
196	3.541622	192.168.1.18	Wd-prOd-SS-eu-...	TCP	66	54918 → 443 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 WS=256 SACK_PERM=1
198	3.578486	Wd-prOd-SS-eu-...	192.168.1.18	TCP	66	443 → 54917 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=1440 WS=256 SACK_PERM=1
199	3.578542	192.168.1.18	Wd-prOd-SS-eu-...	TCP	54	54917 → 443 [ACK] Seq=1 Ack=1 Win=132352 Len=0
202	3.631134	Wd-prOd-SS-eu-...	192.168.1.18	TCP	66	443 → 54918 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=1440 WS=256 SACK_PERM=1
203	3.631178	192.168.1.18	Wd-prOd-SS-eu-...	TCP	54	54918 → 443 [ACK] Seq=1 Ack=1 Win=132352 Len=0
1392	5.435376	192.168.1.18	web-analytics...	TCP	66	54919 → 443 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 WS=256 SACK_PERM=1
1407	5.478569	web-analytics...	192.168.1.18	TCP	66	443 → 54919 [SYN, ACK] Seq=0 Ack=1 Win=29200 Len=0 MSS=1436 SACK_PERM=1 WS=128
1408	5.478627	192.168.1.18	web-analytics...	TCP	54	54919 → 443 [ACK] Seq=1 Ack=1 Win=132096 Len=0
1493	7.275852	192.168.1.18	204.79.197.219	TCP	66	54920 → 443 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 WS=256 SACK_PERM=1
1507	7.313800	204.79.197.219	192.168.1.18	TCP	66	443 → 54920 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=1440 WS=256 SACK_PERM=1
1508	7.313878	192.168.1.18	204.79.197.219	TCP	54	54920 → 443 [ACK] Seq=1 Ack=1 Win=132352 Len=0

h. Λόγο του ότι η σελίδα www.aueb.gr χρησιμοποιεί πρωτόκολλο https δεν μπορούμε να πάρουμε περισσότερες πληροφορίες για τις φωτογραφίες για αυτό χρησιμοποιήσαμε το website που χρησιμοποιήσαμε και στην πρώτη Άσκηση που είναι http. Φαίνεται πως ζητάμε 18 φωτογραφίες τύπου png, jpg, gif και στέλνονται από την ίδια IP.

frame contains "image" and ip.src == 192.168.1.18						
No.	Time	Source	Destination	Protocol	Length	Info
31	3.152297	192.168.1.18	77.235.42.198	HTTP	594	GET / HTTP/1.1
42	3.239827	192.168.1.18	77.235.42.198	HTTP	657	GET /e1/normal/home.aspx HTTP/1.1
54	3.315999	192.168.1.18	77.235.42.198	HTTP	652	GET /e1/normal/home HTTP/1.1
496	8.907964	192.168.1.18	77.235.42.198	HTTP	612	GET /admin/Gates/Photos/1/1.png HTTP/1.1
544	8.998328	192.168.1.18	77.235.42.198	HTTP	619	GET /CMS/site/images/scroll-to-top.png HTTP/1.1
546	8.999153	192.168.1.18	77.235.42.198	HTTP	643	GET /admin/dsContent/UserData/CommonFiles/banner_2020_full.jpg HTTP/1.1
547	9.000130	192.168.1.18	77.235.42.198	HTTP	646	GET /admin/dsContent/UserData/CommonFiles/banner_2020_partial.jpg HTTP/1.1
548	9.000915	192.168.1.18	77.235.42.198	HTTP	648	GET /admin/dsContent/UserData/CommonFiles/banner_catalogue_2020.jpg HTTP/1.1
575	9.012635	192.168.1.18	77.235.42.198	HTTP	611	GET /CMS/site/images/img-1.jpg HTTP/1.1
649	9.109059	192.168.1.18	77.235.42.198	HTTP	620	GET /assets/images/slider/b21.png HTTP/1.1
853	9.169410	192.168.1.18	77.235.42.198	HTTP	620	GET /assets/images/slider/a21.png HTTP/1.1
950	9.201022	192.168.1.18	77.235.42.198	HTTP	618	GET /assets/images/slider/loading.gif HTTP/1.1
951	9.203847	192.168.1.18	77.235.42.198	HTTP	614	GET /CMS/site/images/book-img.png HTTP/1.1
1224	9.288480	192.168.1.18	77.235.42.198	HTTP	611	GET /CMS/site/images/img-2.jpg HTTP/1.1
1229	9.289759	192.168.1.18	77.235.42.198	HTTP	614	GET /CMS/site/images/note-img.png HTTP/1.1
1230	9.291351	192.168.1.18	77.235.42.198	HTTP	611	GET /CMS/site/images/img-3.jpg HTTP/1.1
1233	9.296445	192.168.1.18	77.235.42.198	HTTP	618	GET /CMS/site/images/calendar-img.png HTTP/1.1
1356	9.345727	192.168.1.18	77.235.42.198	HTTP	637	GET /admin/Pages/Thumb/10000000030869/10000000030869.jpg HTTP/1.1
1472	9.396837	192.168.1.18	77.235.42.198	HTTP	637	GET /admin/Pages/Thumb/10000000030850/10000000030850.jpg HTTP/1.1
1486	9.405628	192.168.1.18	77.235.42.198	HTTP	637	GET /admin/Pages/Thumb/10000000030844/10000000030844.jpg HTTP/1.1
1487	9.407709	192.168.1.18	77.235.42.198	HTTP	615	GET /CMS/site/images/megaphone.png HTTP/1.1
1488	9.408895	192.168.1.18	77.235.42.198	HTTP	622	GET /CMS/site/images/OPA-MSC-3-footer.png HTTP/1.1
1630	9.519501	192.168.1.18	77.235.42.198	HTTP	597	GET /favicon.ico HTTP/1.1

ι. Δεν εμφανίζει κάτι τέτοιο διότι είναι το πρώτο πακέτο και δεν υπάρχει κάτι ανάλογο λόγω του ότι καθαρίσαμε την cache.



κ.

➤ Transmission Control Protocol, Src Port  
➤ Hypertext Transfer Protocol

▼ HTTP/1.1 302 Found\r\n

▼ [Expert Info (Chat/Sequence): HTTP  
[HTTP/1.1 302 Found\r\n]  
[Severity level: Chat]  
[Group: Sequence]

Response Version: HTTP/1.1

Status Code: 302

[Status Code Description: Found]

Response Phrase: Found

l.

```
Set-Cookie: ASP.NET_SessionId=ldkrcrnfrn5ouybangvuqd03; path=/; HttpOnly; SameSite=Lax\r\n
V-AspNet-Version: 4.0.30319\r\n
```

m.

```
Cookie: _ga=GA1.1.1115925276.1622054052; _ga_RSPQE043B6=GS1.1.1622054051.1.1.1622054281.0; ASP.NET_SessionId=ldkrcrnfrn5ouybangvuqd03\r\n
Cookie pair: _ga=GA1.1.1115925276.1622054052
Cookie pair: _ga_RSPQE043B6=GS1.1.1622054051.1.1.1622054281.0
Cookie pair: ASP.NET_SessionId=ldkrcrnfrn5ouybangvuqd03
\r\n
```

# Άσκηση 4

1.

a)  $T_{\text{transf}} = 350\text{MB} / (3.5\text{MB/sec}) = 100 \text{ sec}$

$L_{\text{data}} = 2.5\text{MB/sec} * 100 \text{ sec} = 250\text{MB}$

Άρα το ελάχιστο μέγεθος του κουβά πρέπει να είναι:

$B = 350\text{MB} - 250\text{MB} = 100\text{MB}$

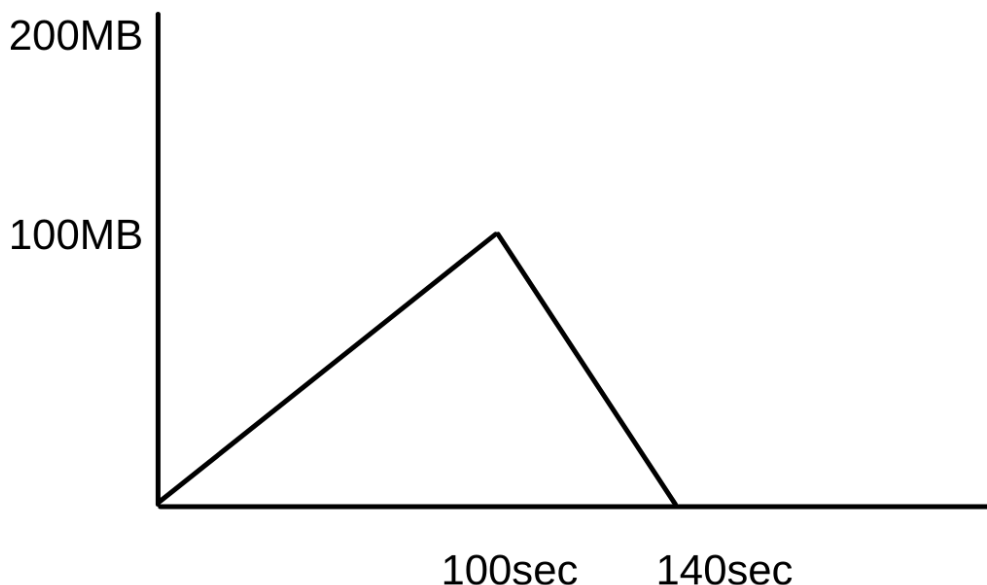
b) Ο ρυθμός αποθήκευσης είναι:

$3.5 \text{ MB/sec} - 2.5 \text{ MB/sec} = 1\text{MB/sec}$

Οπότε στο χρόνο ριπής αποθηκεύει το πολύ:

$1\text{MB/sec} * T_{\text{transfer}} = 1\text{MB/sec} * 100\text{sec} = 100\text{MB}$

Και ο χρόνος για την έξοδο του όγκου της ριπής είναι  
 $350\text{MB} / (2.5\text{MB/sec}) = 140\text{sec}$



c) Για να γεμίσει ο κουβάς με ρυθμό αποθήκευσης  
χρειαζόμαστε  $200\text{MB} / (1\text{MB/sec}) = 200\text{sec}$

Για 200sec θα έχουμε όγκο ριπής  $(3.5\text{MB/sec}) * 200\text{sec} = 700\text{MB}$

2. Ακολουθώντας τον τύπο  $S = B / (M - \rho) = 1\text{MB} / (50\text{MB/sec} - 10\text{MB/sec}) = 25\text{msec}$  είναι η μέγιστη διάρκεια της ριπής εξόδου.

Με τον τύπο  $B / \rho = 1\text{MB} / (10\text{MB/sec}) = 100\text{msec}$

Με ριπή  $50\text{MB/sec} * 40\text{sec} = 2\text{MB}$

Από τα παραπάνω συμπερénουμε πώς θα χρειαστεί  $25\text{msec} + 2 * 100\text{msec} = 225\text{msec}$ .