

Project2 Report

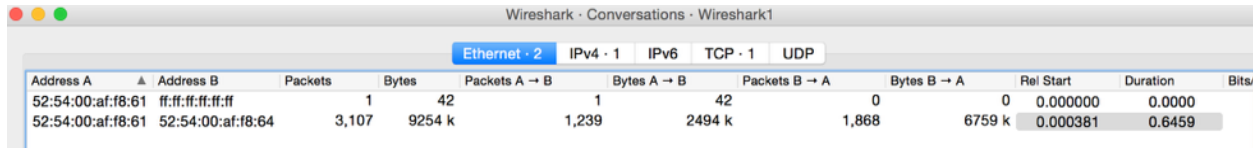
University of Victoria

Q1:

Total number of transmitted packets at hostA is 1239.

Total number of transmitted packets at hostB is 1867.

The total number of transmitted/received packets at both sides are 3108.



Address A	Address B	Packets	Bytes	Packets A → B	Bytes A → B	Packets B → A	Bytes B → A	Rel Start	Duration	Bits/s
52:54:00:af:f8:61	ff:ff:ff:ff:ff:ff	1	42	1	42	0	0	0.000000	0.0000	
52:54:00:af:f8:61	52:54:00:af:f8:64	3,107	9254 k	1,239	2494 k	1,868	6759 k	0.000381	0.6459	

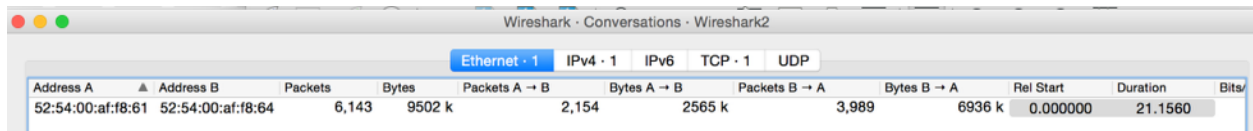
Q2:

\$tc qdisc add dev ens6 root netem drop 20%

Total number of transmitted packets at hostA is 2125.

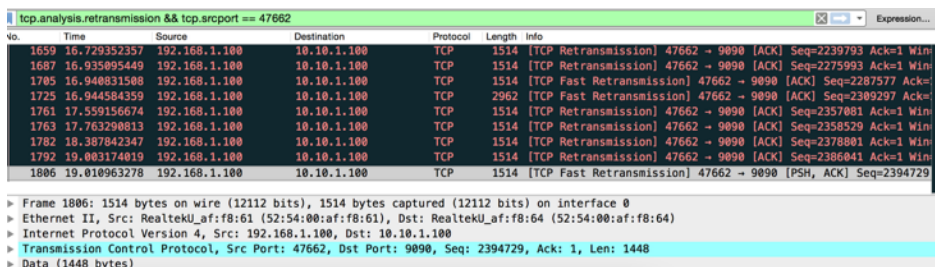
Total number of transmitted packets at hostB is 3987.

The total number of transmitted/received packets at both sides are 6143.



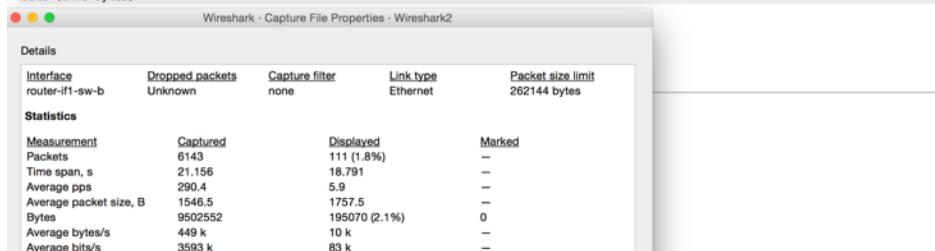
Address A	Address B	Packets	Bytes	Packets A → B	Bytes A → B	Packets B → A	Bytes B → A	Rel Start	Duration	Bits/s
52:54:00:af:f8:61	52:54:00:af:f8:64	6,143	9502 k	2,154	2565 k	3,989	6936 k	0.000000	21.1560	

Total number of retransmitted packets at hostA is 105.



No.	Time	Source	Destination	Protocol	Length	Info
1659	16.729352357	192.168.1.100	10.10.1.100	TCP	1514	[TCP Retransmission] 47662 → 9090 [ACK] Seq=2239793 Ack=1 Win=
1687	16.935095449	192.168.1.100	10.10.1.100	TCP	1514	[TCP Retransmission] 47662 → 9090 [ACK] Seq=2275993 Ack=1 Win=
1705	16.948831588	192.168.1.100	10.10.1.100	TCP	1514	[TCP Fast Retransmission] 47662 → 9090 [ACK] Seq=2287577 Ack=
1725	16.944584359	192.168.1.100	10.10.1.100	TCP	2962	[TCP Fast Retransmission] 47662 → 9090 [ACK] Seq=2309297 Ack=
1761	17.559156674	192.168.1.100	10.10.1.100	TCP	1514	[TCP Retransmission] 47662 → 9090 [ACK] Seq=2357081 Ack=1 Win=
1763	17.763290813	192.168.1.100	10.10.1.100	TCP	1514	[TCP Retransmission] 47662 → 9090 [ACK] Seq=2358529 Ack=1 Win=
1782	18.387842347	192.168.1.100	10.10.1.100	TCP	1514	[TCP Retransmission] 47662 → 9090 [ACK] Seq=2378801 Ack=1 Win=
1792	19.003174019	192.168.1.100	10.10.1.100	TCP	1514	[TCP Retransmission] 47662 → 9090 [ACK] Seq=2386041 Ack=1 Win=
1806	19.018963278	192.168.1.100	10.10.1.100	TCP	1514	[TCP Fast Retransmission] 47662 → 9090 [PSH, ACK] Seq=2394729

Frame 1806: 1514 bytes on wire (12112 bits), 1514 bytes captured (12112 bits) on interface 0
Ethernet II, Src: RealtekU_af:f8:61 (52:54:00:af:f8:61), Dst: RealtekU_af:f8:64 (52:54:00:af:f8:64)
Internet Protocol Version 4, Src: 192.168.1.100, Dst: 10.10.1.100
Transmission Control Protocol, Src Port: 47662, Dst Port: 9090, Seq: 2394729, Ack: 1, Len: 1448
Data (1448 bytes)



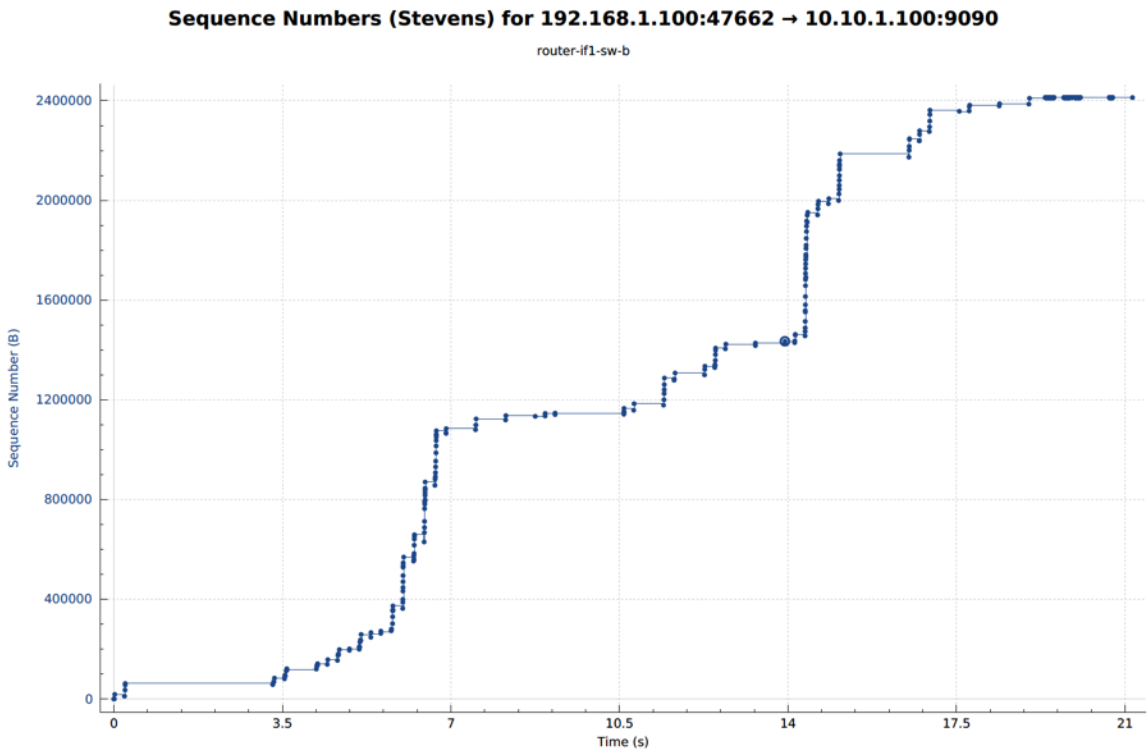
Interface	Dropped packets	Capture filter	Link type	Packet size limit
rtf-sw-b	Unknown	none	Ethernet	262144 bytes

Measurement	Captured	Displayed	Marked
Packets	6143	111 (1.8%)	—
Time span, s	21.156	18.791	—
Average pps	290.4	5.9	—
Average packet size, B	1546.5	1757.5	—
Bytes	9502552	195070 (2.1%)	0
Average bytes/s	449 k	10 k	—
Average bits/s	3593 k	83 k	—

Total number of retransmitted packets at hostB is 11.

2420	0.474369280	192.168.1.100	10.10.1.100	TCP	66	47660 → 9090 [ACK] Seq=2412074 Ack=2012201 Win=11584 Len=0 TS=2412074
2423	0.474666624	192.168.1.100	10.10.1.100	TCP	66	[TCP ZeroWindow] 47660 → 9090 [ACK] Seq=2412074 Ack=2023785 Win=0 Len=0 TS=2412074
2424	0.475219308	192.168.1.100	10.10.1.100	TCP	66	[TCP Window Update] 47660 → 9090 [ACK] Seq=2412074 Ack=2023785 Win=0 Len=0 TS=2412074
2428	0.475543123	192.168.1.100	10.10.1.100	TCP	66	47660 → 9090 [ACK] Seq=2412074 Ack=2045505 Win=18240 Len=0 TS=2412074
2431	0.475792715	192.168.1.100	10.10.1.100	TCP	66	[TCP ZeroWindow] 47660 → 9090 [ACK] Seq=2412074 Ack=2063745 Win=0 Len=0 TS=2412074
2432	0.476279935	192.168.1.100	10.10.1.100	TCP	66	[TCP Window Update] 47660 → 9090 [ACK] Seq=2412074 Ack=2063745 Win=0 Len=0 TS=2412074
2436	0.476596090	192.168.1.100	10.10.1.100	TCP	66	47660 → 9090 [ACK] Seq=2412074 Ack=2085465 Win=22016 Len=0 TS=2412074
2440	0.476945218	192.168.1.100	10.10.1.100	TCP	66	47660 → 9090 [ACK] Seq=2412074 Ack=2107185 Win=320 Len=0 TSva=2412074
2441	0.477335441	192.168.1.100	10.10.1.100	TCP	66	[TCP Window Update] 47660 → 9090 [ACK] Seq=2412074 Ack=2107185 Win=0 Len=0 TS=2412074
2445	0.477692137	192.168.1.100	10.10.1.100	TCP	66	47660 → 9090 [ACK] Seq=2412074 Ack=2128905 Win=18304 Len=0 TS=2412074
2448	0.478012746	192.168.1.100	10.10.1.100	TCP	66	[TCP ZeroWindow] 47660 → 9090 [ACK] Seq=2412074 Ack=2147209 Win=0 Len=0 TS=2412074
2449	0.478488465	192.168.1.100	10.10.1.100	TCP	66	[TCP Window Update] 47660 → 9090 [ACK] Seq=2412074 Ack=2147209 Win=0 Len=0 TS=2412074
2453	0.478845861	192.168.1.100	10.10.1.100	TCP	66	47660 → 9090 [ACK] Seq=2412074 Ack=2168929 Win=20160 Len=0 TS=2412074
2456	0.479089504	192.168.1.100	10.10.1.100	TCP	66	[TCP ZeroWindow] 47660 → 9090 [ACK] Seq=2412074 Ack=2189089 Win=0 Len=0 TS=2412074
2457	0.479630753	192.168.1.100	10.10.1.100	TCP	66	[TCP Window Update] 47660 → 9090 [ACK] Seq=2412074 Ack=2189089 Win=0 Len=0 TS=2412074

When there is no drop request, the TCP Stream Graph - Time Sequence Graph looks like this:



The TCP Stream starts at 0 and end almost around 21, which is almost the same as the time accounted by the program. It lasts for longer time because of retransmission of dropped packets. Also could see the retransmission packets, like from 0.2s to 3s, it is retransmitting, which could also be seen from the captured retransmitted packets. Flow control and congestion control are same as previous one, so no explanation here.

tcp.analysis.retransmission && tcp.srcport == 47662						
	Time	Source	Destination	Protocol	Length	Info
34	0.220138200	192.168.1.100	10.10.1.100	TCP	1514	[TCP Retransmission] 47662 → 9090 [ACK] Seq=11185 A
70	3.300130705	192.168.1.100	10.10.1.100	TCP	1514	[TCP Retransmission] 47662 → 9090 [ACK] Seq=57521 A
74	3.316146459	192.168.1.100	10.10.1.100	TCP	1514	[TCP Retransmission] 47662 → 9090 [ACK] Seq=63313 A
76	3.318984076	192.168.1.100	10.10.1.100	TCP	1514	[TCP Retransmission] 47662 → 9090 [ACK] Seq=64761 A
8	0.010252493	192.168.1.100	10.10.1.100	TCP	1514	[TCP Previous segment not captured] 47662 → 9090 [ACK
9	0.010393284	192.168.1.100	10.10.1.100	TCP	1514	47662 → 9090 [ACK] Seq=2497 Ack=1 Win=29248 Len=1448
10	0.010446666	10.10.1.100	192.168.1.100	TCP	78	[TCP Window Update] 9090 → 47662 [ACK] Seq=1 Ack=25 W
11	0.010690473	10.10.1.100	192.168.1.100	TCP	78	[TCP Window Update] 9090 → 47662 [ACK] Seq=1 Ack=25 W
12	0.010909311	192.168.1.100	10.10.1.100	TCP	1514	47662 → 9090 [ACK] Seq=3945 Ack=1 Win=29248 Len=1448
13	0.010976470	10.10.1.100	192.168.1.100	TCP	78	[TCP Window Update] 9090 → 47662 [ACK] Seq=1 Ack=25 W
14	0.011320563	192.168.1.100	10.10.1.100	TCP	1514	[TCP Previous segment not captured] 47662 → 9090 [ACK
15	0.011519988	10.10.1.100	192.168.1.100	TCP	86	[TCP Window Update] 9090 → 47662 [ACK] Seq=1 Ack=25 W
16	0.012215603	192.168.1.100	10.10.1.100	TCP	1514	[TCP Previous segment not captured] 47662 → 9090 [ACK
17	0.012373912	10.10.1.100	192.168.1.100	TCP	94	[TCP Window Update] 9090 → 47662 [ACK] Seq=1 Ack=25 W
18	0.012719375	192.168.1.100	10.10.1.100	TCP	1514	[TCP Out-Of-Order] 47662 → 9090 [ACK] Seq=5393 Ack=1
19	0.012822413	192.168.1.100	10.10.1.100	TCP	86	[TCP Window Update] 9090 → 47662 [ACK] Seq=1 Ack=25 W