

# Assignment 3

1)

a)

```
navneet@navneet-Inspiron:~$ sudo tshark -i wlx00177c9b1d95 -f tcp -a duration:30 -w /tmp/Capture.pcap
Running as user "root" and group "root". This could be dangerous.
Capturing on 'wlx00177c9b1d95'
46437
```

b)

There are **40 TCP** connections in this packet capture.

The communicating peers can be seen in the attached screenshot.

Wireshark · Capture File List					
Ethernet · 1	IPv4 · 12	IPv6 · 13	TCP · 40	UDP	
Address A	Port A	Address B	Port B	P	
192.168.29.87	56026	157.240.198.60	443		
192.168.29.87	56778	140.82.114.25	443		
192.168.29.170	37734	13.234.168.60	443		
192.168.29.170	56276	13.234.210.38	443		
192.168.29.170	36920	54.174.34.153	443		
192.168.29.170	34208	13.233.43.20	443		
192.168.29.170	59010	172.217.27.163	443		
192.168.29.170	58040	54.192.171.123	443		
192.168.29.170	57312	216.58.200.195	443		
192.168.29.170	57314	216.58.200.195	443		
192.168.29.170	45456	172.217.167.226	443		
192.168.29.170	57328	216.58.200.195	443		
192.168.29.170	57330	216.58.200.195	443		
192.168.29.170	57332	216.58.200.195	443		
192.168.29.170	57346	216.58.200.195	443		
192.168.29.170	58152	157.240.198.60	443		
192.168.29.170	41154	216.58.200.206	443		
2405:201:6802:6040:9ed:fd73:81d5:d543	50066	2404:6800:4002:804::200e	443		
2405:201:6802:6040:9ed:fd73:81d5:d543	59020	2404:6800:4002:804::200e	80		
2405:201:6802:6040:9ed:fd73:81d5:d543	59022	2404:6800:4002:804::200e	80		
2405:201:6802:6040:9ed:fd73:81d5:d543	55420	2a03:2880:f244:c2:face:b00c:0:167	443		
2405:201:6802:6040:9ed:fd73:81d5:d543	54740	2404:6800:4002:812::200a	443		
2405:201:6802:6040:9ed:fd73:81d5:d543	47304	2404:6800:4002:80b::2016	443		
2405:201:6802:6040:9ed:fd73:81d5:d543	54748	2404:6800:4002:812::200a	443		
2405:201:6802:6040:9ed:fd73:81d5:d543	54750	2404:6800:4002:812::200a	443		
2405:201:6802:6040:9ed:fd73:81d5:d543	55286	2404:6800:4002:810::2002	443		
2405:201:6802:6040:9ed:fd73:81d5:d543	34710	2404:6800:4002:804::2001	443		
2405:201:6802:6040:9ed:fd73:81d5:d543	59686	2404:6800:4002:808::2004	443		
2405:201:6802:6040:9ed:fd73:81d5:d543	50240	2404:6800:4002:809::2003	443		
2405:201:6802:6040:9ed:fd73:81d5:d543	34724	2404:6800:4002:804::2001	443		
2405:201:6802:6040:9ed:fd73:81d5:d543	34726	2404:6800:4002:804::2001	443		
2405:201:6802:6040:9ed:fd73:81d5:d543	34728	2404:6800:4002:804::2001	443		
2405:201:6802:6040:9ed:fd73:81d5:d543	49642	2404:6800:4002:806::2001	443		
2405:201:6802:6040:9ed:fd73:81d5:d543	56202	2404:6800:4002:809::2006	443		
2405:201:6802:6040:9ed:fd73:81d5:d543	43216	2404:6800:4003:c02::bd	443		
2405:201:6802:6040:9ed:fd73:81d5:d543	57316	2405:200:160e:1716::e	443		
2405:201:6802:6040:9ed:fd73:81d5:d543	57318	2405:200:160e:1716::e	443		
2405:201:6802:6040:9ed:fd73:81d5:d543	46628	2405:200:161b:743::d	443		
2405:201:6802:6040:9ed:fd73:81d5:d543	46630	2405:200:161b:743::d	443		
2405:201:6802:6040:9ed:fd73:81d5:d543	57324	2405:200:160e:1716::e	443		

- c) Since address A is the local address of my system, thus we can consider bytes sent from host A to B as **upstream** and bytes sent from host B to A as **downstream**. The upstream and downstream data transfer for each TCP connection can be seen from the screenshot.

Address A	Port A	Address B	Port B	Bytes A → B	Bytes B → A
192.168.29.87	56778	140.82.114.25	443	96	0
192.168.29.170	57312	216.58.200.195	443	128	74
192.168.29.170	57314	216.58.200.195	443	128	74
192.168.29.170	57328	216.58.200.195	443	128	74
192.168.29.170	57330	216.58.200.195	443	128	74
192.168.29.170	57332	216.58.200.195	443	128	74
192.168.29.170	57346	216.58.200.195	443	128	74
2405:201:6802:...	54740	2404:6800:40...	443	168	94
2405:201:6802:...	54748	2404:6800:40...	443	168	94
2405:201:6802:...	54750	2404:6800:40...	443	168	94
2405:201:6802:...	34710	2404:6800:40...	443	168	94
2405:201:6802:...	34724	2404:6800:40...	443	168	94
2405:201:6802:...	34726	2404:6800:40...	443	168	94
192.168.29.170	59010	172.217.27.163	443	171	171
192.168.29.170	41154	216.58.200.206	443	171	171
2405:201:6802:...	43216	2404:6800:40...	443	211	211
192.168.29.170	58152	157.240.198.60	443	342	1,477
192.168.29.87	56026	157.240.198.60	443	396	0
2405:201:6802:...	59020	2404:6800:40...	80	352	180
2405:201:6802:...	55420	2a03:2880:f24...	443	469	445
2405:201:6802:...	59022	2404:6800:40...	80	888	1,019
2405:201:6802:...	49642	2404:6800:40...	443	1,692	1,433
192.168.29.170	36920	54.174.34.153	443	2,262	4,763
192.168.29.170	37734	13.234.168.60	443	2,741	5,379
192.168.29.170	58040	54.192.171.123	443	1,893	6,250
2405:201:6802:...	56202	2404:6800:40...	443	2,480	2,256
192.168.29.170	56276	13.234.210.38	443	2,634	7,234
192.168.29.170	45456	172.217.167.226	443	2,358	5,074
2405:201:6802:...	59686	2404:6800:40...	443	3,937	4,172
2405:201:6802:...	50240	2404:6800:40...	443	3,054	3,341
2405:201:6802:...	55286	2404:6800:40...	443	4,535	8,711
2405:201:6802:...	34728	2404:6800:40...	443	9,314	45 k
2405:201:6802:...	46628	2405:200:161...	443	14 k	208 k
2405:201:6802:...	47304	2404:6800:40...	443	29 k	677 k
2405:201:6802:...	50066	2404:6800:40...	443	136 k	635 k
2405:201:6802:...	57318	2405:200:160...	443	67 k	1,067 k
2405:201:6802:...	57324	2405:200:160...	443	70 k	1,341 k
2405:201:6802:...	57316	2405:200:160...	443	111 k	2,754 k
2405:201:6802:...	57316	2405:200:160...	443	111 k	2,754 k
2405:201:6802:...	46630	2405:200:161...	443	143 k	3,924 k
192.168.29.170	34208	13.233.43.20	443	687 k	33 M

Total data transfer in upstream for all the connections = **1302865 bytes**

Total data transfer in downstream for all the connections = **44462455 bytes**

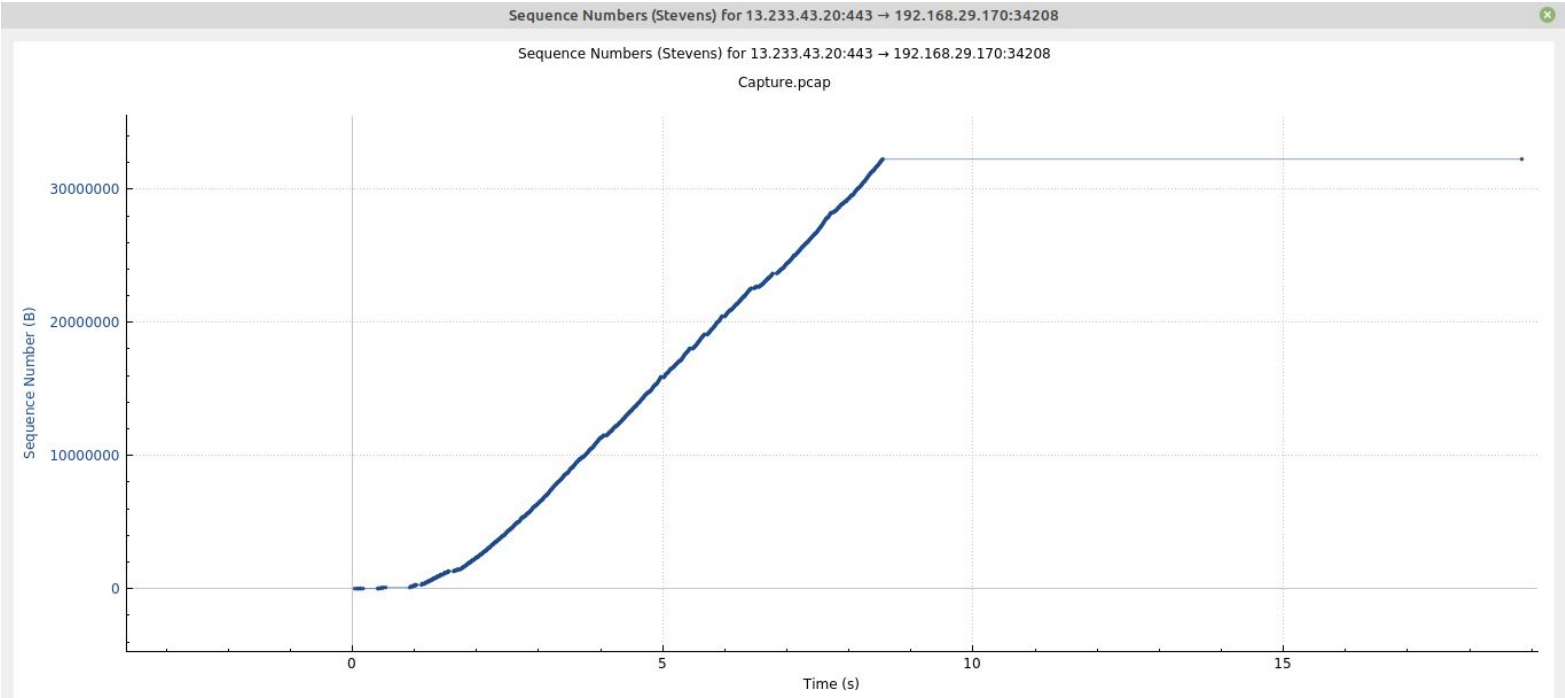
- d) The connection for which the bytes transfer was maximum is attached below:

Address A	Port A	Address B	Port B	Bytes
192.168.29.170	34208	13.233.43.20	443	34 M

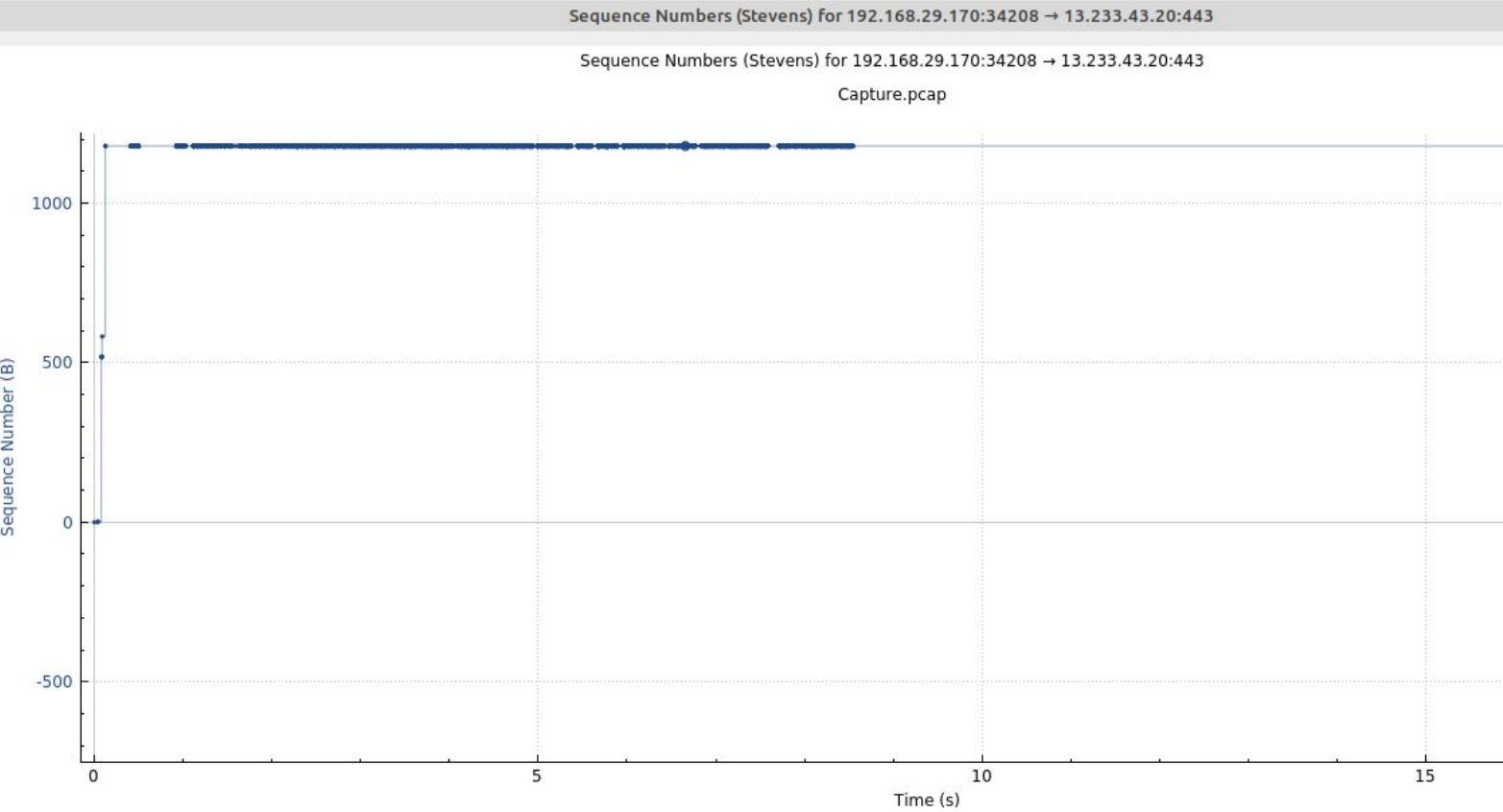
We observe that the sequence number does not get repeated for two different data packets,

this means that the sequence space is sufficient enough to satisfy transmitted sequence numbers .

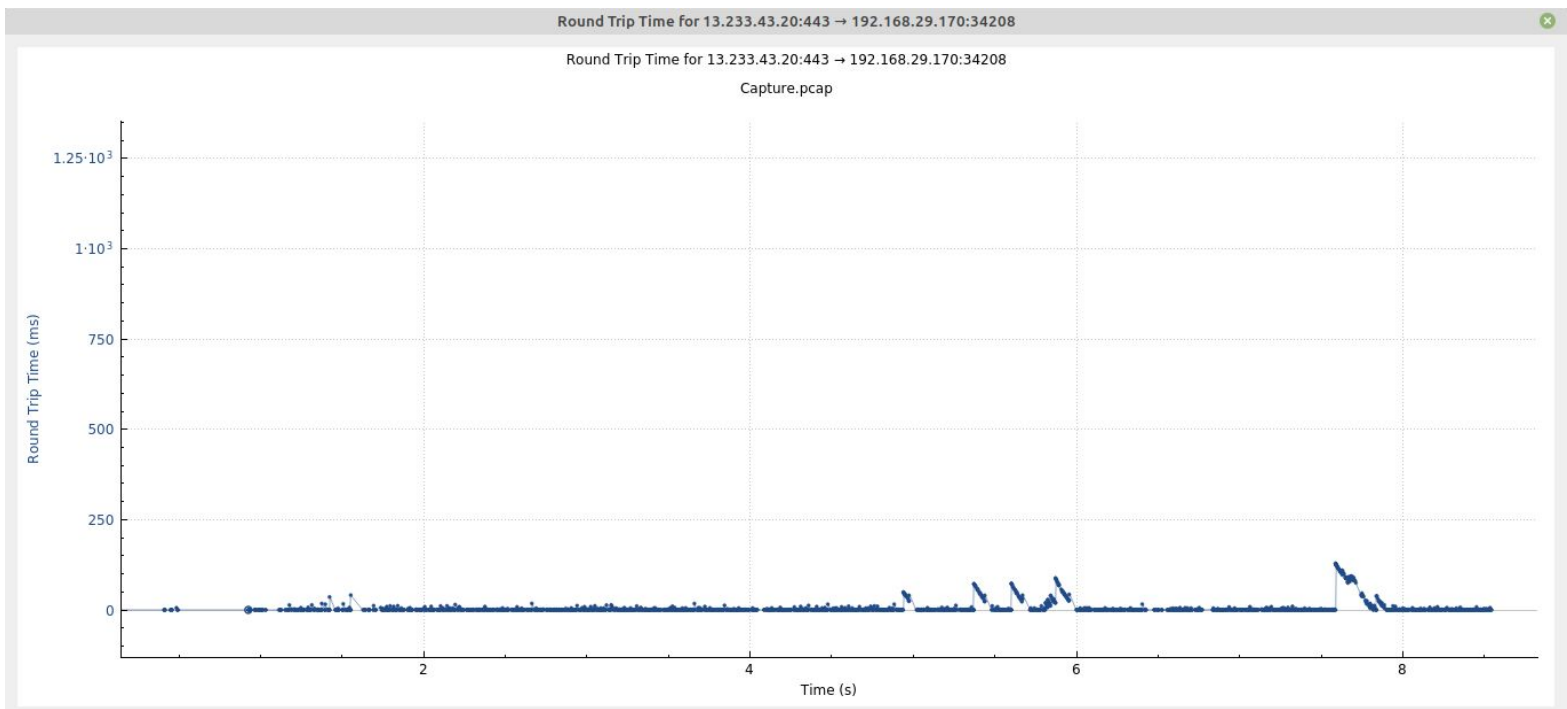
The TCP stream graph for host B to A(my system) is shown below



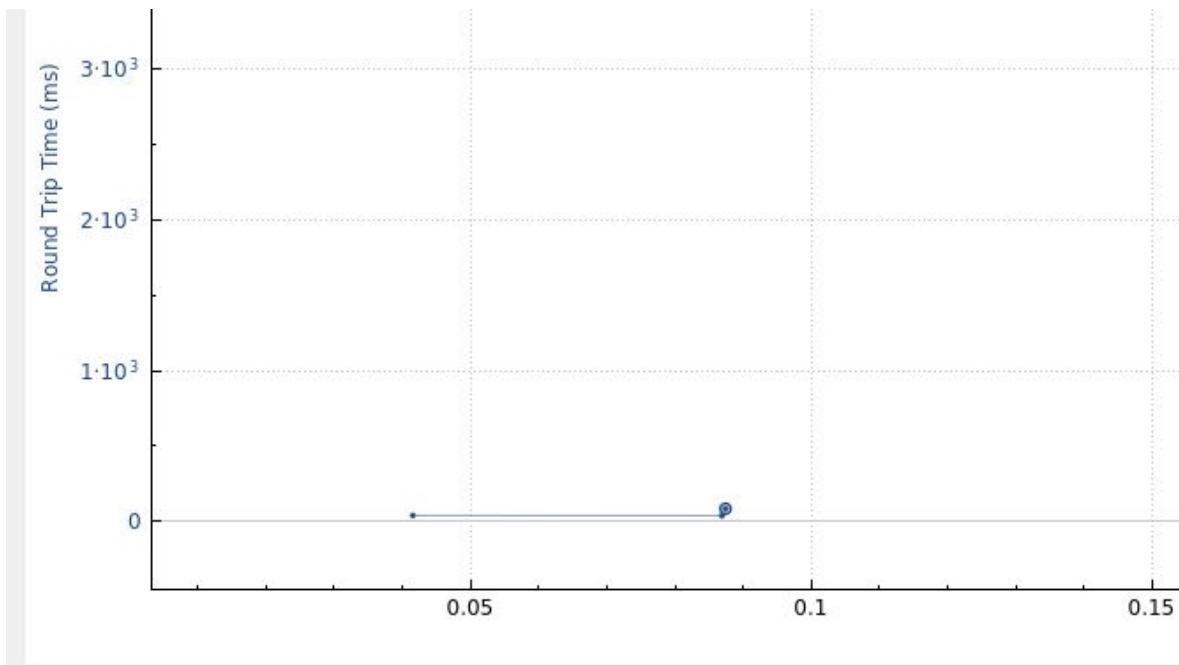
The TCP stream graph for host A(my system) to B is shown below



e) The RTT graph for host B to A(my system) is as follows :



The RTT graph for A(my system) to B is as follows :





f)

Used sample1.pcap for this part

Address A	Port A	Address B	Port B	Packets	Bytes
10.129.28.29	47385	10.129.5.192	80	9,658	11 M

This is the connection for which maximum bytes transfer happens in sample1.pcap

Yes, the timeout instances are there in this case. These can be figured out from the TCP Retransmission packets, these packets are retransmitted because the sender does not receive an ACK for these packets within the timeout period.

These can be found using **tcp.analysis.rto** filter. It filters the TCP packets that were retransmitted due to timeout. So, for the TCP connection mentioned above we use the following filter to find the timeout instances.

**ip.addr==10.129.28.29 && tcp.port==47385 && ip.addr==10.129.5.192 && tcp.port==80 && tcp.analysis.rto**

No.	Time	Source	Destination	Protocol	Length	Info
8528	87.208227	10.129.5.192	10.129.28.29	TCP	1514	[TCP Retransmission] 80 → 47385 [ACK] Seq=7625 Ack=1323 Win=18048 Len=144
8529	87.208234	10.129.5.192	10.129.28.29	TCP	1514	[TCP Retransmission] 80 → 47385 [ACK] Seq=10521 Ack=1323 Win=18048 Len=144
8875	88.205876	10.129.5.192	10.129.28.29	TCP	1514	[TCP Retransmission] 80 → 47385 [ACK] Seq=53961 Ack=1323 Win=18048 Len=144
9100	88.963435	10.129.5.192	10.129.28.29	TCP	1514	[TCP Retransmission] 80 → 47385 [ACK] Seq=103193 Ack=1323 Win=18048 Len=144
9300	89.452378	10.129.5.192	10.129.28.29	TCP	1514	[TCP Retransmission] 80 → 47385 [ACK] Seq=103193 Ack=1323 Win=18048 Len=144
9554	90.052305	10.129.5.192	10.129.28.29	TCP	1514	[TCP Retransmission] 80 → 47385 [ACK] Seq=122017 Ack=1323 Win=18048 Len=144
9814	90.804254	10.129.5.192	10.129.28.29	TCP	1514	[TCP Retransmission] 80 → 47385 [ACK] Seq=122017 Ack=1323 Win=18048 Len=144
9819	90.813495	10.129.5.192	10.129.28.29	TCP	1514	[TCP Retransmission] 80 → 47385 [ACK] Seq=123465 Ack=1323 Win=18048 Len=144
9820	90.813510	10.129.5.192	10.129.28.29	TCP	1514	[TCP Retransmission] 80 → 47385 [ACK] Seq=126361 Ack=1323 Win=18048 Len=144
9979	91.108273	10.129.5.192	10.129.28.29	TCP	1514	[TCP Retransmission] 80 → 47385 [PSH, ACK] Seq=130393 Ack=1323 Win=18048 Len=144
10182	91.628256	10.129.5.192	10.129.28.29	TCP	1514	[TCP Retransmission] 80 → 47385 [ACK] Seq=143737 Ack=1323 Win=18048 Len=144
10210	91.672169	10.129.5.192	10.129.28.29	TCP	1514	[TCP Retransmission] 80 → 47385 [ACK] Seq=145185 Ack=1323 Win=18048 Len=144
10634	92.346591	10.129.5.192	10.129.28.29	TCP	1514	[TCP Retransmission] 80 → 47385 [ACK] Seq=246545 Ack=1323 Win=18048 Len=144
11042	93.010593	10.129.5.192	10.129.28.29	TCP	1514	[TCP Retransmission] 80 → 47385 [ACK] Seq=321841 Ack=1323 Win=18048 Len=144
11772	94.069117	10.129.5.192	10.129.28.29	TCP	1514	[TCP Retransmission] 80 → 47385 [ACK] Seq=455057 Ack=1323 Win=18048 Len=144
12571	95.860671	10.129.5.192	10.129.28.29	TCP	1514	[TCP Retransmission] 80 → 47385 [ACK] Seq=575241 Ack=1323 Win=18048 Len=144
13076	97.141908	10.129.5.192	10.129.28.29	TCP	1514	[TCP Retransmission] 80 → 47385 [ACK] Seq=633161 Ack=1323 Win=18048 Len=144
14162	99.217839	10.129.5.192	10.129.28.29	TCP	1514	[TCP Retransmission] 80 → 47385 [ACK] Seq=751897 Ack=1323 Win=18048 Len=144
14172	99.235229	10.129.5.192	10.129.28.29	TCP	1514	[TCP Retransmission] 80 → 47385 [ACK] Seq=753345 Ack=1323 Win=18048 Len=144
15024	100.718665	10.129.5.192	10.129.28.29	TCP	1514	[TCP Retransmission] 80 → 47385 [ACK] Seq=846017 Ack=1323 Win=18048 Len=144
19447	107.575114	10.129.5.192	10.129.28.29	TCP	1514	[TCP Retransmission] 80 → 47385 [ACK] Seq=1368745 Ack=1323 Win=18048 Len=144
19448	107.575128	10.129.5.192	10.129.28.29	TCP	1514	[TCP Retransmission] 80 → 47385 [ACK] Seq=1370193 Ack=1323 Win=18048 Len=144
19488	107.631385	10.129.5.192	10.129.28.29	TCP	1514	[TCP Retransmission] 80 → 47385 [ACK] Seq=1370193 Ack=1323 Win=18048 Len=144
19611	107.787883	10.129.5.192	10.129.28.29	TCP	1514	[TCP Retransmission] 80 → 47385 [ACK] Seq=1384673 Ack=1323 Win=18048 Len=144
19874	108.080340	10.129.5.192	10.129.28.29	TCP	1514	[TCP Retransmission] 80 → 47385 [ACK] Seq=1380329 Ack=1323 Win=18048 Len=144
19894	108.101078	10.129.5.192	10.129.28.29	TCP	1514	[TCP Retransmission] 80 → 47385 [ACK] Seq=1390465 Ack=1323 Win=18048 Len=144
20449	108.760234	10.129.5.192	10.129.28.29	TCP	1514	[TCP Retransmission] 80 → 47385 [ACK] Seq=1423769 Ack=1323 Win=18048 Len=144
20483	108.802643	10.129.5.192	10.129.28.29	TCP	1514	[TCP Retransmission] 80 → 47385 [ACK] Seq=1425217 Ack=1323 Win=18048 Len=144
20484	108.802649	10.129.5.192	10.129.28.29	TCP	1514	[TCP Retransmission] 80 → 47385 [PSH, ACK] Seq=1429561 Ack=1323 Win=18048 Len=144
20780	109.116287	10.129.5.192	10.129.28.29	TCP	1514	[TCP Retransmission] 80 → 47385 [ACK] Seq=1433905 Ack=1323 Win=18048 Len=144

Frame 8528: 1514 bytes on wire (12112 bits), 196 bytes captured (1568 bits)

The RTO for this segment was: Time offset

Packets: 115701 · Displayed: 311 (0.3%)

Profile: Defa

There are **311** such instances for timeout for this connection.

Let's check the congestion window size for the 88099<sup>th</sup> packet.(It is a Retransmission Packet)

No.	Time	Source	Destination	Protocol	Length	Info
83744	212.463764	10.129.5.192	10.129.28.29	TCP	1514	[TCP Retransmission] 80 → 47385 [ACK]
83997	212.776487	10.129.5.192	10.129.28.29	TCP	1514	[TCP Retransmission] 80 → 47385 [ACK]
84243	213.092304	10.129.5.192	10.129.28.29	TCP	1514	[TCP Retransmission] 80 → 47385 [ACK]
84484	213.612310	10.129.5.192	10.129.28.29	TCP	1514	[TCP Retransmission] 80 → 47385 [ACK]
85020	214.656293	10.129.5.192	10.129.28.29	TCP	1514	[TCP Retransmission] 80 → 47385 [ACK]
85123	214.761879	10.129.5.192	10.129.28.29	TCP	1514	[TCP Retransmission] 80 → 47385 [ACK]
85124	214.761892	10.129.5.192	10.129.28.29	TCP	1514	[TCP Retransmission] 80 → 47385 [ACK]
85125	214.761898	10.129.5.192	10.129.28.29	TCP	1514	[TCP Retransmission] 80 → 47385 [ACK]
86501	216.548148	10.129.5.192	10.129.28.29	TCP	1514	[TCP Retransmission] 80 → 47385 [ACK]
88099	218.524243	10.129.5.192	10.129.28.29	TCP	1514	[TCP Retransmission] 80 → 47385 [ACK]
88394	219.164279	10.129.5.192	10.129.28.29	TCP	1514	[TCP Retransmission] 80 → 47385 [ACK]
89322	220.296237	10.129.5.192	10.129.28.29	TCP	1514	[TCP Retransmission] 80 → 47385 [ACK]
89498	220.452763	10.129.5.192	10.129.28.29	TCP	1514	[TCP Retransmission] 80 → 47385 [ACK]
89499	220.452770	10.129.5.192	10.129.28.29	TCP	1514	[TCP Retransmission] 80 → 47385 [ACK]
89500	220.452775	10.129.5.192	10.129.28.29	TCP	1514	[TCP Retransmission] 80 → 47385 [ACK]
90208	221.480302	10.129.5.192	10.129.28.29	TCP	1514	[TCP Retransmission] 80 → 47385 [ACK]
91229	223.948294	10.129.5.192	10.129.28.29	TCP	1514	[TCP Retransmission] 80 → 47385 [ACK]

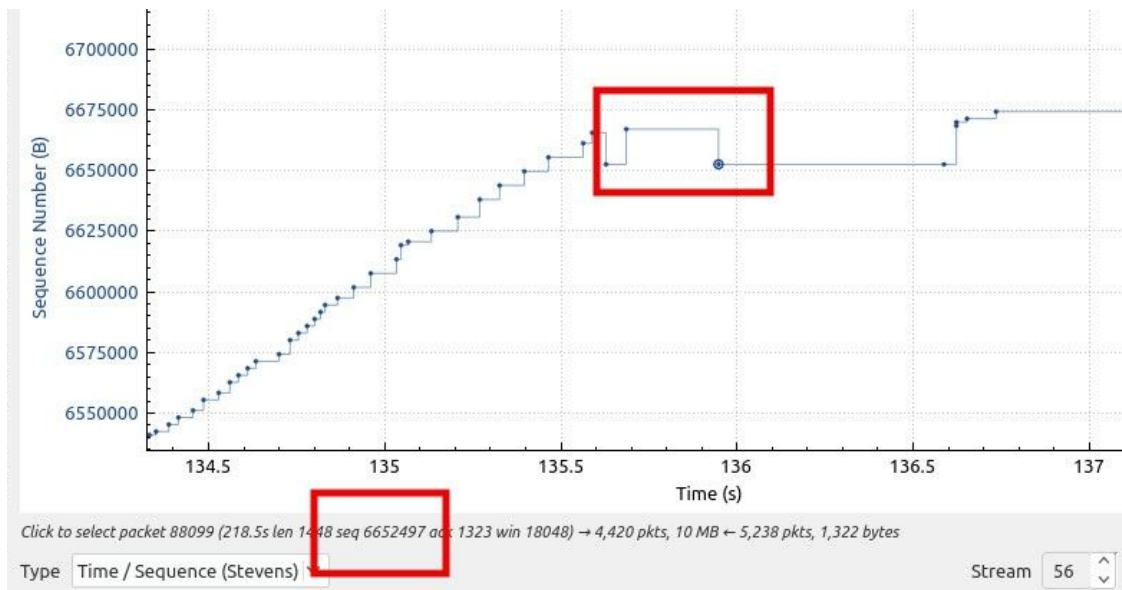
  

[Calculated window size: 18048]  
[Window size scaling factor: 64]  
Checksum: 0x3cad [unverified]  
[Checksum Status: Unverified]  
Urgent pointer: 0  
Options: (12 bytes), No-Operation (NOP), No-Operation (NOP), Timestamps  
[SEQ/ACK analysis]  
[RTT: 0.002597000 seconds]  
[Bytes in flight: 15928]  
[Bytes sent since last RST flag: 5593624]  
[TCP Analysis Flags]

We can calculate the approx congestion window size before the time-out happens from the bytes in flight. So, the congestion window size is **15928 bytes** just before the timeout happens.

After the timeout happens the congestion window size will become **1 M.S.S.**

We can see from the graph below that there was a dip in the sequence number just after one packet was transferred, this means that timeout must have happened, and we know this is a retransmission packet.



Considering the packet two packets before this, we observe the same sequence number, this makes sure that the packet 88099 was a retransmission packet.



If we observe the window scaling graph for 88099th packet we see this (zoomed in view):



We observe that the Bytes out value is approximately 1450 bytes and we know that congestion window size can be inferred from the bytes out, so the congestion window size will be near this value, which will be almost 1 MSS.



g)

Used sample1.pcap for this part

tcp.analysis.fast_retransmission							
No.	Time	Source	Destination	Protocol	Length	Info	
6041	83.432371	10.129.5.192	10.129.28.106	HTTP	1514	[TCP Fast Retransmission]	Continuation[Packet size limited during
6174	83.533092	10.129.5.192	10.129.28.106	HTTP	1514	[TCP Fast Retransmission]	Continuation
6220	83.555855	10.129.5.192	10.129.28.106	HTTP	1514	[TCP Fast Retransmission]	Continuation[Packet size limited during
6294	83.607392	10.129.5.192	10.129.28.106	HTTP	1514	[TCP Fast Retransmission]	Continuation[Packet size limited during
6332	83.631442	10.129.5.192	10.129.28.106	HTTP	1514	[TCP Fast Retransmission]	Continuation
6402	83.670715	10.129.5.192	10.129.28.106	HTTP	1514	[TCP Fast Retransmission]	Continuation
6437	83.686654	10.129.5.192	10.129.28.106	HTTP	1514	[TCP Fast Retransmission]	Continuation
6475	83.705877	10.129.5.192	10.129.28.106	HTTP	1514	[TCP Fast Retransmission]	Continuation
6572	83.769021	10.129.5.192	10.129.28.106	HTTP	1514	[TCP Fast Retransmission]	Continuation
6618	83.788381	10.129.5.192	10.129.28.106	HTTP	1514	[TCP Fast Retransmission]	Continuation
6643	83.798986	10.129.5.192	10.129.28.106	HTTP	1514	[TCP Fast Retransmission]	Continuation
6687	83.823741	10.129.5.192	10.129.28.106	HTTP	1514	[TCP Fast Retransmission]	Continuation[Packet size limited during
6737	83.857918	10.129.5.192	10.129.28.106	HTTP	1514	[TCP Fast Retransmission]	Continuation
6835	83.918946	10.129.5.192	10.129.28.106	HTTP	1514	[TCP Fast Retransmission]	Continuation[Packet size limited during
6864	83.933367	10.129.5.192	10.129.28.106	HTTP	1514	[TCP Fast Retransmission]	Continuation
6897	83.952690	10.129.5.192	10.129.28.106	HTTP	1514	[TCP Fast Retransmission]	Continuation
6944	83.975170	10.129.5.192	10.129.28.106	HTTP	1514	[TCP Fast Retransmission]	Continuation
6986	83.996000	10.129.5.192	10.129.28.106	HTTP	1514	[TCP Fast Retransmission]	Continuation
7074	84.052652	10.129.5.192	10.129.28.106	HTTP	1514	[TCP Fast Retransmission]	Continuation
7096	84.066471	10.129.5.192	10.129.28.106	HTTP	1514	[TCP Fast Retransmission]	Continuation
7237	84.483770	10.129.5.192	10.129.28.106	HTTP	1514	[TCP Fast Retransmission]	Continuation
7251	84.539517	10.129.5.192	10.129.28.106	HTTP	1514	[TCP Fast Retransmission]	Continuation
7386	84.879832	10.129.5.192	10.129.26.74	HTTP	1514	[TCP Fast Retransmission]	Continuation
7467	84.952435	10.129.5.192	10.129.26.74	HTTP	1514	[TCP Fast Retransmission]	Continuation
7498	84.982860	10.129.5.192	10.129.26.74	HTTP	1514	[TCP Fast Retransmission]	Continuation
7596	85.174960	10.129.5.192	10.129.26.74	HTTP	1514	[TCP Fast Retransmission]	Continuation
7653	85.266754	10.129.5.192	10.129.26.74	HTTP	1514	[TCP Fast Retransmission]	Continuation
7661	85.281033	10.129.5.192	10.129.26.74	HTTP	1514	[TCP Fast Retransmission]	Continuation
7688	85.324513	10.129.5.192	10.129.26.74	HTTP	1514	[TCP Fast Retransmission]	Continuation[Packet size limited during
7784	85.508639	10.129.5.192	10.129.26.74	HTTP	1514	[TCP Fast Retransmission]	Continuation

Frame 6041: 1514 bytes on wire (12112 bits), 196 bytes captured (1568 bits)

0000 00 1f 3b d8 e1 ed e4 11 5b 5d 17 86 08 00 45 00 ...; .... []...E.

This frame is a (suspected) fast retransmission: Label

Packets: 11570 · Displayed: 1268 (1.1%)

Number of fast retransmissions are **1268** (for all the TCP connections)



2) Netstat was executed after the execution for tshark was over

- a) Netstat displayed 29 connections which does not match with the TCP connections in my captured pcap file. This is because some of the TCP connections might have been closed during those 30 seconds.

```
navneet@navneet-Inspiron:~$ netstat -t
Active Internet connections (w/o servers)
Proto Recv-Q Send-Q Local Address           Foreign Address         State
tcp        0      0 navneet-Inspiron:58796 45.55.41.223:http      CLOSE_WAIT
tcp        0      0 navneet-Inspiron:34208 ec2-13-233-43-20.:https ESTABLISHED
tcp        0      0 navneet-Inspiron:49202 ec2-52-200-53-54.:https ESTABLISHED
tcp        0      0 navneet-Inspiron:45456 del11s04-in-f2.1e:https ESTABLISHED
tcp        0      0 navneet-Inspiron:59010 kix05s07-in-f3.1e:https ESTABLISHED
tcp        0      0 navneet-Inspiron:37024 ec2-18-232-238-10:https ESTABLISHED
tcp        0      0 navneet-Inspiron:56778 lb-140-82-114-25:https ESTABLISHED
tcp        0      0 navneet-Inspiron:41154 nrt12s12-in-f206.:https ESTABLISHED
tcp        0      0 navneet-Inspiron:56026 whatsapp-cdn-shv:https ESTABLISHED
tcp        0      0 navneet-Inspiron:37734 ec2-13-234-168-60:https ESTABLISHED
tcp        0      0 navneet-Inspiron:46666 ec2-52-26-249-11:https ESTABLISHED
tcp        0      0 navneet-Inspiron:36920 ec2-54-174-34-153:https ESTABLISHED
tcp        0      0 navneet-Inspiron:45918 aeab55d76dd13c9bb:https TIME_WAIT
tcp        0      0 navneet-Inspiron:56276 ec2-13-234-210-38:https ESTABLISHED
tcp        0      0 navneet-Inspiron:58040 server-54-192-171:https ESTABLISHED
tcp        0      0 navneet-Inspiron:58152 whatsapp-cdn-shv:https ESTABLISHED
tcp6       0      0 navneet-Inspiron:50240 del03s14-in-x03.1:https ESTABLISHED
tcp6       0      0 navneet-Inspiron:49642 del03s07-in-x01.1:https ESTABLISHED
tcp6       0      0 navneet-Inspiron:46630 2405:200:161b:743:https ESTABLISHED
tcp6       0      0 navneet-Inspiron:56202 del03s14-in-x06.1:https ESTABLISHED
tcp6       0      0 navneet-Inspiron:46628 2405:200:161b:743:https ESTABLISHED
tcp6       0      0 navneet-Inspiron:59020 del03s09-in-x0e.1e:http TIME_WAIT
tcp6       0      0 navneet-Inspiron:55286 del11s05-in-x02.1:https ESTABLISHED
tcp6       0      0 navneet-Inspiron:47304 del03s16-in-x16.1:https ESTABLISHED
tcp6       0      0 navneet-Inspiron:59022 del03s09-in-x0e.1e:http ESTABLISHED
tcp6       0      0 navneet-Inspiron:50066 del03s09-in-x0e.1:https ESTABLISHED
tcp6       0      0 navneet-Inspiron:34728 del03s09-in-x01.1:https ESTABLISHED
tcp6       0      0 navneet-Inspiron:59686 del03s13-in-x04.1:https ESTABLISHED
tcp6       0      0 navneet-Inspiron:43216 sc-in-xbd.1e100.n:https ESTABLISHED
```

b)

2 of these connections are in Timed-Wait state while 26 of them are in Established state. There is no fin-wait-1 tcp connection.

```
navneet@navneet-Inspiron:~$ netstat -t
Active Internet connections (w/o servers)
Proto Recv-Q Send-Q Local Address           Foreign Address         State
tcp        0      0 navneet-Inspiron:58796 45.55.41.223:http      CLOSE_WAIT
tcp        0      0 navneet-Inspiron:34208 ec2-13-233-43-20.:https ESTABLISHED
tcp        0      0 navneet-Inspiron:49202 ec2-52-200-53-54.:https ESTABLISHED
tcp        0      0 navneet-Inspiron:45456 del11s04-in-f2.1e:https ESTABLISHED
tcp        0      0 navneet-Inspiron:59010 kix05s07-in-f3.1e:https ESTABLISHED
tcp        0      0 navneet-Inspiron:37024 ec2-18-232-238-10:https ESTABLISHED
tcp        0      0 navneet-Inspiron:56778 lb-140-82-114-25:https ESTABLISHED
tcp        0      0 navneet-Inspiron:41154 nrt12s12-in-f206.:https ESTABLISHED
tcp        0      0 navneet-Inspiron:56026 whatsapp-cdn-shv:https ESTABLISHED
tcp        0      0 navneet-Inspiron:37734 ec2-13-234-168-60:https ESTABLISHED
tcp        0      0 navneet-Inspiron:46666 ec2-52-26-249-11:https ESTABLISHED
tcp        0      0 navneet-Inspiron:36920 ec2-54-174-34-153:https ESTABLISHED
tcp        0      0 navneet-Inspiron:45918 aeab55d76dd13c9bb:https TIME_WAIT
tcp        0      0 navneet-Inspiron:56276 ec2-13-234-210-38:https ESTABLISHED
tcp        0      0 navneet-Inspiron:58040 server-54-192-171:https ESTABLISHED
tcp        0      0 navneet-Inspiron:58152 whatsapp-cdn-shv:https ESTABLISHED
tcp6       0      0 navneet-Inspiron:50240 del03s14-in-x03.1:https ESTABLISHED
tcp6       0      0 navneet-Inspiron:49642 del03s07-in-x01.1:https ESTABLISHED
tcp6       0      0 navneet-Inspiron:46630 2405:200:161b:743:https ESTABLISHED
tcp6       0      0 navneet-Inspiron:56202 del03s14-in-x06.1:https ESTABLISHED
tcp6       0      0 navneet-Inspiron:46628 2405:200:161b:743:https ESTABLISHED
tcp6       0      0 navneet-Inspiron:59020 del03s09-in-x0e.1e:http TIME_WAIT
tcp6       0      0 navneet-Inspiron:55286 del11s05-in-x02.1:https ESTABLISHED
tcp6       0      0 navneet-Inspiron:47304 del03s16-in-x16.1:https ESTABLISHED
tcp6       0      0 navneet-Inspiron:59022 del03s09-in-x0e.1e:http ESTABLISHED
tcp6       0      0 navneet-Inspiron:50066 del03s09-in-x0e.1:https ESTABLISHED
tcp6       0      0 navneet-Inspiron:34728 del03s09-in-x01.1:https ESTABLISHED
tcp6       0      0 navneet-Inspiron:59686 del03s13-in-x04.1:https ESTABLISHED
tcp6       0      0 navneet-Inspiron:43216 sc-in-xbd.1e100.n:https ESTABLISHED
```

c)

```
navneet@navneet-Inspiron:~$ sudo ifconfig wlx00177c9b1d95 down
```

```
navneet@navneet-Inspiron:~$ netstat -t
Active Internet connections (w/o servers)
Proto Recv-Q Send-Q Local Address           Foreign Address         State
tcp        0      0 navneet-Inspiron:58796 45.55.41.223:http      CLOSE_WAIT
tcp        0    124 navneet-Inspiron:49202 ec2-52-200-53-54.:https FIN_WAIT1
tcp        0    103 navneet-Inspiron:45456 dell1s04-in-f2.1e:https FIN_WAIT1
tcp        0    103 navneet-Inspiron:59010 kix05s07-in-f3.1e:https FIN_WAIT1
tcp        0    124 navneet-Inspiron:37024 ec2-18-232-238-10:https FIN_WAIT1
tcp        0      0 navneet-Inspiron:56318 whatsapp-cdn-shv.:https ESTABLISHED
tcp        0      0 navneet-Inspiron:56778 lb-140-82-114-25.:https ESTABLISHED
tcp        0    103 navneet-Inspiron:41154 dell1s07-in-f14.1:https FIN_WAIT1
tcp        0      0 navneet-Inspiron:56026 whatsapp-cdn-shv.:https ESTABLISHED
tcp        0      0 navneet-Inspiron:46666 ec2-52-26-249-11.:https ESTABLISHED
tcp        0      0 navneet-Inspiron:39152 82.221.107.34.bc.g:http ESTABLISHED
tcp        0    103 navneet-Inspiron:58040 server-54-192-171:https FIN_WAIT1
tcp        0    103 navneet-Inspiron:58152 whatsapp-cdn-shv.:https FIN_WAIT1
tcp6       0    103 2405:201:6802:604:50240 del03s14-in-x03.1:https FIN_WAIT1
tcp6       0    103 2405:201:6802:604:49642 del03s07-in-x01.1:https FIN_WAIT1
tcp6       0      0 navneet-Inspiron:39116 2600:1901:0:38d7:::http ESTABLISHED
tcp6       0    103 2405:201:6802:604:56202 del03s14-in-x06.1:https FIN_WAIT1
tcp6       0      0 navneet-Inspiron:39112 2600:1901:0:38d7:::http ESTABLISHED
tcp6       0    103 2405:201:6802:604:55286 dell1s05-in-x02.1:https FIN_WAIT1
tcp6       0    103 2405:201:6802:604:47304 del03s16-in-x16.1:https FIN_WAIT1
tcp6       0    103 2405:201:6802:604:50066 del03s09-in-x0e.1:https FIN_WAIT1
tcp6       0    103 2405:201:6802:604:34728 del03s09-in-x01.1:https FIN_WAIT1
tcp6       0    103 2405:201:6802:604:59686 del03s13-in-x04.1:https FIN_WAIT1
tcp6       0    103 2405:201:6802:604:43216 sc-in-xbd.1e100.n:https FIN_WAIT1
```

The number of TCP connections became 24, this is because some of the connections might have closed.

The Number of FIN\_WAIT1 connections increased to 16, this is because the interface is down and we are no longer connected to the network. Putting the interface to downstate triggered this.

Some of them are still in Established state which will eventually get converted to Fin\_wait1 state.

Finally, every connection will be closed , since the interface is not active now.