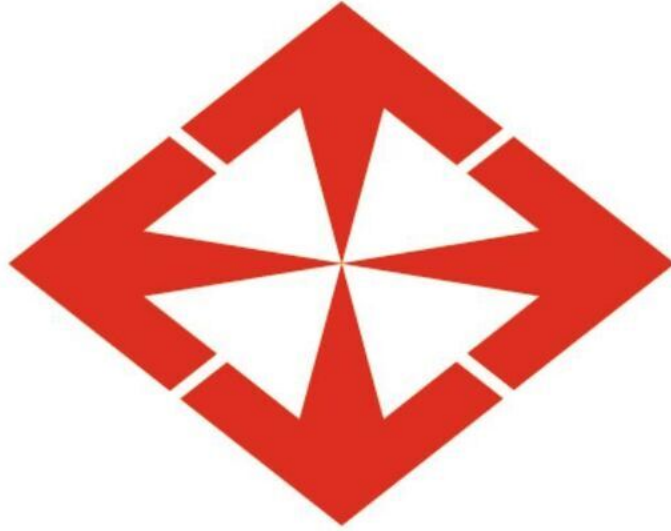




**BAŞKENT ÜNİVERSİTESİ**

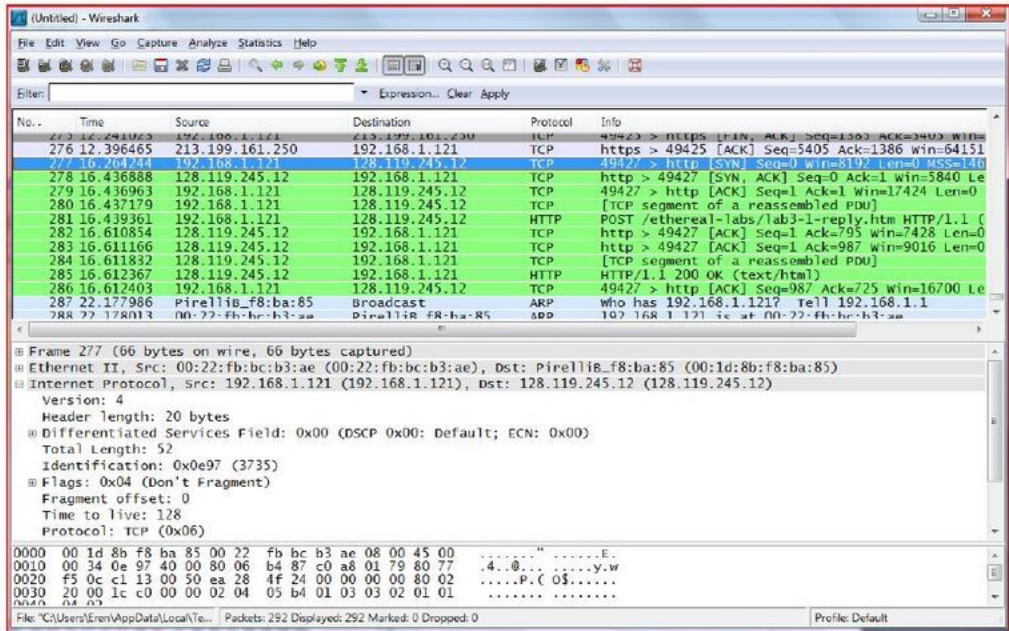
**EEM 413**

**BİLGİSAYAR AĞLARI**

**LAB 3 : TCP**

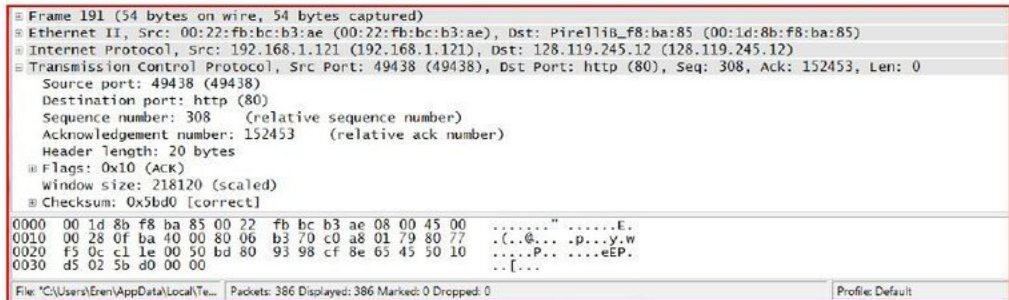
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---



1) Source IP adresi: 192.168.1.121

Source port numarası: 49438



2) Hedef IP adresi: 128.119.245.12 ve port numarası 80 (HTTP)

3) Source IP adres: 192.168.1.121 ve port numarası 49438'dir

4) Sequence numarası olarak 0 ile işaretlenir. Syn flag :1 olmuştur

```

Transmission Control Protocol, Src Port: 49438 (49438), Dst Port: http (80), Seq: 0, Len: 0
  Source port: 49438 (49438)
  Destination port: http (80)
  Sequence number: 0 (relative sequence number)
  Header length: 32 bytes
  Flags: 0x02 (SYN)
    0... .. = Congestion Window Reduced (CWR): Not set
    .0... .. = ECN-Echo: Not set
    ..0... .. = Urgent: Not set
    ...0... .. = Acknowledgment: Not set
    ....0... .. = Push: Not set
    .....0... .. = Reset: Not set
    .....1... .. = Syn: Set
    .....0... .. = Fin: Not set
  Window size: 8192
  Checksum: 0x061d [correct]
  Options: (12 bytes)
0000  00 1d 8b f8 ba 85 00 22 fb bc b3 ae 08 00 45 00  ....E.
0010  00 34 0f 76 40 00 80 06 b3 a8 c0 a8 01 79 80 77  .4.v@... .y.w
0020  f5 0c c1 1e 00 50 bd 80 92 64 00 00 00 00 80 02  ....P... .d....
0030  20 00 06 1d 00 00 02 04 05 b4 01 03 03 02 01 01  ....
0040  04 03
File: "C:\Users\Eren\AppData\Local\Te...  Packets: 386 Displayed: 386 Marked: 0 Dropped: 0  Profile: Default

```

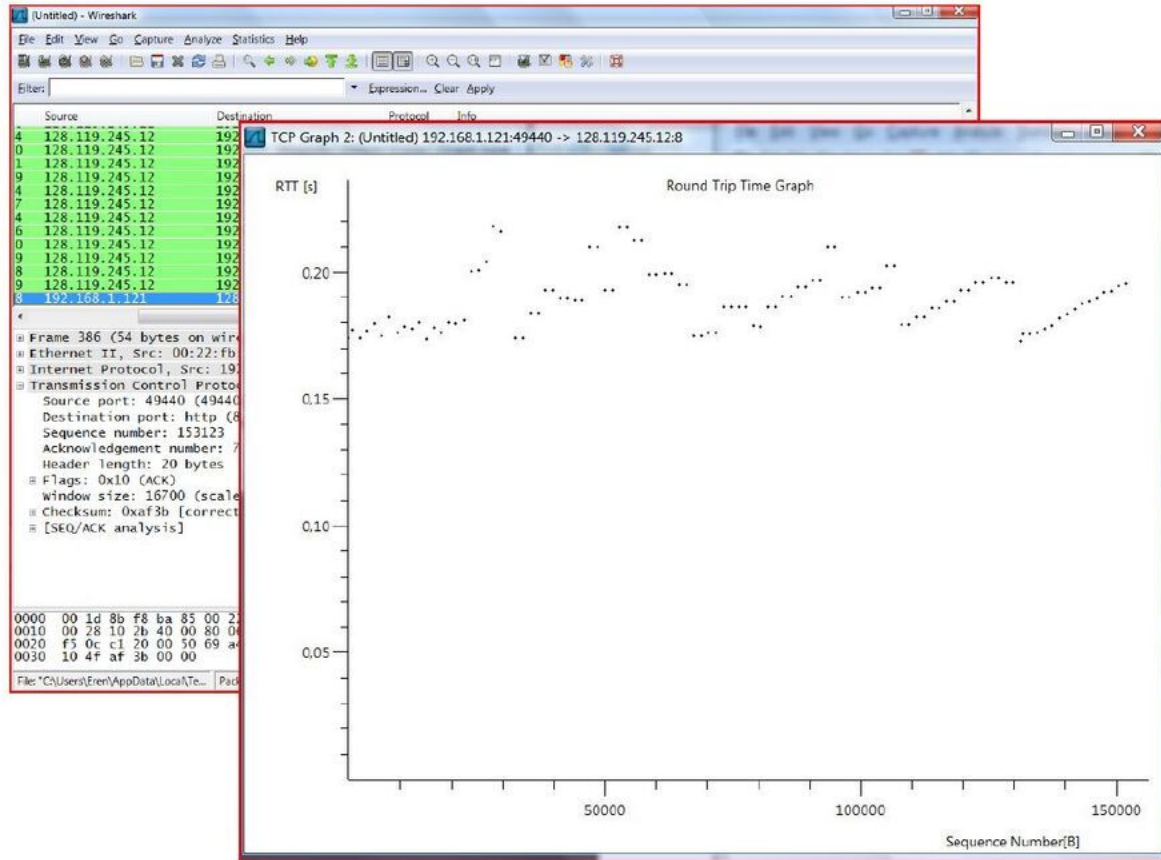
5) Sequence numarası 1 olarak ayarlanır. Syn ve Ack flag'leri set yapılır.

```

Frame 2 (66 bytes on wire (66 bytes captured))
Ethernet II, Src: Pirelli8:f8:ba:85 (00:1d:8b:f8:ba:85), Dst: 00:22:fb:bc:b3:ae (00:22:fb:bc:b3:ae)
Internet Protocol, Src: 128.119.245.12 (128.119.245.12), Dst: 192.168.1.121 (192.168.1.121)
Transmission Control Protocol, Src Port: http (80), Dst Port: 49438 (49438), Seq: 0, Ack: 1, Len: 0
  Source port: http (80)
  Destination port: 49438 (49438)
  Sequence number: 0 (relative sequence number)
  Acknowledgement number: 1 (relative ack number)
  Header length: 32 bytes
  Flags: 0x12 (SYN, ACK)
    0... .. = Congestion Window Reduced (CWR): Not set
    .0... .. = ECN-Echo: Not set
    ..0... .. = Urgent: Not set
    ...1... .. = Acknowledgment: Set
    ....0... .. = Push: Not set
    .....0... .. = Reset: Not set
    .....1... .. = Syn: Set
0000  00 22 fb bc b3 ae 00 1d 8b f8 ba 85 08 00 45 00  ....E.
0010  00 34 00 00 40 00 31 06 12 1f 80 77 f5 0c c0 a8  .4..@.1. .w...
0020  01 79 00 50 c1 1e cf 8c 11 c0 bd 80 92 65 80 12  .y.P... ..e...
0030  16 d0 2d f7 00 00 02 04 05 ac 01 01 04 02 01 03  ....
0040  05 03
File: "C:\Users\Eren\AppData\Local\Te...  Packets: 386 Displayed: 386 Marked: 0 Dropped: 0  Profile: Default

```

6) sequence number: 153123 , 4 numaralı segmenttir.



7) Programdan elde edilen grafik:

8) İlk altı TCP segmetin uzunluğu 20 byte.

9) Son ACK onay kaynağı 6012 olarak görünüyor.

```
Frame 10 (1506 bytes on wire (1506 bytes captured))
Ethernet II, Src: PirelliB_f8:ba:85 (00:1d:8b:f8:ba:85), Dst: 00:22:fb:bc:b3:ae (00:22:fb:bc:b3:ae)
Internet Protocol, Src: 128.119.245.12 (128.119.245.12), Dst: 192.168.1.121 (192.168.1.121)
Transmission Control Protocol, Src Port: http (80), Dst Port: 49438 (49438), Seq: 3219, Ack: 308, Len: 1452
  Source port: http (80)
  Destination port: 49438 (49438)
  Sequence number: 3219 (relative sequence number)
  [Next sequence number: 4671 (relative sequence number)]
  Acknowledgement number: 308 (relative ack number)
  Header length: 20 bytes
  Flags: 0x10 (ACK)
  Window size: 6912 (scaled)
  Checksum: 0xbd24 [correct]
  [Reassembled_PDU_in_frame: 190]
  TCP segment data (1452 bytes)

0020 01 79 00 50 c1 1e cf 8c 1e 53 bd 80 93 98 50 10 .y.P....S....P.
0030 90 80 bd 24 00 00 20 68 6f 75 73 65 21 27 20 28 .:..house! (
0040 57 68 69 63 68 20 77 61 73 20 76 65 72 79 20 6c Which wa s very l
0050 69 6b 65 6c 79 0d 0a 74 72 75 65 2e 29 0d 0a 0d ikely. t rue.)...
0060 0a 70 70 44 6f 77 6a 7e 70 64 6f 77 6a 7e 70 64 num down d

Window size (tcp.window_size), 2 bytes | Packets: 386 Displayed: 386 Marked: 0 Dropped: 0 | Profile: Default
```

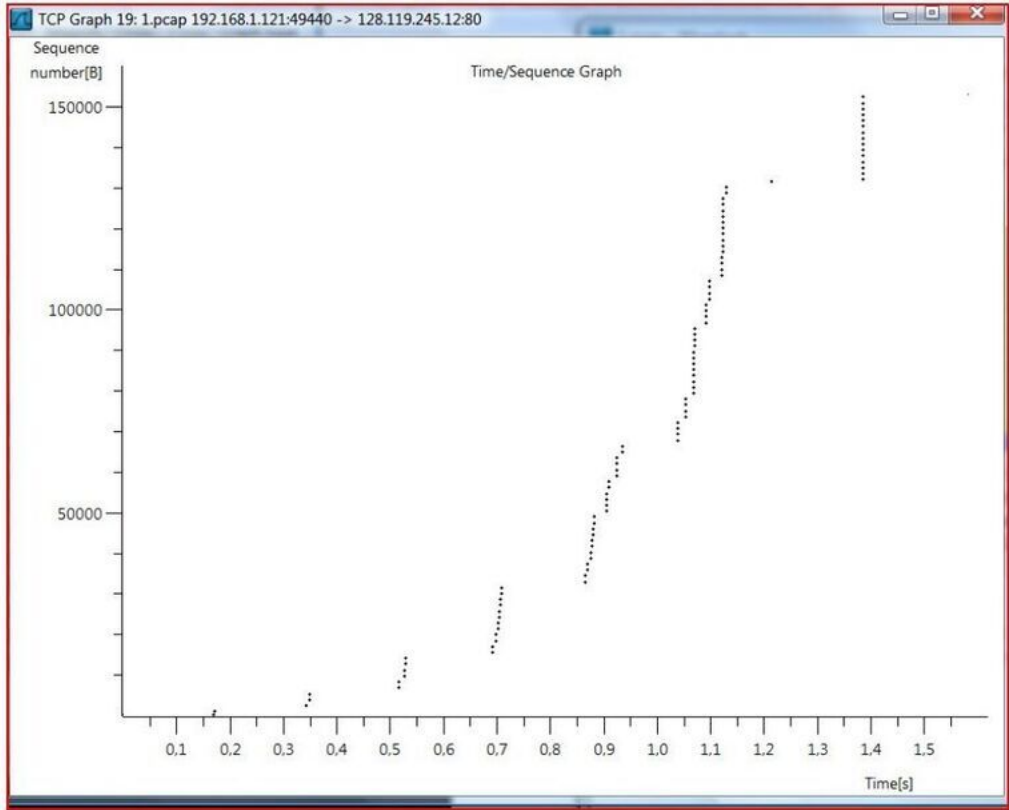
10) Bilgisayarımızda herhangi bir transfer gözüküyor. Yeniden göndermek için sıra numarasını kontrol etmek gerekiyor.

11) ACK'in kaynağı kendi segmentinde görünüyor.

12)

$$\text{Troughput} = \frac{\text{Gönderilen byte}}{\text{Gönderim zamanı}} = \frac{152198}{17.152008 - 16.955966} = 776354 \text{ bps}$$

13) Aktarımın yavaşça başlayıp, daha sonra hızlandığını görebiliriz. Ayrıca oluşan sıkışıklıkta grafiğin sağ tarafında görülebilmekte.



14) Transfer yavaşça başladı ve giderek hızlanarak son buldu. Transfer sırasında ki sıkışıklık grafikte sağ tarafta görülebilmekte.

server'a yükledik. Sequence ve acknowledge numaralarını inceledik. Ayrıca TCP'nin congestion control, slow-start ve congestion avoidance yapılarını gördük.